



September 2015

WILDLAND FIRE MANAGEMENT

Agencies Have Made
Several Key Changes
but Could Benefit from
More Information
about Effectiveness

GAO Highlights

Highlights of [GAO-15-772](#), a report to congressional requesters

Why GAO Did This Study

Wildland fire plays an important ecological role in maintaining healthy ecosystems. Over the past century, however, various land management practices, including fire suppression, have disrupted the normal frequency of fires and have contributed to larger and more severe wildland fires. Wildland fires cost billions to fight each year, result in loss of life, and cause damage to homes and infrastructure. In fiscal years 2009 through 2014, the five federal wildland fire agencies obligated a total of \$8.3 billion to suppress wildland fires.

GAO was asked to review multiple aspects of federal wildland fire management across the five federal wildland fire management agencies. This report examines (1) key changes the federal wildland fire agencies have made in their approach to wildland fire management since 2009, (2) how the agencies assess the effectiveness of their wildland fire management programs, and (3) how the agencies determine the distribution of their wildland fire management resources. GAO reviewed laws, policies, and guidance related to wildland fire management; reviewed agency performance measures; analyzed obligation data for fiscal years 2004 through 2014; and interviewed officials from the five agencies, as well as Interior's Office of Wildland Fire.

What GAO Recommends

GAO recommends that the agencies develop specific criteria for selecting wildland fires for review and conducting the reviews, and revise agency policies accordingly. The agencies generally agreed with GAO's findings and recommendations.

View [GAO-15-772](#). For more information, contact Anne-Marie Fennell at (202) 512-3841 or fennella@gao.gov.

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WILDLAND FIRE MANAGEMENT

Agencies Have Made Several Key Changes but Could Benefit from More Information about Effectiveness

What GAO Found

Since 2009, the five federal agencies responsible for wildland fire management—the Forest Service within the Department of 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—have made several key changes in their approach to wildland fire management. One key change was the issuance of agency guidance in 2009 that provided managers with more flexibility in responding to wildland fires. This change allowed managers to consider different options for response given land management objectives and the risk posed by the fire. The agencies also worked with nonfederal partners to develop a strategy aimed at coordinating wildland fire management activities around common goals. The extent to which the agencies' steps have resulted in on-the-ground changes varied across agencies and regions, however, and officials identified factors, such as proximity to populated areas, that may limit their implementation of some changes.

The agencies assess the effectiveness of their wildland fire management programs in several ways, including through performance measures and reviews of specific wildland fires. The agencies are developing new performance measures, in part to help better assess the results of their current emphasis on risk-based management, according to agency officials. However, the agencies have not consistently followed agency policy regarding fire reviews, which calls for reviews of all fires resulting in federal suppression expenditures of \$10 million or more, nor have they used specific criteria for the reviews they have conducted. GAO has previously found that it is important for agencies to collect performance information to inform key management decisions and to identify problems and take corrective actions. Forest Service and Interior officials said focusing only on suppression costs does not allow them to identify the most useful fires for review, and they told GAO they are working to improve their criteria for selecting fires to review and conducting these reviews. Forest Service officials did not indicate a time frame for their efforts, and while they provided a draft update of their policy manual, it did not contain specific criteria. Interior officials told GAO they expect to develop criteria by the end of 2015, but did not provide information about how they planned to develop such criteria or the factors they would consider. By developing specific criteria for selecting fires to review and conducting reviews, and making commensurate changes to agency policies, the agencies may enhance their ability to help ensure that their fire reviews provide useful information about the effectiveness of their wildland fire activities.

The Forest Service and Interior determine the distribution of fire management resources for three primary wildland fire activities of suppression, preparedness, and fuel reduction in part on the basis of historical funding amounts. For suppression, the Forest Service and Interior manage suppression funding as needed for responding to wildland fires, estimating required resources using the average of the previous 10 years of suppression obligations. For preparedness and fuel reduction, the Forest Service and Interior distribute resources based primarily on historical amounts. Both are working to distribute resources in ways that better reflect current conditions, including developing new systems that they stated they plan to begin using in fiscal year 2016.

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Abbreviations

BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
FLAME	Federal Land Assistance, Management, and Enhancement Act of 2009
FWS	Fish and Wildlife Service
HFPAS	Hazardous Fuels Prioritization and Allocation System
NFMAS	National Fire Management Analysis System
NPS	National Park Service
WFDSS	Wildland Fire Decision Support System
WUI	wildland-urban interface

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September 16, 2015

The Honorable Raúl Grijalva
Ranking Member
Committee on Natural Resources
House of Representatives

The Honorable Alan Lowenthal
Ranking Member
Subcommittee on Energy and Mineral Resources
Committee on Natural Resources
House of Representatives

The Honorable Peter DeFazio
House of Representatives

Wildland fire plays an important ecological role in maintaining healthy ecosystems, with many ecosystems being adapted to or dependent upon fire. However, over the past century, various land management practices, including fire suppression, have disrupted the normal frequency of fires in many forest and rangeland ecosystems across the United States, resulting in abnormally dense accumulations of vegetation. According to scientific reports, this altered landscape, combined with drought and other climate stressors, has contributed to larger and more severe wildland fires, and many scientists and researchers expect fires to become even larger and more severe in the future.¹ In addition, continued development occurring in and around wildlands, an area often called the wildland-urban interface (WUI), has placed more people, businesses, and other valuable infrastructure at risk from wildland fire. Wildland fires cost billions of dollars every year and have resulted in loss of life, both of residents as well as firefighters, and damage to homes and infrastructure. Wildland

¹See, for example, National Research Council, *Climate Change: Evidence, Impacts, and Choices. Answers to Common Questions about the Science of Climate Change* (Washington, D.C.: 2012) and U.S. Climate Change Science Program, *The Effects of Climate Change on Agriculture, Land Resources, Water Resources, and Biodiversity in the United States* (Washington, D.C.: May 2008). The National Resource Council report notes that the risk of wildland fire is expected to increase in many regions, such as the evergreen forests of the western United States, and may decrease in other areas, such as those dominated by shrubs and grasses.

fires have also destroyed or damaged important cultural resources and critical natural resources, such as watersheds that provide drinking water to communities.

Five federal agencies—the Forest Service within the Department of Agriculture and the Bureau of Indian Affairs (BIA), Bureau of Land Management (BLM), Fish and Wildlife Service (FWS), and National Park Service (NPS) within the Department of the Interior—are responsible for managing wildland fires on federal lands. State forestry agencies and other entities—including tribal, county, city, and rural fire departments—have primary responsibility for managing wildland fires on nonfederal lands and share responsibility for protecting homes and other private structures.

As noted in the *2014 Quadrennial Fire Review*, an interagency report prepared for the federal wildland fire agencies, balancing the need to suppress unwanted wildland fires to protect people and resources with the need to recognize fire's natural role on the landscape is a complex task.² In recent decades, increased wildland fire intensity has placed greater demands on federal wildland fire management programs and prompted new policies and efforts aimed at implementing more effective management strategies to manage wildland fire. These efforts take on greater importance in light of constrained budgets and the amount spent by federal agencies on wildland fire management; in fiscal years 2009 through 2014, for example, federal agencies reported obligating a total of \$8.3 billion to suppress wildland fires. According to several agency reports, given the current condition of the nation's landscapes and the future outlook for wildland fires, increasing demands on federal wildland fire management programs are likely to persist.³

²Booz Allen Hamilton, *2014 Quadrennial Fire Review* (Washington, D.C.: May 2015). The Quadrennial Fire Review, prepared on behalf of the Forest Service and Interior, is a strategic assessment process conducted by the fire management agencies every 4 years to evaluate current wildland fire management strategies and capabilities against estimates of the future fire environment. The first such review occurred in 2005 and the second in 2009.

³See, for example, Department of Agriculture and Department of the Interior, *The National Strategy: The Final Phase in the Development of the National Cohesive Wildland Fire Management Strategy* (Washington, D.C.: April 2014), and Booz Allen Hamilton, *2014 Quadrennial Fire Review* (Washington, D.C.: May 2015).

The five agencies' wildland fire management efforts have undergone multiple reviews, including by us and the Offices of Inspector General for Agriculture and Interior, to assess whether federal wildland fire activities and policies are appropriate and are being carried out in a cost-effective manner. We last conducted a comprehensive review of federal wildland fire management in 2009.⁴ The resulting report provided an overview of the agencies' efforts to address wildland fire issues, including the progress the agencies had made in managing wildland fire.

You asked us to review multiple aspects of federal wildland fire management across the five federal land management agencies responsible for wildland fire management. This report examines (1) key changes the federal wildland fire agencies have made in their approach to wildland fire management since 2009, (2) how the agencies assess the effectiveness of their wildland fire management programs, and (3) how the agencies determine the distribution of their wildland fire management resources.

To perform this work, we reviewed laws, policies, and guidance related to federal wildland fire management. We also interviewed headquarters officials from each of the five federal land management agencies responsible for wildland fire management (the Forest Service, BIA, BLM, FWS, and NPS), as well as Interior's Office of Wildland Fire.⁵ We also conducted interviews of officials from each of the 9 Forest Service regional offices and 11 of BLM's 12 state offices,⁶ as well as from selected BIA, FWS, and NPS regions.⁷ We focused these regional

⁴GAO, *Wildland Fire Management: Federal Agencies Have Taken Important Steps Forward, but Additional, Strategic Action Is Needed to Capitalize on Those Steps*, [GAO-09-877](#) (Washington, D.C.: Sept. 9, 2009). For a list of GAO reports on topics related to federal wildland fire management, see the related products section at the end of this report.

⁵The Department of the Interior's Office of Wildland Fire organizes the activities of the four Interior agencies that manage and operate wildland fire programs. Specifically, it manages, oversees, and coordinates the department's wildland fire management programs, policies, budgets, information technology systems, and decision support tools.

⁶We did not interview officials from the BLM Eastern States Office because its wildland fire management program is minimal.

⁷The Forest Service, BIA, FWS, and NPS have regional offices, while BLM has state offices. For the purposes of this report, we refer to all of these as regional offices when we discuss the agencies collectively.

interviews primarily on the Forest Service and BLM because those agencies receive the greatest percentage of federal wildland fire funding. For BIA, FWS, and NPS, we selected the two regions from each agency that received the most funds—BIA’s Northwest and Western Regions, FWS’s Southwest and Southeast Regions, and NPS’s Pacific West and Intermountain Regions. During these interviews, we asked about changes to the agencies’ approach to wildland fire management, agency efforts to assess the effectiveness of their wildland fire management activities, and agency processes for determining the distribution of fire management resources.

To address our first objective, we reviewed agency documents, including policies, guidance, and reports such as the *Quadrennial Fire Review*, to identify changes the agencies have made to their approach to managing wildland fire since 2009, efforts the agencies have undertaken to address wildland fire management challenges, and any agency-identified improvements resulting from those changes. To further our understanding of these issues, we interviewed agency headquarters and regional officials about these changes. In particular, we asked about the extent to which changes to the agencies’ wildland fire management approaches have occurred or are planned and how the regions implemented national direction and policy. We analyzed the responses provided to us during the interviews to identify prominent changes since 2009 and challenges associated with implementing them.

To address our second objective, we reviewed documents, such as agency strategic plans and budget justifications, and interviewed officials to identify key performance measures and other mechanisms the agencies use to determine the effectiveness of their wildland fire management programs, as well as any changes they are making in this area. We also reviewed legislative and agency direction related to fire reviews, including agency policies and the *Interagency Standards for Fire and Fire Aviation Operations*, and we reviewed reports resulting from fire reviews conducted by the agencies since 2009. We compared agency practices for conducting fire reviews to direction contained in relevant agency policy. To obtain additional insight into the use of performance information on the part of federal agencies, we also reviewed our previous reports related to agencies’ use of performance information.

To address our third objective, we reviewed relevant agency budget documentation, including annual budget justifications, as well as information about the tools and systems the agencies use to distribute funds and resources, to identify the agencies’ distribution processes. We

did not assess the design or the use of these tools or systems. We interviewed agency officials about their agencies' processes for budget formulation and resource distribution, including any differences among agencies or regional offices in how funds and resources are distributed, as well as the extent to which distribution decisions have changed in recent years at the headquarters and regional levels for each of the five agencies. We also obtained and analyzed Forest Service and Interior data on wildland fire management obligations for fiscal years 2004 through 2014, analyzing the data in both nominal (actual) and constant (adjusted for inflation) terms. We reviewed budget documents and obligation data provided by the agencies and interviewed agency officials knowledgeable about the data, and we found the data to be sufficiently reliable for the purposes of this report. Unless otherwise noted, dollar figures provided in this report represent obligations reported to us by the agencies and are presented in nominal dollars, unadjusted for inflation.⁸ Appendix I describes our objectives, scope, and methodology in more detail.

We conducted this performance audit from August 2014 to September 2015 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.

Background

Wildland fires are both natural and inevitable and play an important ecological role on the nation's landscapes. These fires have long shaped the composition of forests and grasslands, periodically reduced vegetation densities, and stimulated seedling regeneration and growth in some species. Wildland fires can be ignited by lightning or by humans either accidentally or intentionally. As we have described in previous reports, however, various land use and management practices over the past century—including fire suppression, grazing, and timber

⁸An obligation is a definite commitment that creates a legal liability of the government for the payment of goods and services ordered or received, or a legal duty on the part of the United States. Payment may be made immediately or in the future. An agency incurs an obligation, for example, when it places an order, signs a contract, awards a grant, or purchases a service.

harvesting—have reduced the normal frequency of fires in many forest and rangeland ecosystems.⁹ These practices contributed to abnormally dense, continuous accumulations of vegetation, which in turn can fuel uncharacteristically severe wildland fires in certain ecosystems.

According to scientific reports, several other factors have contributed to overall changes to ecosystems and the landscapes on which they depend, altering natural fire regimes and contributing to an increased frequency or intensity of wildland fire in some areas. For example, the introduction and spread of highly flammable invasive nonnative grasses, such as cheatgrass, along with the expanded range of certain flammable native species, such as western juniper, in the Great Basin region of the western United States—including portions of California, Idaho, Nevada, Oregon, and Utah— have increased the frequency and intensity of fire in the sagebrush steppe ecosystem.¹⁰ Changing climate conditions, including drier conditions in certain parts of the country, have increased the length and severity of wildfire seasons, according to many scientists and researchers.¹¹ For example, in the western United States, the average number of days in the fire season has increased from approximately 200 in 1980 to approximately 300 in 2013, according to the *2014 Quadrennial Fire Review*.¹² In Texas and Oklahoma this increase was even greater, with the average fire season increasing from fewer than 100 days to more than 300 during this time. According to the U.S. Global Change Research Program’s 2014 National Climate Assessment, projected climate changes suggest that western forests in the United

⁹See, for example, [GAO-09-877](#) and 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).

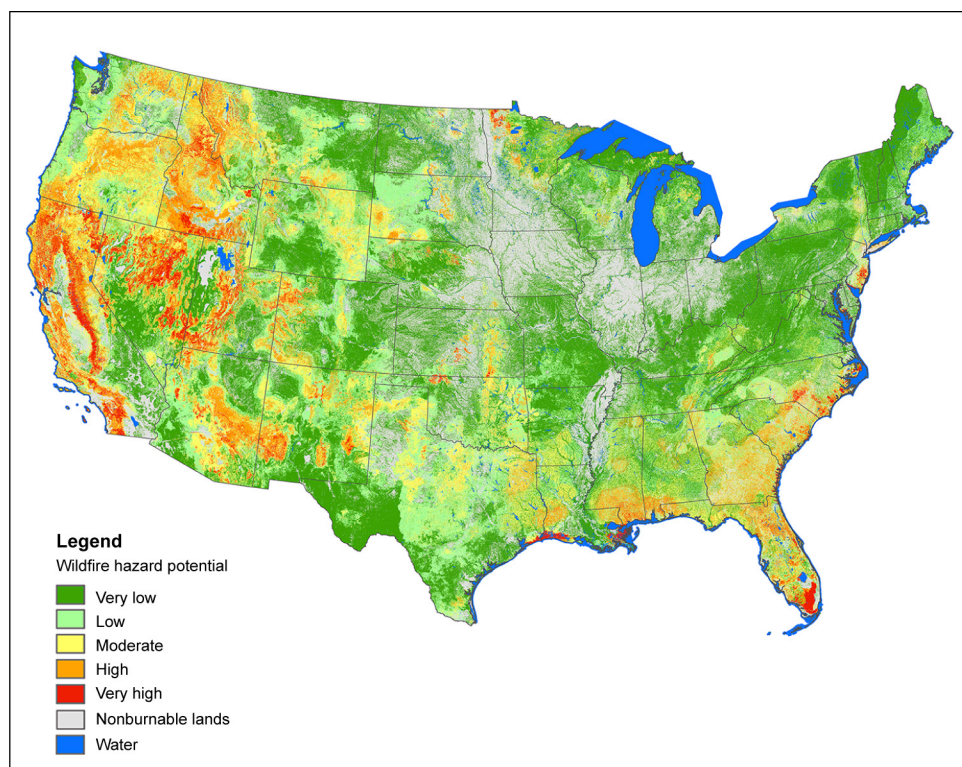
¹⁰The sagebrush steppe ecosystem is found in the western United States and western Canada. The sagebrush steppe name comes from the most dominant plant found in the ecosystem, the sagebrush, while steppe describes a largely treeless, dry, level grassland. According to BLM, the majority of BLM-managed lands are in the sagebrush steppe ecosystem.

¹¹See, for example, National Research Council, *Climate Change: Evidence, Impacts, and Choices. Answers to Common Questions about the Science of Climate Change* (Washington, D.C.: 2012) and U.S. Climate Change Science Program, *The Effects of Climate Change on Agriculture, Land Resources, Water Resources, and Biodiversity in the United States* (Washington, D.C.: May 2008).

¹²Booz Allen Hamilton, *2014 Quadrennial Fire Review* (Washington, D.C.: May 2015). The states included in this statistic were Alaska, Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming.

States will be increasingly affected by large and intense fires that occur more frequently.¹³ Figure 1 shows the wildfire hazard potential across the country as of 2014.

Figure 1: Wildfire Hazard Potential for the Contiguous 48 States, 2014



Source: Forest Service. | GAO-15-772

Note: According to the Forest Service, areas mapped with higher values of wildfire hazard potential represent fuels with a higher probability of extreme fire behavior under conducive weather conditions. The map does not represent a forecast or fire outlook for any particular season.

In addition, development in the wildland-urban interface (WUI) has continued to increase over the last several decades, increasing wildland fire's risk to life and property. According to the *2014 Quadrennial Fire Review*, 60 percent of new homes built in the United States since 1990 were built in the WUI, and the WUI includes 46 million single-family

¹³U.S. Global Change Research Program, *Climate Change Impacts in the United States: The Third National Climate Assessment* (Washington, D.C.: May 2014).

homes and an estimated population of more than 120 million. In addition to increased residential development, other types of infrastructure are located in the WUI, including power lines, campgrounds and other recreational facilities, communication towers, oil and gas wells, and roads. Some states, such as New Mexico and Wyoming, have experienced significant increases in oil and gas development over the past decade, adding to the infrastructure agencies may need to protect.

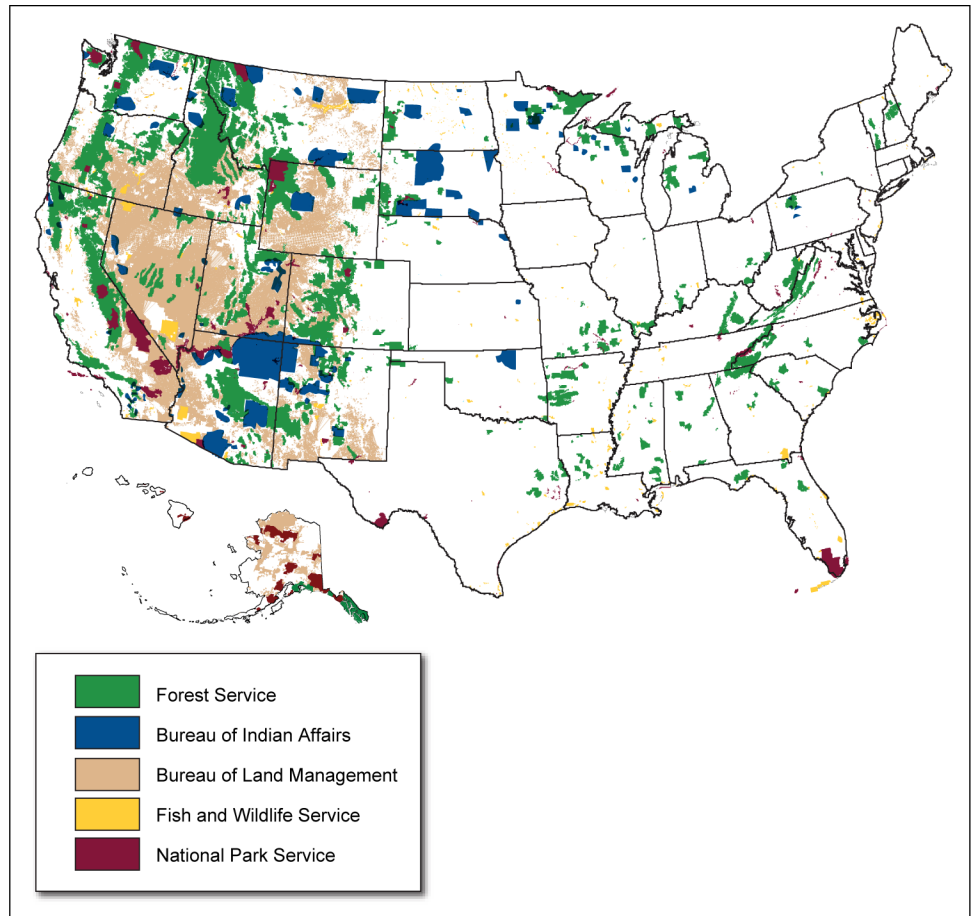
Primary Federal Land Management Agencies with Wildland Fire Management Responsibilities

Under the National Forest Management Act and the Federal Land Policy and Management Act of 1976, respectively, the Forest Service and BLM manage their lands for multiple uses such as protection of fish and wildlife habitat, forage for livestock, recreation, timber harvesting, and energy production.¹⁴ FWS and NPS manage federal lands under legislation that primarily calls for conservation; management for activities such as harvesting timber for commercial use is generally precluded.¹⁵ BIA is responsible for the administration and management of lands held in trust by the United States for Indian tribes, individuals, and Alaska Natives. These five agencies manage about 700 million surface acres of land in the United States, including national forests and grasslands, national wildlife refuges, national parks, and Indian reservations. The Forest Service and BLM manage the majority of these lands. The Forest Service manages about 190 million acres; BLM manages about 250 million acres; and BIA, FWS, and NPS manage 55, 89, and 80 million acres, respectively. Figure 2 shows the lands managed by each of these five agencies.

¹⁴These acts require the agencies to develop land management plans that provide for multiple uses. All land management actions must conform to the approved plan governing the land management unit—such as a national forest—where the action is to take place.

¹⁵The National Wildlife Refuge System Improvement Act of 1997 directs FWS to administer a national network of lands and waters for the conservation, management, and, where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans. The National Park Service Organic Act of 1916 created the National Park Service to promote and regulate the use of national parks, monuments, and reservations with the purpose of conserving the scenery, natural and historic objects, and wildlife therein and to leave them “unimpaired” for the enjoyment of future generations.

Figure 2: Lands Managed by the Five Federal Land Management Agencies Responsible for Wildland Fire Management



Sources: GAO analysis of U. S. Geological Survey's National Atlas website data; Map Resources (map). | GAO-15-772

Severe wildland fires and the vegetation that fuels them may cross the administrative boundaries of the individual federal land management agencies or the boundaries between federal and nonfederal lands. State forestry agencies and other entities—including tribal, county, city, and rural fire departments—share responsibility for protecting homes and other private structures and have primary responsibility for managing wildland fires on nonfederal lands. Most of the increased development in

the WUI occurs on nonfederal lands, and approximately 70,000 communities nationwide are considered to be at high risk from wildland fire.¹⁶ Some of these communities have attempted to reduce risk of wildland fire through programs aimed at improving fire risk awareness and promoting steps to reduce their risk, such as the Firewise Communities program.¹⁷

Key Components of Wildland Fire Management

Wildland fire management consists of three primary components: preparedness, suppression, and fuel reduction.¹⁸

- **Preparedness.** To prepare for a wildland fire season, the five land management agencies acquire firefighting assets—including firefighters, fire engines, aircraft, and other equipment—and station them either at individual federal land management units or at centralized dispatch locations in advance of expected wildland fire activity. The primary purpose of acquiring these assets is to respond to fires before they become large—a response referred to as initial attack. The agencies fund the assets used for initial attack primarily from their wildland fire preparedness accounts.
- **Suppression.** When a fire starts, interagency policy calls for the agencies to consider land management objectives—identified in land and fire management plans developed by each land management unit—and the structures and resources at risk when determining whether or how to suppress the fire. A wide spectrum of strategies is available to choose from, and the land manager at the affected local

¹⁶Booz Allen Hamilton, *2014 Quadrennial Fire Review* (Washington, D.C.: May 2015).

¹⁷The Firewise Communities program is a nonregulatory program administered by the National Fire Protection Association and sponsored by the Forest Service, Interior, and state forestry organizations. It is designed to involve homeowners, community leaders, planners, developers, and others in efforts to protect people, property, and natural resources from the risk of wildland fire. Activities under the program include assisting individuals and residential communities with techniques to help protect homes and improve emergency preparedness in the event of wildland fire. Communities that take certain steps can become recognized as Firewise Communities sites. For more information on the program, see GAO, *Payments to Counties: More Clarity Could Help Ensure County Expenditures Are Consistent with Key Parts of the Secure Rural Schools Act*, [GAO-12-775](#) (Washington, D.C.: July 16, 2012).

¹⁸Other fire program components include prevention; science, research, and development; site rehabilitation; and assistance to nonfederal entities.

unit is responsible for determining which strategy to use—from conducting all-out suppression efforts to monitoring fires within predetermined areas in order to provide natural resource benefits. When a fire is reported, the agencies are to follow a principle of closest available resource, meaning that, regardless of jurisdiction, the closest available firefighting equipment and personnel respond. In instances when fires escape initial attack and grow large, the agencies respond using an interagency system that mobilizes additional firefighting assets from federal, state, and local agencies, as well as private contractors, regardless of which agency or agencies have jurisdiction over the burning lands. The agencies use an incident management system under which specialized teams are mobilized to respond to wildland fires, with the size and composition of the team determined by the complexity of the fire. Federal agencies typically fund the costs of these activities from their wildland fire suppression accounts.

- **Fuel reduction.** Fuel reduction refers to agencies' efforts to reduce potentially hazardous vegetation that can fuel fires, such as brush and "ladder fuels" (i.e., small trees and other vegetation that can carry fire vertically to taller vegetation such as large trees), in an effort 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.¹⁹ The agencies use multiple approaches for reducing this vegetation, including setting fires under controlled conditions (prescribed burns), mechanical thinning, herbicides, certain grazing methods, or combinations of these and other approaches. The agencies typically fund these activities from their fuel reduction accounts.

Risk is an inherent element of wildland fire management. Federal agencies acknowledge this risk, and agency policies emphasize the importance of managing their programs accordingly. For example, Forest Service guidance states that "the wildland fire management environment is complex and possesses inherent hazards that can—even with reasonable mitigation—result in harm." According to a 2013 Forest Service report on decision making for wildfires, risk management is to be

¹⁹In 2015, Interior changed the name of its fuel reduction account to "fuel management" and now generally refers to this activity as fuel management rather than fuel reduction. However, for the purposes of this report, we refer to these activities and accounts collectively as fuel reduction.

applied at all levels of wildfire decision making, from the individual firefighter on the ground facing changing environmental conditions to national leaders of the fire management agencies weighing limited budgets against increasingly active fire seasons.²⁰ For example, the report explains that, during individual wildland fires, risk can be defined as “a function of values, hazards, and probability.”²¹

Funding for Federal Wildland Fire Management

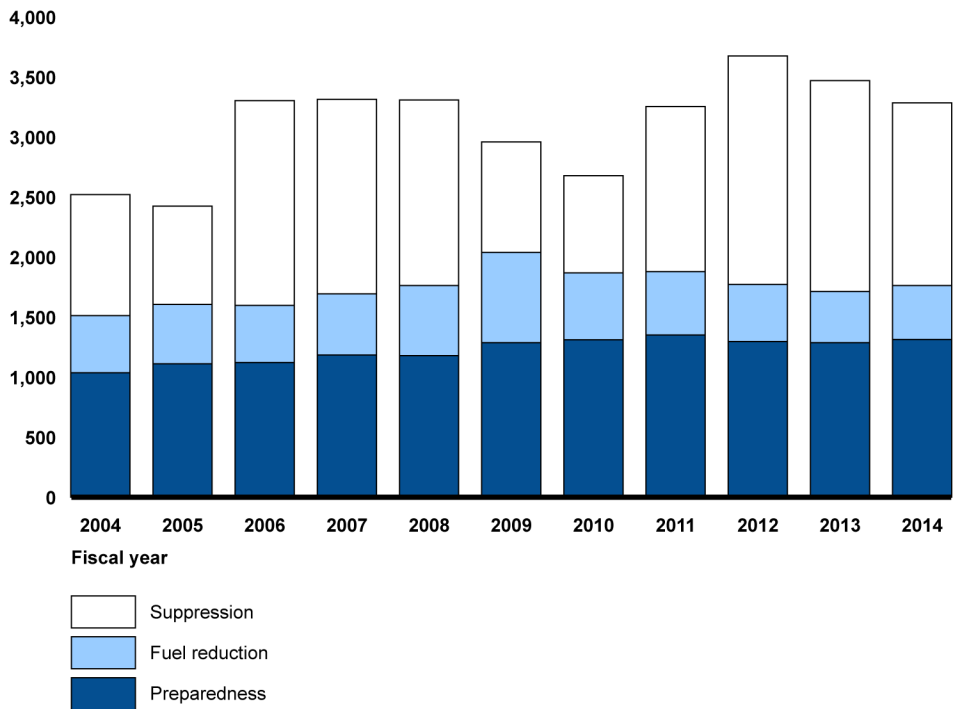
Congress, the Office of Management and Budget, federal agency officials, and others have raised questions about the growing cost of federal wildland fire management. According to a 2015 report by Forest Service researchers, for example, the amount the Forest Service spends on wildland fire management has increased from 17 percent of the agency’s total funds in 1995 to 51 percent of funds in 2014.²² The report noted that this has come at the cost of other land management programs within the agency, such as vegetation and watershed management, some of which support activities intended to reduce future wildfire damage. From fiscal years 2004 through 2014, the Forest Service and Interior agencies obligated \$14.9 billion for suppression, \$13.4 billion for preparedness, and \$5.7 billion for fuel reduction. Figure 3 shows the agencies’ total obligations for these three components of wildland fire management for fiscal years 2004 through 2014.

²⁰Department of Agriculture, Forest Service, Rocky Mountain Research Station, *Decision Making for Wildfires: A Guide for Applying a Risk Management Process at the Incident Level*, General Technical Report RMRS-GTR-298WWW (Ft. Collins, CO: June 2013).

²¹Values can include ecological, social, and economic values that could be lost or damaged due to fire, including people, property, infrastructure, natural and cultural resources, and air quality. Hazard is made up of the condition under which the fire burns, its ability to spread, and the intensity and severity it may present. For example, a fire that burns during extremely windy conditions may represent a greater hazard than a fire burning under less severe weather conditions. Probability is the likelihood of a fire becoming an active event and adversely affecting values, such as the likelihood that a fire will reach a particular point within a specified time period.

²²David E. Calkin, Matthew P. Thompson, and Mark A. Finney, “Negative Consequences of Positive Feedbacks in U.S. Wildfire Management,” *Forest Ecosystems*, vol. 2, no. 9 (2015).

Figure 3: Obligations for Suppression, Fuel Reduction, and Preparedness, Forest Service and Department of the Interior, Fiscal Years 2004 through 2014
Dollars in millions



Sources: GAO analysis of Forest Service and Interior data. | GAO-15-772

After receiving its annual appropriation, the Forest Service allocates preparedness and fuel reduction funds to its nine regional offices, and those offices in turn allocate funds to individual field units (national forests and grasslands). Interior’s Office of Wildland Fire, upon receiving its annual appropriation, allocates preparedness and fuel reduction funds to BIA, BLM, FWS, and NPS. These agencies then allocate funds to their regional or state offices, which in turn allocate funds to individual field units (e.g. national parks or national wildlife refuges). The Forest Service and Interior agencies do not allocate suppression funding to their regions. These funds are managed at the national level.

Federal Wildland Fire Policy History

Federal wildland fire management policy has evolved over the past century in response to changing landscape conditions and greater recognition of fire’s role in maintaining resilient and healthy ecosystems. According to wildland fire historians, in the late 1800s and early 1900s, the nation experienced a series of large and devastating fires that burned

millions of acres, including highly valued timber stands. In May 1908, federal legislation authorized the Forest Service to use any of its appropriations to fight fires.²³ During the following decades, the Forest Service and Interior agencies generally took the view that fires were damaging and should be suppressed quickly, with policies and practices evolving gradually. For example, in 1935, the Forest Service issued the “10 a.m. policy,” which stated that whenever possible, every fire should be contained by 10 a.m. on the day after it was reported. In more remote areas, suppression policies had minimal effect until fire towers, lookout systems, and roads in the 1930s facilitated fire detection and fire deployment.²⁴ The use of aircraft to drop fire retardants—that is, chemicals designed to slow fire growth—began in the 1950s, according to agency documents. Subsequent to the introduction of the 10 a.m. policy, some changes to agency policies lessened the emphasis on suppressing all fires, as some federal land managers took note of the unintended consequences of suppression and took steps to address those effects. In 1943, for example, the Chief of the Forest Service permitted national forests to use prescribed fire to reduce fuels on a case-by-case basis. In 1968, NPS revised its fire policy, shifting its approach from suppressing all fires to managing fire by using prescribed burning and allowing fires started by lightning to burn in an effort to accomplish approved management objectives.²⁵ In 1978, the Forest Service revised its policy to allow naturally ignited fires to burn in some cases, and formally abandoned the 10 a.m. policy.

Two particularly significant fire events—the Yellowstone Fires of 1988, in which approximately 1.3 million acres burned, and the South Canyon Fire of 1994, in which 14 firefighters lost their lives—led the agencies to fundamentally reassess their approach to wildland fire management and develop the Federal Wildland Fire Management Policy of 1995. Under the 1995 policy, the agencies continued to move away from their emphasis

²³Pub. L. No. 60-136, 35 Stat. 259 (1908). This legislation also established that 25 percent of the revenue received from each national forest—through activities such as timber sales—must be paid to the relevant state for use on roads and schools in the counties where the national forest is located. 35 Stat. 260.

²⁴Department of Agriculture, Forest Service, Pacific Northwest Research Station, *Ecological Foundations for Fire Management in North American Forest and Shrubland Ecosystems*, PNW-GTR-779 (March 2009).

²⁵Administrative Policies for Natural Areas of the National Park System.

on suppressing every wildland fire, seeking instead to (1) make communities and resources less susceptible to being damaged by wildland fire and (2) respond to fires so as to protect communities and important resources at risk while considering both the cost and long-term effects of that response. The policy was reaffirmed and updated in 2001, and guidance for its implementation was issued in 2003 and 2009.

In 2000, after one of the worst wildland fire seasons in 50 years, the President asked the Secretaries of Agriculture and the Interior to submit a report on managing the impact of wildland fires on communities and the environment. The report, along with congressional approval of increased appropriations for wildland fire management for fiscal year 2001, as well as other related activities, formed the basis of what is known as the National Fire Plan. The National Fire Plan emphasized the importance of reducing the buildup of hazardous vegetation that fuels severe fires, stating that unless hazardous fuels are reduced, the number of severe wildland fires and the costs associated with suppressing them would continue to increase. In 2003, Congress passed the Healthy Forests Restoration Act, with the stated purpose of, among other things, reducing wildland fire risk to communities, municipal water supplies, and other at-risk federal land through a collaborative process of planning, setting priorities for, and implementing fuel reduction projects.

Along with the development of policies governing their responses to fire, the agencies developed a basic operational framework within which they manage wildland fire incidents. For example, to respond to wildland fires affecting both federal and nonfederal jurisdictions, firefighting entities in the United States have, since the 1970s, used an interagency incident management system. This system provides an organizational structure that expands to meet a fire's complexity and demands, and allows entities to share firefighting personnel, aircraft, and equipment. Incident commanders who manage the response to each wildland fire may order firefighting assets through a three-tiered system of local, regional, and national dispatch centers. Federal, tribal, state, and local entities and private contractors supply the firefighting personnel, aircraft, equipment, and supplies which are dispatched through these centers. The agencies continue to use this framework as part of their approach to wildland fire management.

Agencies Have Made Several Key Changes in Their Approach to Wildland Fire Management Since 2009

Since 2009, the five federal agencies have made several changes in their approach to wildland fire management. The agencies have issued fire management guidance which, among other things, gave their managers greater flexibility in responding to wildland fires by providing for responses other than full suppression of fires. In collaboration with nonfederal partners such as tribal and state governments, they have also developed a strategy aimed at coordinating federal and nonfederal wildland fire management activities around common goals, such as managing landscapes for resilience to fire-related disturbances. In addition, Interior, and BLM in particular, have placed a greater emphasis on wildland fire management efforts in the sagebrush steppe ecosystem by issuing guidance and developing strategies aimed at improving the condition of this landscape. The agencies have also taken steps to change other aspects of wildland fire management, including changes related to improving fire management technology, line officer training, and firefighter safety. Agency officials told us the agencies are moving toward a more risk-based approach to wildland fire management. The extent to which the agencies' actions have resulted in on-the-ground changes varied across agencies and regions, however, and officials identified factors, such as proximity to populated areas, that may limit their implementation of some of these actions.

Agencies Issued Guidance That Provided Greater Flexibility in Responding to Wildland Fire

The agencies have increased their emphasis on using wildland fire to provide natural resource benefits rather than seeking to suppress all fires, in particular through issuing the *2009 Guidance for Implementation of Federal Wildland Fire Management Policy*. Compared with interagency guidance issued in 2003, the 2009 guidance provided greater flexibility to managers in responding to wildland fire to achieve natural resource benefits for forests and grasslands, such as reducing vegetation densities and stimulating regeneration and growth in some species. The 2003 guidance stated that only one "management objective" could be applied to a single wildland fire—meaning that wildland fires could either be managed to meet suppression objectives or managed for continued burning to provide natural resource benefits, but not both. The 2003 guidance also restricted a manager's ability to switch between full suppression and management for natural resource benefits, even when fire conditions changed. In contrast, under the 2009 interagency guidance, managers may manage individual fires for multiple objectives, and may change the management objectives on a fire as it spreads across the landscape. For example, managers may simultaneously attempt to suppress part of a fire that is threatening infrastructure or valuable resources while allowing other parts of the same fire to burn to

achieve desired natural resource benefits.²⁶ According to agency documents, the 2009 guidance was intended to reduce barriers to risk-informed decision making, allowing the response to be more commensurate with the risk posed by the fire, the resources to be protected, and the agencies' land management objectives.

However, agency officials varied in their opinions about the extent to which this guidance changed their management practices, with some telling us it marked a departure from their past practices, and others telling us it did not significantly change the way they managed wildland fire. Several headquarters and regional agency officials told us the guidance improved managers' ability to address natural resource needs when managing a fire, rather than simply suppressing all fires. For example, BIA officials told us that the flexibility provided through the guidance allowed managers on the San Carlos Apache Reservation in southeastern Arizona to use a variety of management strategies to manage the 2014 Skunk Fire. According to a BIA fire ecologist, managers were able to maximize firefighter safety while fostering desirable ecological benefits, including helping to restore the historical fire regime to the area.²⁷ In addition, Forest Service officials from several regions, including the Rocky Mountain and Intermountain Regions, told us they have used the full range of management options in the guidance more frequently over the last 5 years, and they credited the 2009 guidance for giving them the ability to manage fires and their associated risks. For example, during the 2011 Duckett Fire on the Pike-San Isabel National Forests in Colorado, managers attempted to contain part of the fire to protect a subdivision while allowing the portion of the fire uphill from the subdivision to burn into wilderness. Officials told us that, prior to the 2009 guidance, they would likely have responded to this fire by attempting full

²⁶The guidance states that the use of fire will be based on land or resource management plans and associated fire management plans prepared by individual units such as national parks. Land or resource management plans identify, among other things, fire's role in a particular area, and the objectives in the plans provide the basis for development of fire management objectives in designated areas. These fire-related objectives are contained in the units' fire management plans, which are intended to identify and integrate all wildland fire management and related activities within the context of approved land or resource management plans and assure that wildland fire management goals and components are coordinated.

²⁷A fire regime describes the role fire plays in an ecosystem, including typical fire frequency, scale, intensity, and duration.

suppression, which could have put firefighters at risk at the upper part of the fire because of the steep and rugged terrain.

In contrast, other officials told us the effect of the guidance was minimal because certain factors—including proximity to populated areas, size of the land management unit, and concerns about resources necessary to monitor fires—limit their ability to manage wildland fire incidents for anything other than suppression. For example, Forest Service officials from the Eastern Region told us that they try to use fire to provide natural resource benefits where possible, but they have fewer opportunities for doing so because of the smaller size of Forest Service land units in this region, which makes it more likely the fires will cross into nonfederal land, and their proximity to many areas of WUI. Similarly, Forest Service officials from the Pacific Southwest Region told us they are limited in using the added flexibility provided through the 2009 interagency guidance in Southern California, in part because the forests there are so close to major cities. However, in other more remote areas of California, these officials said they have managed wildland fires concurrently for one or more objectives, and objectives can change as the fire spreads across the landscape. Officials from BLM's Utah State Office also told us that their changed landscape is a limiting factor in responding to wildland fire. Specifically, cheatgrass, a nonnative, highly flammable grass, has replaced much of the native vegetation of the sagebrush steppe ecosystem that used to exist on the lands they manage in western Utah. As a result, introducing fire into this area could be detrimental rather than helpful because cheatgrass's flammability makes fires difficult to control.

Several officials also told us that managing wildland fires for objectives beyond full suppression, as provided for in the 2009 guidance, is highly dependent on circumstance. Officials told us that allowing fires to burn requires the agencies to devote assets to monitoring the fires to prevent them from escaping, which—especially for long-duration fires—can reduce the assets available to respond to other fires that may occur. For example, in 2012, in response to what it predicted to be an expensive and above-normal fire season, the Forest Service issued guidance to its regions limiting the use of any strategy other than full suppression (i.e., any strategy that involved allowing fires to burn for natural resource benefits) for the remainder of that year. The Forest Service noted that it was issuing this guidance because of concerns about committing the assets necessary to monitor long-duration fires that were allowed to burn in order to provide natural resource benefits. In 2015, during the Thunder Creek fire in North Cascades National Park, concerns about the resources needed to monitor the fire if it were allowed to burn to provide

natural resource benefits led NPS managers instead to order full suppression efforts to help ensure that the resources would be available for other fires. In a press release about the fire, NPS noted that experts anticipated a very high potential for wildfire in 2015, leading to agency concerns that significant fire activity throughout the west could leave few available firefighting resources later in the season.

Agencies Made Changes Intended to Formalize Collaboration with Nonfederal Partners

Another change since 2009 was the completion in 2014 of the National Cohesive Wildland Fire Management Strategy (Cohesive Strategy), developed in collaboration with partners from multiple jurisdictions (i.e., tribal, state, and local governments, nongovernmental partners, and public stakeholders) and aimed at coordinating wildland fire management activities around common wildland fire management goals.²⁸ The agencies have a long history of collaboration with nonfederal partners in various aspects of wildland fire management, including mobilizing firefighting resources during wildland fire incidents and conducting fuel reduction projects across jurisdictions.²⁹ The Cohesive Strategy is intended to set broad, strategic, nationwide direction for such collaboration.

Specifically, the Cohesive Strategy provides a nationwide framework designed to more fully integrate fire management efforts across jurisdictions, manage risks, and protect firefighters, property, and landscapes by setting “broad, strategic, and national-level direction as a foundation for implementing actions and activities across the nation.”³⁰ The vision of the Cohesive Strategy is “to safely and effectively extinguish fire, when needed; use fire where allowable; manage our natural

²⁸The Federal Land Assistance, Management, and Enhancement (FLAME) Act of 2009 required the Forest Service and Interior to complete and submit to Congress a report that contains a “cohesive wildfire management strategy.” Pub. L. No. 111-88 § 503, 123 Stat. 2971 (2009).

²⁹The Federal Wildland Fire Management Policy of 1995, updated in 2001, urged coordination, consistency, and agreement not only among the five federal land management agencies but also between these agencies and other federal agencies as well as tribal, state, and private stakeholders.

³⁰As part of the development of the Cohesive Strategy, each of three regions of the country—Northeast, Southeast, and Western—identified regional goals, objectives, and challenges to be incorporated into the national strategy, and the regions created implementation plans to help attain the goals.

resources; and as a nation, live with wildland fire.” The Cohesive Strategy identified three goals: (1) landscapes across all jurisdictions are resilient to fire-related disturbances in accordance with management objectives; (2) human populations and infrastructure can withstand wildfire without loss of life or property; and (3) all jurisdictions participate in developing and implementing safe, effective, and efficient risk-based wildfire management decisions. According to a senior Forest Service official, the Wildland Fire Leadership Council is responsible for providing a national, intergovernmental platform for implementing the strategy.³¹ In September 2014, an interim National Cohesive Strategy Implementation Task Group completed an implementation framework that included potential roles, responsibilities, and membership for a “national strategic committee” that is intended to provide oversight and leadership on implementing the strategy.

Agency officials differed in the extent to which they viewed the Cohesive Strategy as having a significant effect on their wildland fire management activities. On the one hand, several headquarters and regional agency officials told us the Cohesive Strategy has improved wildland fire management. For example, Forest Service officials from the Southern Region told us the Cohesive Strategy has reinforced existing work that better enabled them to collaborate on new projects, which they told us is important because nearly 85 percent of the land base in the region is privately owned, and little could be achieved without collaboration. Forest Service officials cited one instance in which they signed a regional level agreement that will cover several state chapters of The Nature Conservancy to exchange resources for fuel reduction treatment and to promote public understanding of its benefits—an action they said was supported by the Cohesive Strategy.³² Similarly, Forest Service officials from the Intermountain Region told us about several efforts that have been implemented across their region that they attribute to the Cohesive

³¹The Wildland Fire Leadership Council consists of senior officials from the Departments of Agriculture, Interior, and Homeland Security, including the Agriculture Undersecretary and Deputy Undersecretary for Natural Resources and Environment; the Interior Assistant Secretary for Policy, Management, and Budget; the Administrator of the U.S. Fire Administration; 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, along with a state forester and a local fire department chief.

³²According to its website, the Nature Conservancy is a nonprofit organization that works to protect ecologically important lands and waters.

Strategy. For example, in 2014, the Forest Service, the state of Utah, and other stakeholders collaborated on the implementation of Utah’s Catastrophic Wildfire Reduction Strategy, which aims to identify where fuel treatment across the state would be most beneficial. In contrast, many officials told us they have collaborated with partners for years and did not find the additional direction provided through the Cohesive Strategy to be much different than how they already operated. For example, several regional BLM, FWS, and NPS officials told us they have long worked with nonfederal partners on issues related to wildland fire management and that the Cohesive Strategy did not change those relationships.

However, implementation of collaborative actions stemming from the Cohesive Strategy may be limited by such factors as differences in laws and policies among federal, tribal, state, and local agencies. For example, while the 2009 federal interagency guidance provided federal managers with additional flexibility in managing a single fire for multiple purposes, laws and regulations at the state and local levels typically require full suppression of all fires, according to the *2014 Quadrennial Fire Review*.³³ For example, according to California state law, state forest officials in California are “charged with the duty of preventing and extinguishing forest fires.”³⁴

Increased Emphasis by Interior on the Sagebrush Steppe Ecosystem

Since 2009, Interior and BLM have placed a greater emphasis on wildland fire management, restoration, and protection related to the sagebrush steppe ecosystem—particularly with respect to habitat for the greater sage-grouse. Several changes, including urbanization and increased infrastructure built in support of various activities (e.g., roads and power lines associated with oil, gas, or renewable energy projects), have altered the sagebrush steppe ecosystem in the Great Basin region

³³The Forest Service is required to “in all ways that are practicable, aid in the enforcement of the laws of the States or Territories...for the prevention and extinguishment of forest fires[.]” 16 U.S.C. § 553. As noted in a 2006 report by the Department of Agriculture Inspector General, homeowner reliance on the federal government to provide suppression services in the WUI places a substantial financial burden on the Forest Service. Department of Agriculture, Office of Inspector General Western Region, *Audit Report: Forest Service Large Fire Suppression Costs*, Report No. 08601-44-SF (Washington, D.C.: November 2006).

³⁴Cal. Pub. Res. Code § 4113.

of the western United States.³⁵ In addition, the introduction and spread of highly flammable invasive nonnative grasses such as cheatgrass have altered this ecosystem by increasing the frequency and intensity of fire. As of July 2015, FWS was evaluating whether to list the greater sage-grouse, a species reliant on the sagebrush steppe ecosystem, as a threatened and endangered species under the Endangered Species Act.³⁶ FWS has noted the importance of fire and fuel management activities in reducing the threat to sage-grouse habitat.³⁷ Beginning in 2011, BLM issued guidance to its state offices emphasizing the importance of sage-grouse habitat in fire operations and the need for fuel reduction activities to address concerns about the habitat, more than half of which is located on BLM-managed lands. In 2014, the agency issued guidance reiterating this importance and stating that it would make changes in funding to allow field units to place greater focus on reducing fire's threats in sage-grouse habitat areas.

In January 2015, the Secretary of the Interior issued a Secretarial Order to enhance policies and strategies “for preventing and suppressing rangeland fire and for restoring sagebrush landscapes impacted by fire across the West.”³⁸ The order established the Rangeland Fire Task Force and directed it to, among other things, complete a report on activities to be implemented ahead of the 2016 Western fire season. Under the order, the task force also was to address longer term actions to implement the policy and strategy set forth by the order. In a report issued in May 2015, *An Integrated Rangeland Fire Management Strategy*, the task force called for prepositioning firefighting assets where priority sage-grouse habitat exists, including moving assets from other parts of the country as available. The goal is to improve preparedness and suppression capability during initial stages of a wildfire to increase the chances of keeping fires small and reduce the loss of sage-grouse habitat.

³⁵The Great Basin region includes parts of California, Idaho, Nevada, Oregon, and Utah. More than 350 species of plants and animals are found in this region.

³⁶In 2011, FWS agreed to make a final listing decision concerning the greater sage-grouse by the end of fiscal year 2015.

³⁷75 Fed. Reg. 13910, 13982 (March 23, 2010).

³⁸*Secretarial Order 3336, Rangeland Fire Prevention, Management, and Restoration*, January 5, 2015.

The report also identified actions aimed at improving the targeting of fuel reduction activities, including identifying priority landscapes and fuel management priorities within those landscapes. These actions are to be completed by the end of September 2015 and continuously improved upon in subsequent years. According to BLM state officials, the increased emphasis on sage-grouse habitat will significantly change how they manage their fuel reduction programs. BLM officials from states that include sage-grouse habitat said they expect a large increase in fuel reduction treatment funding and increased project approvals. In contrast, BLM officials from states without this habitat told us they expect significant funding decreases, limiting their capacity to address other resource issues important for nonsagebrush ecosystems.

Agencies Made Additional Changes in Other Areas of Wildland Fire Management

Since 2009, the agencies also have taken steps to change other areas of wildland fire management, including technology for wildland fire planning and response, line-officer training, and firefighter safety.

Working to Improve Technology for Wildland Fire Planning and Response

Since 2009, the agencies have applied new technologies to improve wildland fire management planning and response. Prominent among them is the Wildland Fire Decision Support System (WFDSS), a Web-based decision-support tool that assists fire managers and analysts in making strategic and tactical decisions for fire incidents. WFDSS replaced older tools, some of which had been used for more than 30 years and were not meeting current fire management needs, according to the system's website.³⁹ According to this site, WFDSS has several advantages over the older systems, such as enabling spatial data layering,⁴⁰ increasing use of map displays, preloading information about field units' management objectives, and allowing for use in both single

³⁹https://wfdss.usgs.gov/wfdss/WFDSS_About.shtml, accessed August 10, 2015.

⁴⁰Geospatial data describe features or phenomena that can be referenced to specific locations relative to the earth's surface. For example, features such as buildings, rivers, and federal lands, and phenomena such as wildland fires, can all be tracked by their geographic locations in data layers. These data layers can then be linked (or "layered") to display the combined information as maps with different layers of information, which may facilitate analysis of how the data in the various layers interrelate. See GAO, *Geospatial Data: Progress Needed on Identifying Expenditures, Building and Utilizing a Data Infrastructure, and Reducing Duplicative Efforts*, [GAO-15-193](#) (Washington, D.C.: Feb. 12, 2015).

and multiple fire situations. Officials from several agencies told us that using WFDSS improved their ability to manage fires by allowing information from fire management plans to be loaded into WFDSS and providing substantial real-time fire information on which to make decisions. For example, one Forest Service official told us that, at one point in a recent particularly active fire season in the Pacific Northwest Region, the system processed information on approximately 20 concurrent fires that managers could monitor in real time. As a result, they were able to make strategic and risk-informed decisions about the resource allocations needed for each fire, including decisions to let some fires burn to meet natural resource benefit objectives. According to Forest Service reviews of several fires that occurred in 2012, however, some managers said WFDSS did not provide effective decision support for firefighters because the system underestimated fire behavior or did not have current information.⁴¹

According to officials from several agencies, another example of updated wildland fire technology has been the replacement of traditional paper-based fire management plans with electronic geospatial-based plans. Federal wildland fire management policy directs each agency to develop a fire management plan for all areas they manage with burnable vegetation. A fire management plan, among other things, identifies fire management goals for different parts of a field unit. According to an interagency document describing geospatial-based plans, agency officials expect such plans to increase efficiency because the plans can more easily be updated to account for changes in the landscape resulting from fires, fuel reduction treatments, and other management activities. In addition, the electronic format is designed to allow plans to more easily be shared across multiple users, including personnel responding to wildland fires. Agency officials mentioned other technological improvements, such as the development of an “Enterprise Geospatial Portal” providing wildland fire data in geospatial form using a Web-based platform, although many officials also told us that additional improvements are needed in wildland fire technology overall.

In addition to specific technologies, in 2012 the Forest Service and Interior issued a report titled “Wildland Fire Information and Technology:

⁴¹Wildland Fire Lessons Learned Center, *Lessons From Recent Large Fire Reviews Briefing Paper* (August 7, 2013).

Strategy, Governance, and Investments,” representing the agencies’ efforts to develop a common wildland fire information and technology vision and strategy. The agencies signed a Memorandum of Understanding later that same year intended to establish a common management approach for information and technology services. Nevertheless, the *2014 Quadrennial Fire Review* concluded that the wildland fire management community does not have an agenda for innovation and technology adoption or a list of priorities, stating that the wildland fire community “sometimes struggles to define common technology priorities and implement integrated, enterprise-level solutions” and noting that there are more than 400 information technology systems in use by the wildland fire community.⁴² The report provides recommendations on actions the agencies could consider for improvement; however, because it was issued in May 2015, it is too early to determine what, if any, actions the agencies have taken. In commenting on a draft of this report, Interior stated that the agencies are completing an investment strategy for wildland fire applications and supporting infrastructure, but did not provide an expected date for its completion.

Increasing Line-Officer Training

Officials from several agencies told us that, since 2009, the agencies have increased training efforts, particularly those aimed at improving line officers’ knowledge about, and response to, wildland fires. Line officers are land unit managers such as national forest supervisors, BLM district managers, and national park superintendents. During a wildland fire, staff from “incident management teams” with specific wildland firefighting and management training manage the response, and line officers associated with the land unit where the fire is occurring must approve major decisions that incident management teams make during the response.⁴³ Officials at BLM’s Oregon/Washington State Office, for example, told us they provide line officers with day-long simulation exercises, as well as shadowing opportunities that give line officers experience on actual wildland fires. Beginning in 2007, the Forest Service initiated a Line Officer Certification Program and began a coaching and mentoring

⁴²We did not examine the agencies’ information technology systems as part of this review.

⁴³For large and complex fires, an incident management team comprising an incident commander and a cadre of personnel to handle command, planning, logistics, operations, and finance functions manages suppression operations. The incident management team orders firefighting assets—including personnel, aircraft, equipment, and supplies—through a three-tiered system of local, regional, and national dispatch centers.

Emphasizing the Primacy of
Firefighter Safety

program to provide on-the-ground experience for preparing line officers to act as agency administrators during wildland fires or other critical incidents. This program is aimed at providing officials that do not have wildland fire experience the opportunity to work under the advisement of a coach with wildland fire experience. According to Forest Service documents, this program has evolved substantially, in part to address the increased demand for skills necessary to manage increasingly complex wildland fires. In May 2015, the Forest Service issued guidance for the program and called for each Forest Service regional office to administer it within the regions.

Officials told us that, since 2009, the agencies have, in some cases, changed firefighting tactics to better protect firefighters, including making greater use of natural barriers to contain fire instead of attacking fires directly. The agencies have also issued additional guidance aimed at emphasizing the primacy of firefighter safety. In 2010, the agencies developed and issued the “Dutch Creek Protocol” (named after a wildland fire where a firefighter died), which provided a standard set of protocols for wildland firefighting teams to follow during an emergency medical response or when removing and transporting personnel from a location on a fire. Both the Forest Service and Interior have also issued agency direction stating that firefighter safety should be the priority of every fire manager.⁴⁴

⁴⁴See, for example, Departments of Agriculture and the Interior, *2015 Direction to Wildland Fire Leadership* (Washington, D.C.: June 4, 2015), and Forest Service, *Chief's Letter of Intent – 2015 Fire Management* (Washington, D.C.: Jan. 28, 2015).

Agencies Assess Effectiveness of Their Programs in Several Ways, but Have Not Consistently Conducted Reviews That Could Improve Responses to Wildland Fires

The agencies assess the effectiveness of their wildland fire management programs in several ways, including through performance measures, efforts to assess specific activities, and reviews of specific wildland fire incidents. Both the Forest Service and Interior are developing new performance measures and evaluations, in part to help better assess the results of their current emphasis on risk-based management, according to agency officials. In addition, the agencies have undertaken multiple efforts, such as studies, to assess the effectiveness of activities including fuel reduction treatments and aerial firefighting. The agencies also conduct reviews of their responses to wildland fires. However, they have not consistently followed agency policy in doing so or used specific criteria for selecting the fires they have reviewed, limiting their ability to help ensure that their fire reviews provide useful information and meaningful results.

Agencies Use Various Performance Measures to Assess Wildland Fire Management

Both the Forest Service and Interior use various performance measures, such as the number of WUI acres treated to reduce fuels and the percentage of wildland fires contained during initial attack, to assess their wildland fire management effectiveness. These measures are reported in, among other things, the agencies' annual congressional budget justifications. Officials from both the Forest Service and Interior told us their performance measures need improvement to more appropriately reflect their approach to wildland fire management and, in June 2015, officials from both agencies told us that they were working to improve them. For example, several performance measures for both agencies use a "stratified cost index" to help analyze suppression costs on wildfires. The index is based on a model that compares the suppression costs of fires that have similar characteristics, such as fire size, fuel types, and proximity to communities, and identifies the percentage of fires with suppression costs that exceeded the index. We found in a June 2007 report, however, that the index was not entirely reliable and that using the index as the basis for comparison may not allow the agencies to accurately identify fires where more, or more-expensive, resources than needed were used.⁴⁵ The agencies continue to use the index, but have

⁴⁵We did not make a recommendation regarding this issue, noting that it would take several years, at the earliest, before the agencies could collect enough data for the model to be useful. See [GAO-07-655](#).

acknowledged its shortcomings.⁴⁶ The Forest Service reported in its fiscal year 2016 budget justification to Congress that improvements were forthcoming. In April 2015, Forest Service officials told us they have incorporated detailed geospatial information into the model on which the index is based to help yield more accurate predictions of suppression expenditures and have submitted the model for peer review. Once that is complete, the agencies plan to begin to implement the updated model, but officials did not provide a time frame for doing so.

Both agencies have also made efforts to improve their performance measures to better reflect their emphasis on a risk-based approach to wildland fire management. In fiscal year 2014, Interior began using a new performance measure intended to better reflect a variety of strategies in addition to full suppression: “Percent of wildfires on DOI-managed landscapes where the initial strategy (ies) fully succeeded during the initial response phase.”⁴⁷ The same year, the Forest Service began developing a performance measure intended to reflect that, in some cases, allowing naturally-ignited fires to burn can provide natural resource benefits at a lower cost and lower risk to personnel than fully suppressing the fire as quickly as possible: “Percent of acres burned by natural ignition with resource benefits.” Forest Service officials told us they are working with field units to evaluate whether this measure will effectively assess their efforts to implement a risk-based approach to fire management and that they will adjust it as needed. The officials told us they plan to finalize the measure and use it in 2017.

Also, in fiscal year 2014, the Forest Service began developing a performance measure that would assess the risk that wildland fire presents to highly valued resources such as communities and watersheds. This measure is known as the “National Forest System wildfire risk index.” According to the agency’s fiscal year 2016 budget justification, it would create an index of relative fire risk based on the

⁴⁶Specifically, the index does not account for two of the main factors that influence suppression costs. These factors are long-term ecological conditions and changing climatic conditions, both of which may have substantial effects on fire management strategies. See Department of Agriculture, Forest Service, *Fiscal Year 2016 Budget Justification* (Washington, D.C.: February 2015).

⁴⁷Interior officials told us this measure is based on information supplied by the field units responsible for the initial fire response, and that these units are responsible for determining whether the initial strategies succeeded.

likelihood of a large fire affecting these highly valued resources. It may also incorporate factors measuring the relative importance of these resources and the expected effects that might occur from fire. The Forest Service plans to establish a national baseline measure for this index in 2015 and then periodically remeasure it, likely every 2 years, to determine if overall risk has been reduced, according to Forest Service officials. Changes that could affect the index include those resulting from fuel reduction treatments, wildland fire, forest management activities, vegetative growth, and increased WUI development, among others, according to the agency's 2016 budget justification. As with the performance measure described above, agency officials told us they will evaluate whether the measure meets their needs before adopting it; if it meets their needs, they plan to finalize the measure and use it in 2017.

Agencies Have Undertaken Multiple Efforts to Assess Effectiveness of Specific Activities

The agencies have also undertaken multiple efforts to assess the effectiveness of particular activities, such as fuel reduction and aerial firefighting. Regarding fuel reduction activities, we found in September 2007 and September 2009 that demonstrating the effectiveness of fuel reduction treatments is inherently complex and that the agencies did not have sufficient information to evaluate fuel treatment effectiveness, such as the extent to which treatments changed fire behavior.⁴⁸ Without such information, we concluded that the agencies could not ensure that fuel reduction funds were directed to the areas where they can best minimize risk to communities and natural and cultural resources. Accordingly, we recommended that the agencies take actions to develop additional information on fuel treatment effectiveness.⁴⁹ While the agencies took steps to address this recommendation, they are continuing efforts to improve their understanding of fuel treatment effectiveness. For example, the Forest Service and Interior agencies use a system called Fuel Treatment Effectiveness Monitoring to document and assess fuel

⁴⁸GAO, *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) and [GAO-09-877](#).

⁴⁹See [GAO-07-1168](#).

reduction treatment effectiveness.⁵⁰ The Forest Service began requiring such assessments in 2011 and Interior requested such assessments be completed starting in 2012.⁵¹ Under this approach, the agencies are to complete a monitoring report whenever a wildfire interacts with a fuel treatment and enter the information into the system. Officials told us that additional efforts are under way to help understand other aspects of fuel treatment effectiveness. For example, in February 2015, the Joint Fire Science Program completed its strategy to implement the 2014 Fuel Treatment Science Plan.⁵² It includes as one of its goals the “development of measures/metrics of effectiveness that incorporate ecological, social, resilience, and resource management objectives at the regional and national level.”

The Forest Service and Interior are also implementing an effort known as the Aerial Firefighting Use and Effectiveness Study, begun in 2012 to address concerns about limited performance information regarding the use of firefighting aircraft. As part of this effort, the agencies are collecting information on how aerial retardant and suppressant delivery affects fire behavior and plan to use this and other collected information to track the performance of specific aircraft types, according to the study website.⁵³ This will help the agencies identify ways to improve their current fleet of aircraft and inform future aerial firefighting operations and aviation

⁵⁰Fuel Treatment Effectiveness Monitoring is a program to evaluate the effectiveness of prescribed fire and mechanical treatments designed to reduce the risk of wildfire. Forest Service and Interior agencies conduct assessments in instances where a wildfire either starts within or burns into a fuel treatment area, to evaluate the resulting impacts on fire behavior and fire suppression actions.

⁵¹The Interior agencies each issued their own guidance related to Fuel Treatment Effectiveness Monitoring. NPS issued guidance in 2012, BIA in 2013, BLM in 2014, and FWS in 2015.

⁵²The Joint Fire Science Program is an interagency program that funds scientific research on wildland fires and distributes results to help policymakers, fire managers, and practitioners make sound decisions. The program is jointly funded by the Departments of Agriculture and the Interior and is governed by a 10-member board with 5 members from the Forest Service and 1 member each from BIA, BLM, FWS, NPS, and the U.S. Geological Survey. According to the program website, it has funded more than 170 studies examining the effectiveness of fuel reduction treatments in different locations since 1998.

⁵³<http://www.fs.fed.us/fire/aviation/afue/index.html>, accessed July 31, 2015.

strategic planning, according to the website.⁵⁴ Agency officials told us the study is not a one-time activity, but is an ongoing effort to continually provide information to help improve their use of firefighting resources.

Forest Service and Interior Agencies Have Not Consistently Conducted Reviews of Wildland Fire Incidents to Assess their Effectiveness

The Forest Service and the Interior agencies have conducted reviews to assess their effectiveness in responding to wildland fires but have not consistently followed agency policy in doing so and did not always use specific criteria for selecting the fires they have reviewed. Officials from both the Forest Service and Interior told us that current agency policy regarding fire reviews overly emphasizes the cost of wildland fire suppression rather than the effectiveness of their response to fire. However, the agencies have neither updated their policies to better reflect their emphasis on effectiveness nor established specific criteria for selecting fires for review and conducting the reviews. By developing such criteria, the agencies may enhance their ability to obtain useful, comparable information about their effectiveness in responding to wildland fires, which, in turn, may help them identify needed improvements in their wildland fire approach.

Congressional reports and agency policy have generally called for the agencies to review their responses to wildland fires involving federal expenditures of \$10 million or more. For fiscal years 2003 through 2010, congressional committee reports directed the Forest Service and Interior to conduct reviews of large fire incidents, generally for the purpose of understanding how to better contain suppression costs; beginning in fiscal year 2006, these reports included a cost threshold, specifying that such reviews be conducted for fires involving federal expenditures of \$10 million or more. The agencies, in turn, have each developed their own policies that generally direct them to review each fire that exceeds the \$10 million threshold.⁵⁵

⁵⁴In 2013, we recommended that the Forest Service and Interior expand efforts to collect information on aircraft performance and effectiveness to include all types of firefighting aircraft in the federal fleet, among other recommendations. See GAO, *Wildland Fire Management: Improvements Needed in Information, Collaboration, and Planning to Enhance Federal Fire Aviation Program Success*, [GAO-13-684](#) (Washington, D.C.: Aug. 20, 2013).

⁵⁵In some cases, those policies note that fire reviews may be conducted for other purposes, such as where the fire raised significant political, social, natural resource, or policy concerns.

The agencies, however, have not consistently conducted reviews of fire incidents meeting the \$10 million threshold, in part because, according to officials, current agency policy that includes the \$10 million threshold does not reflect the agencies' focus on assessing the effectiveness of their response to fire. However, the agencies have not developed specific criteria for selecting fire incidents for review. Forest Service officials told us that, rather than selecting all fires with federal expenditures of \$10 million or more, they changed their approach to selecting fires to review. These officials told us that focusing exclusively on suppression costs when selecting fires limits the agency in choosing those fires where it can obtain important information and best assess management actions and ensure they are appropriate, risk-based, and effective. Forest Service officials told us the agency judgmentally selects incidents to review based on a range of broad criteria, such as complexity and national significance, taking into account political, social, natural resource, or policy concerns. Using these broad selection criteria, the Forest Service reviewed 5 wildland fires that occurred in 2012 and 10 that occurred in 2013. However, with these broad criteria it is not clear why the Forest Service selected those particular fires and not others. For example, the 2013 Rim Fire, which cost over \$100 million to suppress—by far the costliest fire to suppress that year—and burned over 250,000 acres of land,⁵⁶ was not among the 2013 fires selected for review. Moreover, the reviews completed for each of those years did not use consistent or specific criteria for conducting the reviews. As of July 2015, the agency had not selected the fires it will review from the 2014 wildland fire season and, when asked, agency officials did not indicate a time frame for doing so.

Forest Service officials told us they believe it is appropriate to judgmentally select fires to provide them flexibility in identifying which fires to review and which elements of the fire response to analyze. Nevertheless, Forest Service officials also acknowledged the need to develop more specific criteria for selecting fires to review and conducting the reviews and, in July 2015, told us they are working to update their criteria for doing so. They provided us a draft update of the Forest Service policy manual, but this draft did not contain specific criteria for selecting fires for review or conducting the reviews. Moreover, officials did not provide a time frame for completing their update.

⁵⁶The Rim Fire burned about 154,000 acres of Forest Service land, about 79,000 acres of NPS land, and about 23,000 acres of private land.

Within Interior, BLM officials told us BLM completed its last fire review based on significant cost (i.e., federal expenditures of \$10 million or more) in 2013. These officials told us that BLM, similar to the Forest Service, plans to shift the emphasis of its fire reviews to evaluate management actions rather than focusing on cost, and that officials are working to determine criteria for selecting fires for review.⁵⁷ Interior headquarters officials told us that FWS and NPS have continued to follow the direction provided through their policies regarding reviews of fires that met the \$10 million threshold. Interior headquarters officials, however, acknowledged the need to improve Interior's approach to selecting fires for review to focus more on information about decision making rather than fire costs. In July 2015, the officials told us they plan to develop criteria other than cost for use by all Interior agencies in selecting fires to review, and that they plan to develop standard criteria for implementing the reviews. They stated that they expect this department-wide effort to be completed by the end of calendar year 2015 but did not provide information about how they planned to develop such criteria or the factors they would consider.

Agency reports have likewise cited the need to improve both the processes for selecting fires for review and the implementation of the reviews. A 2010 report, for example, noted the importance of improving the selection of fires to review and stated that the agencies would benefit from a more productive review strategy.⁵⁸ The report said the agencies' existing approach to conducting reviews tended to produce isolated efforts and unrelated recommendations rather than establishing a consistent foundation for continuous improvement. A 2013 report assessing the usefulness of the Forest Service's five reviews of 2012 fires noted shortcomings in consistency across the reviews, including unclear criteria for selecting fires and conducting reviews, as well as limitations in the specificity of the resulting reports and recommendations.⁵⁹ As noted,

⁵⁷In June 2015, BLM issued guidance for reviewing fires occurring in sage-grouse habitat. The guidance calls for reviews of fires occurring during the 2015 wildland fire season on BLM-administered lands containing at least 10,000 acres of specifically designated sage-grouse habitat.

⁵⁸Department of Agriculture Independent Large Fire Cost Review Panel and Guidance Group, Inc., *Large Fire Cost Review for Fiscal Year 2009* (August 2010).

⁵⁹Wildland Fire Lessons Learned Center, *Lessons From Recent Large Fire Reviews Briefing Paper* (August 7, 2013). There was no similar analysis performed of the Forest Service's 10 reviews of fires occurring in 2013.

both agencies have acknowledged the need to improve their criteria for selecting fires to review and conducting the reviews. By developing specific criteria in agency policies for selecting fires for review and conducting the reviews, the agencies may enhance their ability to help ensure that their fire reviews provide useful information and meaningful results. This is consistent with our previous body of work on performance management, which has shown that it is important for agencies to collect performance information to inform key management decisions, such as how to identify problems and take corrective actions and how to identify and share effective approaches.⁶⁰ By collecting such performance information, the agencies may be better positioned to identify needed improvements in their wildland fire approach and thereby use their limited resources more effectively.

Agencies Distribute Resources in Part on the Basis of Historical Amounts, but Are Developing New Methods Intended to Better Reflect Current Conditions

The Forest Service and Interior determine the distribution of fire management resources in part on the basis of historical amounts but are developing new methods intended to better reflect current conditions. For suppression, the Forest Service and Interior manage funding as needed for units to respond to individual wildland fires. For preparedness, the Forest Service and Interior distribute resources based, in part on historical funding levels generated by an obsolete system.⁶¹ The agencies are working to replace the system and develop new tools to help them distribute resources to reflect current landscape conditions, values at risk,⁶² and the probability of wildland fire. For fuel reduction, until recently, the Forest Service and Interior both distributed funds using the same system. In 2014, the Forest Service began using a new system to help it distribute fuel reduction funding in ways that better reflect current

⁶⁰See GAO, *Managing for Results: Enhancing Agency Use of Performance Information for Management Decision Making*, [GAO-05-927](#) (Washington, D.C.: Sept. 9, 2005), GAO, *Nanotechnology: Improved Performance Information Needed for Environmental, Health, and Safety Research*, [GAO-12-427](#) (Washington, D.C.: May 21, 2012), and [GAO-13-684](#).

⁶¹As noted, the Forest Service allocates preparedness and fuel reduction funding directly to its nine regions, while Interior allocates funds to its four agencies, which in turn allocate to their respective regional offices. For both the Forest Service and the Interior agencies, once regional offices receive funding, they in turn allocate funds to individual units such as national forests or national parks.

⁶²As noted, values can include ecological, social, and economic values that could be lost or damaged due to fire, including people, property, infrastructure, natural and cultural resources, and air quality.

conditions. Interior is working to develop a system that likewise reflects current conditions.

Agencies Fund Suppression as Needed for Responding to Wildland Fires

The agencies manage funding for suppression at the national level as needed for field units to respond to individual wildland fires. The overall amount of suppression funding the agencies obligate is determined by the complexity and number of wildland fire responses over the course of the fiscal year and can vary considerably from year to year. For example, federal agencies obligated approximately \$1.7 billion for suppression in fiscal year 2006, \$809 million in fiscal year 2010, and \$1.9 billion in fiscal year 2012.⁶³ (See app. II for more detailed information about suppression obligations by the Forest Service and the Interior agencies for fiscal years 2004 through 2014.)

Each year, the agencies estimate the expected level of funding for suppression activities using the average of the previous 10 years of suppression obligations.⁶⁴ The estimated amount, however, has often been less than the agencies' actual suppression obligations, particularly for the Forest Service. In all but 2 years since 2000, Forest Service suppression obligations have exceeded the 10-year average that forms the basis of the agency's annual appropriation. To pay for wildfire suppression activities when obligations are greater than the amount appropriated for suppression, the Forest Service and Interior may transfer funds from other programs within their respective agencies as permitted by law.⁶⁵ As we found in a prior report, these transfers can affect the agencies' ability to carry out other important land management functions that are key to meeting their missions, such as restoration of forest lands

⁶³As noted, unless otherwise specified, obligations are presented in nominal dollars, or actual dollars that are not adjusted for inflation.

⁶⁴For example, to determine the fiscal year 2015 budget request for suppression, which the agencies submitted in fiscal year 2014, the agencies averaged obligations for suppression for fiscal years 2004 through 2013.

⁶⁵See, e.g., Pub. L. No. 113-76, Div. G, Interior, Environment, and Related Agencies Appropriations Act, 2014, Title I, § 102, 128 Stat. 309 (Interior); Title III, 128 Stat. 325 (Forest Service).

and other improvements.⁶⁶ For example, according to a Forest Service report, funding transfers led to a canceled fuel reduction project on the Sante Fe National Forest and the deferral of critical habitat acquisition on the Cibola National Forest, both located in New Mexico.⁶⁷

In their annual budget justifications for fiscal years 2015 and 2016, the agencies proposed an alternative mechanism to fund suppression activities. Under that proposal, the agencies would receive 70 percent of the standard 10-year average of suppression obligations as their appropriation for wildland fire suppression, which reflects the amount the agencies spend to suppress approximately 99 percent of wildland fires.⁶⁸ If suppression obligations exceed this amount, additional funds would be made available from a disaster funding account. Forest Service and Interior officials told us this proposal would allow them to better account for the variable nature of wildland fire seasons and reduce or eliminate the need to transfer funds from other accounts to pay for suppression. In addition, legislation pending in Congress would change how certain wildland fire suppression operations are funded.⁶⁹

Forest Service and Interior Distribute Preparedness Funding Based in Part on an Obsolete System They Are Working to Replace

The Forest Service and Interior distribute preparedness funding to their regions and agencies, respectively, based in part on information generated from a system that is now obsolete. The agencies attempted to develop a new system to distribute preparedness funding, but ended that effort in 2014 and are now working to develop different tools and systems. In distributing preparedness funds to individual forests, some Forest

⁶⁶GAO, *Wildfire Suppression: Funding Transfers Cause Project Cancellations and Delays, Strained Relationships, and Management Disruptions*, [GAO-04-612](#) (Washington, D.C.: June 2, 2004). In this report, we suggested that Congress consider alternative funding approaches for wildfire suppression to reduce the potential need for the Forest Service and Interior to rely on transferring funds from other programs to pay for wildfire suppression.

⁶⁷Forest Service, *Fire Transfer Impact by State and Territory* (Washington, D.C.: June 2014).

⁶⁸The remaining 1 percent of wildland fires typically account for the remaining 30 percent agencies spend on suppression, according to agency documents.

⁶⁹For example, Title V of the Senate version of the Interior and Related Appropriations Act for Fiscal Year 2016 (S. 1645) would allow certain wildland fire suppression activities to be funded in a manner consistent with other natural disasters, using a modification of the approach proposed in the budget request.

Forest Service and Interior
Distribution of Preparedness
Funds to Regions and
Agencies

Service regions have developed additional tools to help them distribute funds; similarly, three of the four Interior agencies have developed additional tools to help them distribute preparedness funds to their regions.⁷⁰ Overall preparedness obligations in 2014 totaled about \$1.0 billion for the Forest Service and about \$274 million for the Interior agencies.⁷¹ (See app. II for detailed information on each of the agencies' obligations for preparedness for fiscal years 2004 through 2014.)

To determine the distribution of preparedness funds from Forest Service headquarters to its regions, and from Interior to the department's four agencies with wildland fire management responsibilities, the Forest Service and Interior rely primarily on amounts that are based on results from a budgeting system known as the National Fire Management Analysis System (NFMAS).⁷² That system, however, was terminated in the early 2000s, according to agency officials. Relying on the results from the last year NFMAS was used, and making only incremental changes from year to year, the Forest Service and Interior have not made significant shifts in the funding distribution across their respective regions and agencies over time, and they have generally maintained the same number and configuration of firefighting assets (e.g., fire engines and crews) in the same geographic areas from year to year. Several agency officials, however, told us that these amounts no longer reflect current conditions, in part because of changes to the landscape resulting from increased human development, climate change, and changes to land management policies that consider natural resource values differently than they did when NFMAS was in use.

Beginning in 2002, the agencies attempted to replace NFMAS with an interagency system designed to help them determine the optimal mix and

⁷⁰As noted, we did not assess the design or use of any of the agencies' tools or systems for distributing funds.

⁷¹Part of the difference in obligation amounts may be attributed to differences in how the Forest Service and Interior use preparedness funds to pay firefighters' salaries. See appendix III for more information about these differences.

⁷²NFMAS had two primary components. One component provided historical weather and fire behavior data, and the other analyzed various fire-management scenarios, considering different combinations of firefighting resources, various potential wildfire conditions, and various resource values (such as the presence of timber or other commodity values), to help identify the most efficient level of preparedness resources for a given land management unit.

location of firefighting assets and distribute funds accordingly. In developing this system, known as the Fire Program Analysis system, the agencies' goal was to develop "a comprehensive interagency process for fire planning and budget analysis identifying cost-effective programs to achieve the full range of fire management goals and objectives."⁷³

According to agency documents, this effort proved problematic because of the difficulty in modeling various aspects of wildland fire management. In addition, agency officials told us it is difficult to design a system that could account for multiple agencies' different needs and varying missions. After more than a decade of work, and investment that Forest Service officials estimated at approximately \$50 million, the agencies terminated the system's development in September 2014. At that time, they stated that it "only delivered inconsistent and unacceptable results."⁷⁴

Since the termination of the Fire Program Analysis system, the agencies have continued to rely on results based on the terminated NFMAS, but have begun working on new tools to help them distribute funding and assets based on current conditions and updated information. Forest Service headquarters officials told us the agency is developing a new tool called the Wildland Fire Investment Portfolio System. According to these officials, this proposed system is intended to model scenarios such as large shifts in firefighting assets, various potential dispatch procedures, and changes in fire behavior due to climate change, which will allow managers, both at the national and individual unit level, to conduct resource trade-off analyses and assess whether assets are being used effectively. Forest Service officials told us that the agency is in the early stages of developing this proposed system and anticipates using it for planning and analysis purposes in fiscal year 2016.

Interior documents state that Interior is developing a system called the Risk-Based Wildland Fire Management model, which Interior will use to help support funding distribution decisions to the four Interior agencies for both preparedness and fuel reduction. The proposed system will assess the probability and likely intensity of wildland fire, values at risk, and the

⁷³Department of the Interior and Forest Service, *FPA Closeout and Transition Plan* (Washington, D.C.: September 29, 2014).

⁷⁴Nevertheless, agency officials told us the effort resulted in some useful analytical products, including certain data sources and a large fire simulation modeling tool known as FSim.

expected value of acres likely to burn. A key element of this system will be the development of strategic business plans by each of the four Interior agencies, detailing how each agency intends to distribute its preparedness and fuel reduction funding to reduce the risks from wildland fire on its lands. Interior officials said that, once the agencies provide these business plans, Interior will assess them in making funding distribution decisions among the agencies. According to several Interior agency officials, identifying priority values at risk across Interior's four agencies may be challenging given the variation in agency missions and the types of lands they manage. For example, a threatened species located primarily on BLM lands may be among BLM's highest priorities, but a forested area relied upon by an Indian tribe for its livelihood may be among BIAs' highest priorities. Interior officials told us that they expect to identify the prioritized values and issue guidance on the proposed system by the end of calendar year 2015, and then use its results to inform their fiscal year 2016 funding distributions to the four agencies.

Forest Service Regions' Distribution to Individual National Forests

Once the Forest Service distributes preparedness funding to regions, it gives regions discretion to determine how to subsequently distribute funding to individual national forests, as long as those determinations are consistent with policy and annual budget program direction. Forest Service headquarters officials told us they do not plan to direct regions to use any specific system to help inform distributions to national forests, so that regions can have flexibility in distributing their funds and take into account local conditions and priorities. According to agency officials, most regions distribute funding to individual national forests based on historical amounts resulting from NFMAS. However, two regions have changed the way they determine funding distribution to individual national forests to better reflect current landscape conditions. The Rocky Mountain Region uses a new system that ranks each of its forests according to a "risk priority score." According to regional officials, use of the system has resulted in shifts in funding across forests in the region; for example, the officials told us they have provided additional resources to forests along Colorado's Front Range because of increased development in the WUI. The Pacific Northwest Region also uses its own funding distribution tool, which considers elements such as fire occurrence and the number of available assets to develop a weighted value for each forest in the region. The region distributes the funding proportionally based on the values calculated for each forest.

Interior Agencies' Distribution to Regional Offices

Once obtaining preparedness funds from Interior, each agency—which, as noted, have their own land management responsibilities and missions—distributes these funds to its units. Three of these agencies—

BLM, FWS, and NPS—use newer systems and current information, such as updated fuel characterization and fire occurrence data, to distribute funding to their regional offices. The fourth agency, BIA, generally uses historical-based amounts (i.e., NFMAS results), but has made some changes to reflect updated priorities. The regions subsequently distribute funding to individual land units, typically using the same systems. The four agencies' approaches are described below.

- **BLM.** Since 2010, BLM officials told us they have used results from the Fire Program Decision Support System to help determine funding distributions to state offices. The system analyzes BLM's fire workload and complexity using four components: fire suppression workload, fuel types, human risk, and additional fire resources, and assigns scores to state offices accordingly. Based on the resulting analyses, BLM has shifted funding across state offices to help better reflect current conditions. BLM officials told us that most states use the new system to help inform the distribution of funding to their units. BLM is also developing an additional component of the Fire Program Decision Support System to help offices determine the appropriate number of firefighting assets needed in each area. Officials expect to apply the new component with their overall system in the fall of 2015.
- **FWS.** In 2014, FWS began distributing its preparedness funding to regions using the Preparedness Allocation Tool. Officials told us that the tool uses information such as historical wildland fire occurrence, proximity to WUI areas, and other information, to inform preparedness funding distributions to regions. Agency officials told us that results from this tool did not generally identify the need for large funding shifts across units, but rather helped identify some smaller shifts to better reflect current landscape conditions. Officials with one FWS region told us that the tool has helped the agency provide better assurance that funding amounts are risk-based and transparent.
- **NPS.** Since 2013, primarily in response to their overall wildland fire management program funding reductions, NPS began using a system called the Planning Data System to determine what level of firefighting workforce the agency could afford under different budget distribution scenarios. The system generates personnel requirements for each NPS unit by establishing a minimum number of people for any unit that meets certain criteria. Those results are rolled up to also provide regional workforce requirements. The results generated from this

system showed that some NPS regions, as well as individual park units, had existing wildland fire organizations that they could no longer adequately support in light of reduced budgets.⁷⁵

- **BIA.** BIA relies primarily on historical funding amounts derived from a system similar to NFMAS. However, BIA officials told us they have made adjustments to the historical amounts using professional judgment. BIA officials told us that the regions also still primarily use historical-based amounts to distribute funding to their units. The officials told us they will wait until Interior finalizes its Risk Based Wildland Fire Management model before they develop a new funding distribution tool.

Agencies Are Working to Distribute Fuel Reduction Funding to Better Account for Current Conditions

Beginning in 2009, the Forest Service and Interior both used systems collectively known as the Hazardous Fuels Prioritization and Allocation System (HFPAS) to distribute fuel reduction funds.⁷⁶ Officials told us these systems, based on similar concepts and approaches, were developed by the agencies to provide an interagency process for distributing fuel reduction funding to the highest-priority projects.⁷⁷ Starting in 2014, the Forest Service instead began using a new system, which, according to officials, allows the agency to more effectively distribute fuel reduction funds. Interior continues to distribute fuel reduction funding to the four agencies based on funding amounts derived from HFPAS, but it plans to develop a new system for distributing funds to reflect more current conditions and risks. Overall fuel reduction obligations in 2014 totaled about \$302 million for the Forest Service and about \$147 million for the Interior agencies. (See app. II for detailed information on the agencies' fuel reduction obligations for fiscal years 2004 through 2014.)

⁷⁵NPS officials told us they are working to refine their funding allocation process by combining results from the Planning Data System with outputs from a risk based fire occurrence and workload analysis tool that they are currently developing, the Strategic Allocation Model.

⁷⁶As noted, Interior now refers to this activity as fuel management rather than fuel reduction.

⁷⁷In 2007, we recommended that the agencies develop a systematic approach to allocating fuel reduction funding. See [GAO-07-1168](#).

Forest Service officials told us their new system identifies locations where the highest probability of wildland fire intersects with important resources, such as residential areas and watersheds critical to municipal water supplies. These officials told us the new system allows the agency to invest its fuel reduction funds in areas where there are both a high probability of wildland fires and important resources at risk. In contrast, according to officials, HFPAS in some cases prioritized funding for areas where important resources, such as extensive WUI, existed but where the potential for wildland fires was low. The new system has identified locations for funding adjustments to Forest Service regions. For example, in 2015 the agency's Eastern and Southern Regions received a smaller proportion of fuel reduction funding than they had previously received, and some western regions saw increases, because results from the system showed that the western regions had more areas with both important resources and high wildland fire potential.

The Forest Service directs its regions to distribute fuel reduction funding to national forests using methods consistent with national information, as well as with specific local data. A senior Forest Service official told us that, as a result, most regions distribute funding to individual national forests based on information generated using HFPAS, augmented with local data. One region has developed a more updated distribution approach. Specifically, in 2012, the Rocky Mountain Region, in conjunction with the Rocky Mountain Research Station and Forest Service headquarters, developed a fuel reduction funding distribution tool that generates a risk priority score for each forest in the region. The risk priority score is based on fire probability, resources at risk from fire, potential fire intensity, and historical fire occurrence. Each forest's risk priority score is used to inform the region's distribution of funding to the national forests.

Interior currently distributes fuel reduction funding to its agencies based on the funding amounts derived from HFPAS results that were last generated in 2013. Interior officials also told us they plan to stop using HFPAS results and are planning to use the new system they are developing, the Risk-Based Wildland Fire Management model, to reflect current information on conditions and risks in distributing fuel reduction funds.

Within Interior, officials from the four agencies told us they have developed, or are in the process of developing, funding distribution systems and tools while they wait for Interior to complete the Risk-Based Wildland Fire Management model. BLM, for example, uses a fuel

reduction funding distribution tool that maps values at risk, including WUI, critical infrastructure, sagebrush habitat, and invasive species data. BLM combines this information with data on wildland fire probability to create a spatial illustration of the values at risk relative to potential fire occurrence. BLM then uses the results of this analysis to fund its state offices. BIA uses its own tool to distribute fuel reduction funding to its regions based on wildland fire potential data generated by the Forest Service. That information is then combined with fire occurrence history and workload capacity to generate a model that shows potential fire risk and capacity across BIA units. FWS officials told us they are developing a fuel reduction funding distribution tool, expected to be used for fiscal year 2016, which considers fire risks associated with each FWS unit. FWS officials told us this tool will identify risk reduction over longer periods of time, contain an accountability function to monitor results, and will share many attributes with FWS' preparedness allocation tool. NPS officials told us the agency will continue to rely on historical amounts, based largely on HFPAS. Similar to the previous Interior distribution approach, NPS distributes funding for specific projects identified at the headquarters level. However, if a unit is not able to implement an identified project, the unit can substitute other projects, as necessary.

Conclusions

Faced with the challenge of working to protect people and resources from the unwanted effects of wildland fire while also recognizing that fire is an inevitable part of the landscape, the federal wildland fire agencies have taken steps aimed at improving their approaches to wildland fire management. Their 2009 update to interagency guidance, for example, was designed to continue moving away from the agencies' decades-long emphasis on suppressing all fires, by giving fire managers more flexibility in responding to fires. In addition, the agencies are working to develop more up-to-date systems for distributing wildland fire resources. A central test of such changes, however, is the extent to which they help ensure appropriate and effective agency responses to fires when they occur. The agencies have acknowledged the importance of reviewing their responses to individual wildland fires to understand their effectiveness and identify possible improvements. However, the agencies have not systematically followed agency policy regarding such fire reviews and, in the reviews they have conducted, they have not used specific criteria in selecting fires and conducting the reviews. Officials from both the Forest Service and Interior told us cost alone should not be the basis for such reviews and have acknowledged the need to improve their criteria for selecting fires and conducting reviews. Draft guidance provided by the Forest Service did not contain specific criteria for such reviews, however,

and Interior officials did not provide information about how they planned to develop criteria or the factors they would consider. By developing specific criteria for selecting fires to review and conducting the reviews, and making commensurate changes to agency policies to help ensure the criteria are consistently applied, the agencies may enhance their ability to ensure that their fire reviews provide useful information and meaningful results. This, in turn, could better position them to identify improvements in their approach to wildland fire management and thereby use their limited resources more effectively.

Recommendations for Executive Action

To better ensure that the agencies have sufficient information to understand the effectiveness of their approach to wildland fires, and to better position them to develop appropriate and effective strategies for wildland fire management, we recommend that the Secretaries of Agriculture and the Interior direct the Chief of the Forest Service and the Director of the Office of Wildland Fire to take the following two actions:

- Develop specific criteria for selecting wildland fires for review and for conducting the reviews as part of their efforts to improve their approach to reviewing fires, and
- Once such criteria are established, revise agency policies to align with the specific criteria developed by the agencies.

Agency Comments and Our Evaluation

We provided a draft of this report for review and comment to the Departments of Agriculture and the Interior. The Forest Service (responding on behalf of the Department of Agriculture) and Interior generally agreed with our findings and recommendations, and their written comments are reproduced in appendixes IV and V respectively. Both agencies stated that they are developing criteria for selecting fires to review and conducting reviews. Both agencies also provided technical comments which we incorporated into our report as appropriate. Interior also provided additional information about wildland fire technology, which we likewise incorporated as appropriate.

We are sending copies of this report to the appropriate congressional committees, the Secretaries of Agriculture and the Interior, and other interested parties. In addition, the report is available at no charge on the GAO website at <http://www.gao.gov>.

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

A handwritten signature in black ink that reads "Anne-Marie Fennell". The signature is written in a cursive style with a large initial "A" and a horizontal line underlining the name.

Anne-Marie Fennell
Director, Natural Resources and Environment

Appendix I: Objectives, Scope, and Methodology

This report examines (1) key changes the federal wildland fire agencies have made in their approach to wildland fire management since 2009, (2) how the agencies assess the effectiveness of their wildland fire management programs, and (3) how the agencies determine the distribution of their wildland fire management resources.

To perform this work, we reviewed laws, policies, guidance, academic literature, and reviews related to federal wildland fire management. These included the 1995 Federal Wildland Fire Management Policy and subsequent implementation guidance, the *Interagency Standards for Fire and Fire Aviation Operations*, and the 2009 and 2014 Quadrennial Fire Reviews. We also interviewed headquarters officials from each of the five federal land management agencies responsible for wildland fire management—the Forest Service in the Department of Agriculture and the Bureau of Indian Affairs (BIA), Bureau of Land Management (BLM), Fish and Wildlife Service (FWS), and National Park Service (NPS) in the Department of the Interior—as well as Interior’s Office of Wildland Fire.

We also conducted semistructured interviews of regional officials in each of the agencies to obtain information about issues specific to particular regions and understand differences across regions.¹ We interviewed wildland fire management program officials from each of the 9 Forest Service regional offices, 11 of BLM’s 12 state offices,² and 2 regional offices each for BIA, FWS, and NPS. We focused these regional interviews primarily on the Forest Service and BLM because those agencies receive the greatest percentage of appropriated federal wildland fire funding. For BIA, FWS, and NPS, we selected the two regions from each agency that received the most funds in those agencies—BIA’s Northwest and Western Regions, FWS’s Southwest and Southeast Regions, and NPS’s Pacific West and Intermountain Regions. We conducted a total of 25 semistructured interviews of regional offices.³

¹The Forest Service, BIA, FWS, and NPS have regional offices, while BLM has state offices. For the purposes of this report, we refer to all of these as regional offices when we discuss the agencies collectively.

²We did not interview officials from the BLM Eastern States Office because its wildland fire management program is minimal.

³The number of semistructured interviews we conducted does not match the number of regional offices identified because two Forest Service regions were included in one interview.

During these semistructured interviews we asked about (1) significant changes to the agencies' approach to wildland fire management, including regional efforts to implement the policy areas identified in the *2009 interagency Guidance for Implementation of Federal Wildland Fire Management Policy*, (2) agency efforts to assess the effectiveness of their wildland fire management activities, and (3) agency processes for determining the distribution of fire management resources. We focused our review on three primary components of wildland fire management—suppression, preparedness, and fuel reduction—because they account for the highest spending amounts among wildland fire management activities.⁴

To address our first objective, we reviewed agency documents, such as policy and guidance, as well as other documents such as agency budget justifications, to identify changes the agencies have made to their approach to managing wildland fire since 2009, efforts the agencies have undertaken to address wildland fire management challenges, agency-identified improvements resulting from those changes, and challenges associated with implementing them. Our review focuses on changes since 2009 because we last completed a comprehensive review of wildland fire management in that year, and because the agencies' last significant change to interagency wildland fire management guidance for implementing the Federal Wildland Fire Management Policy also occurred that year. To further our understanding of these issues, we also asked about these changes in our interviews with agency headquarters officials. In particular, we asked about the extent to which changes to the agencies' wildland fire management approaches have occurred or are planned, the effects of these changes, and associated challenges. In addition, we relied on the semistructured interviews of regional officials described above to understand how the regions implemented national direction and policy. We analyzed the responses provided to us during the interviews to identify common themes about prominent changes since 2009, and challenges associated with implementing those changes. The information we report represents themes that occurred frequently in our interviews with both regional and headquarters officials. We did not report on changes described during our interviews that were not directly related

⁴Other fire program components include prevention; science, research, and development; site rehabilitation; and assistance to nonfederal entities.

to wildland fire management, such as changes to general workforce management policies.

To address our second objective, we reviewed agency strategic plans and budget justifications describing performance measures, as well as other documents associated with agency efforts to assess their programs, including fire reviews. We also reviewed legislative and agency direction related to fire reviews, including agency policies and the *Interagency Standards for Fire and Fire Aviation Operations*, and reviewed reports resulting from fire reviews conducted by the agencies since 2009. We compared agency practices for conducting fire reviews to direction contained in relevant agency policy. We also interviewed headquarters officials to identify the agencies' key performance measures and the extent to which those measures reflect changing approaches to wildland fire management. In our interviews with headquarters and regional officials, we also inquired about other mechanisms the agencies use to determine the effectiveness of their wildland fire management programs, as well as any changes they are making in this area. To obtain additional insight into the use of performance information on the part of federal agencies, we also reviewed our previous reports related to agencies' use of performance information.

To address our third objective, we reviewed relevant agency budget documentation, including annual budget justifications and documentation of agency obligations, as well as information about the tools and systems the agencies use to distribute funds and resources. We did not assess the design or use of any of the agencies' tools or systems for distributing funds. We interviewed agency officials at the headquarters and regional levels to identify the processes they use for budget formulation and resource distribution. We asked about the extent to which these processes have changed in recent years at the headquarters and regional levels for each of the five agencies and the extent to which they have changed funding and resource amounts. We also obtained data from the Forest Service and from Interior's Office of Wildland Fire on obligations for each of the three primary wildland fire management components—suppression, preparedness, and fuel reduction—from fiscal years 2004 through 2014, analyzing the data in both nominal (actual) and constant (adjusted for inflation) terms. Adjusting nominal dollars to constant dollars allows the comparison of purchasing power across fiscal years. To adjust for inflation, we used the gross domestic product price index with 2014 as the base year. We reviewed budget documents and obligation data provided by the agencies, and interviewed agency officials

knowledgeable about the data, and we found the data sufficiently reliable for the purposes of this report.

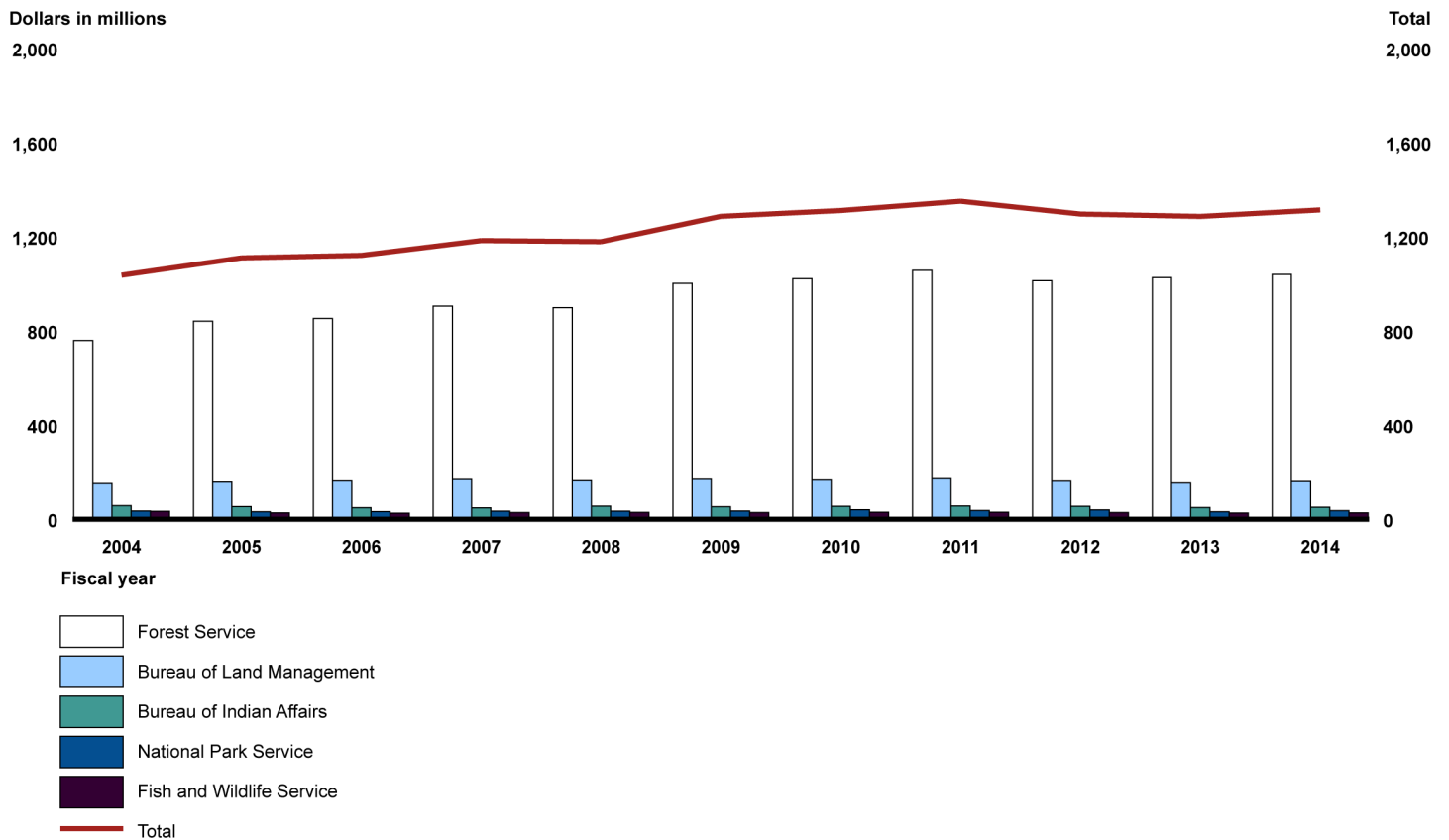
We conducted this performance audit from August 2014 to September 2015 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions 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: Forest Service and Interior Agency Obligations for Preparedness, Fuel Reduction, and Suppression, Fiscal Years 2004 through 2014

This appendix provides information on preparedness, fuel reduction, and suppression obligations by the Forest Service and the Department of the Interior's four wildland fire agencies—the Bureau of Indian Affairs, Bureau of Land Management, Fish and Wildlife Service, and National Park Service—for fiscal years 2004 through 2014.

Figures 4, 5, and 6 show overall agency obligations for preparedness, fuel reduction, and suppression for fiscal years 2004 through 2014. Individual agencies' obligations for each of the three programs are described later in this appendix.

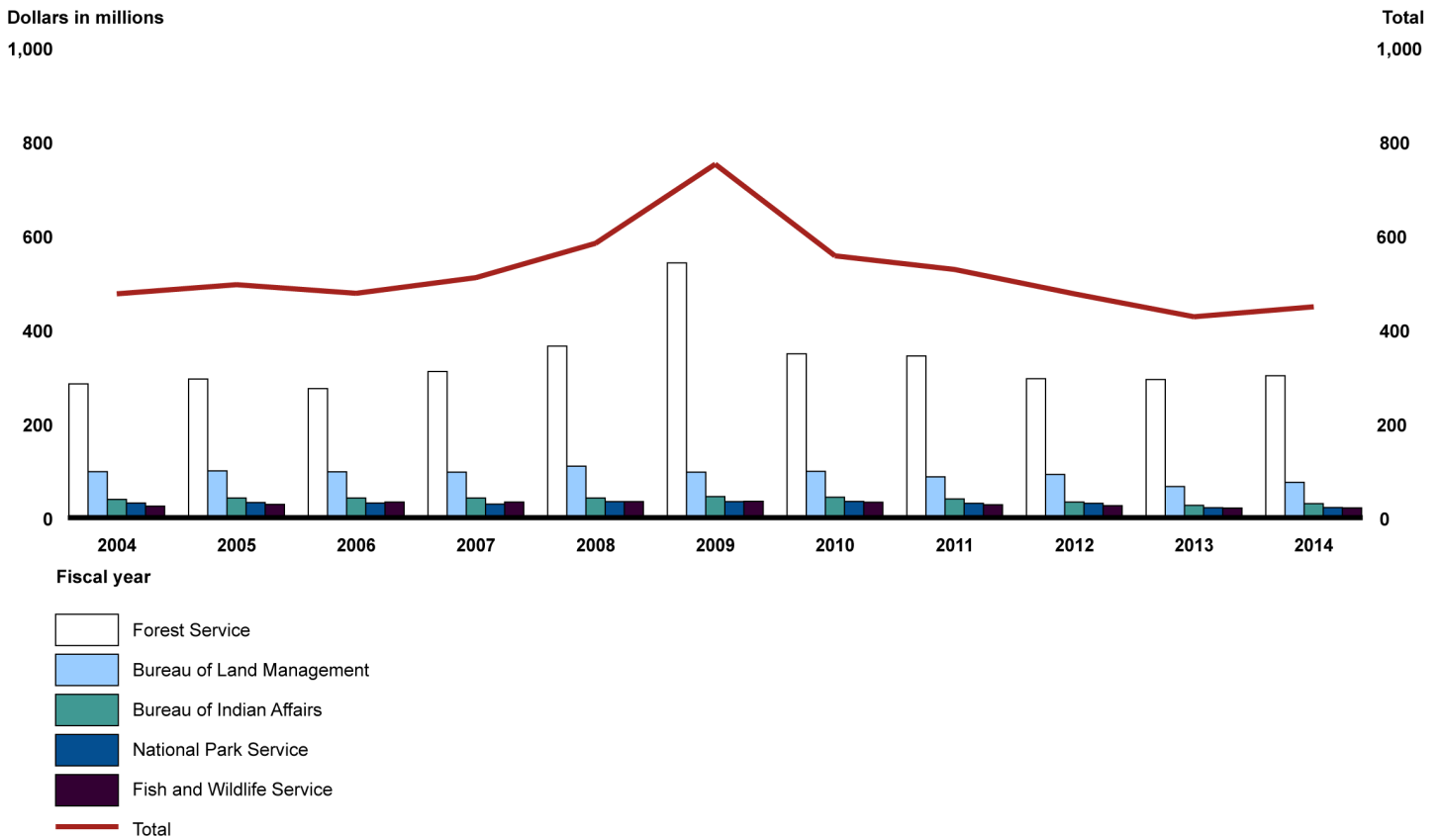
Figure 4: Forest Service and Interior Agency Wildland Fire Preparedness Obligations, Fiscal Years 2004 through 2014



Sources: GAO analysis of Forest Service, Bureau of Land Management, Bureau of Indian Affairs, National Park Service, and Fish and Wildlife Service funding data. | GAO-15-772

Appendix II: Forest Service and Interior Agency Obligations for Preparedness, Fuel Reduction, and Suppression, Fiscal Years 2004 through 2014

Figure 5: Forest Service and Interior Agency Fuel Reduction Obligations, Fiscal Years 2004 through 2014

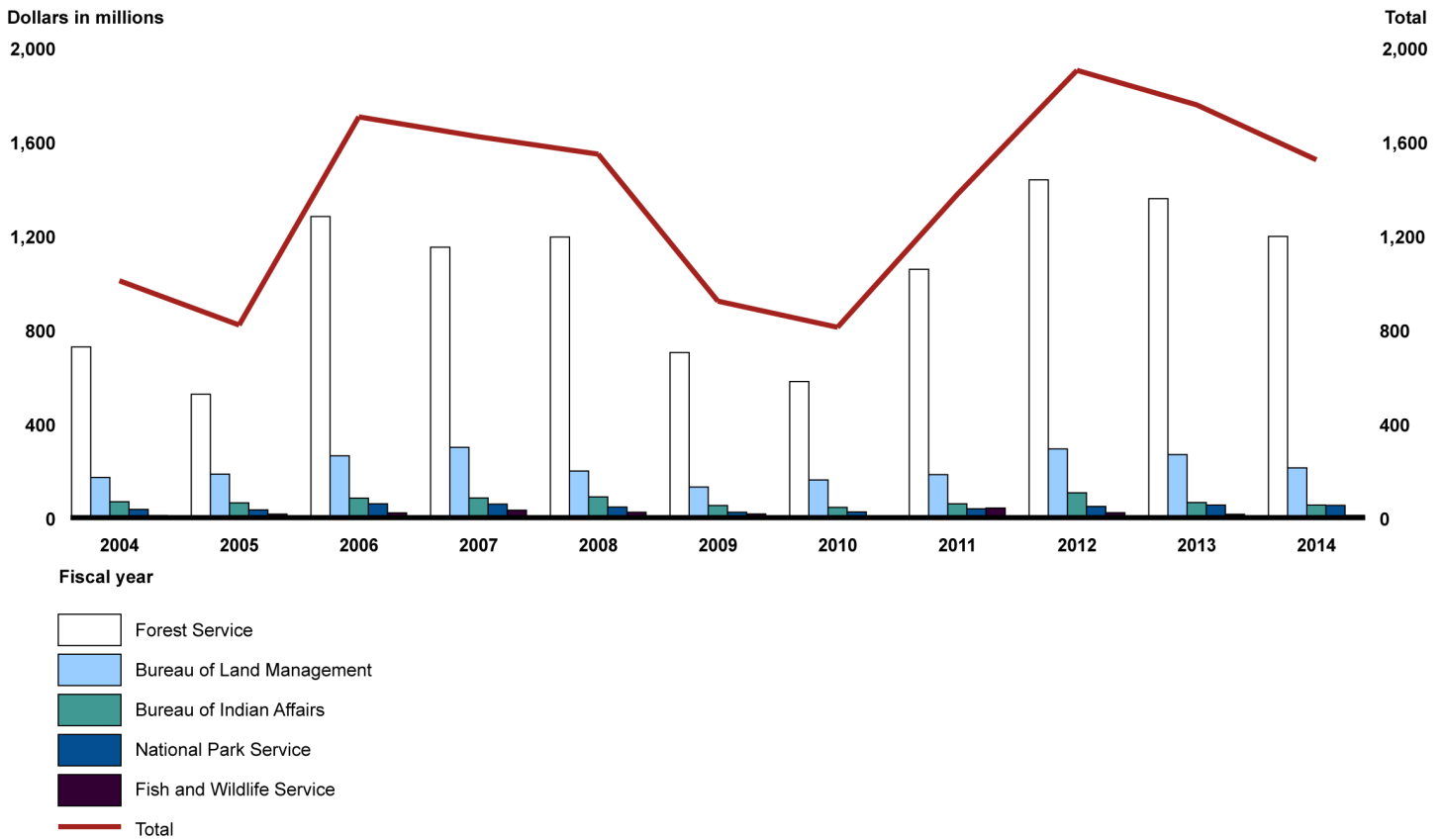


Sources: GAO analysis of Forest Service, Bureau of Land Management, Bureau of Indian Affairs, National Park Service, and Fish and Wildlife Service funding data. | GAO-15-772

Note: The increase in agency obligations for fuel reduction in fiscal year 2009 was due in part to additional appropriations provided by the American Recovery and Reinvestment Act of 2009 (Pub. L. No. 111-5).

Appendix II: Forest Service and Interior Agency Obligations for Preparedness, Fuel Reduction, and Suppression, Fiscal Years 2004 through 2014

Figure 6: Forest Service and Interior Agency Wildland Fire Suppression Obligations, Fiscal Years 2004 through 2014



Sources: GAO analysis of Forest Service, Bureau of Land Management, Bureau of Indian Affairs, National Park Service, and Fish and Wildlife Service funding data. | GAO-15-772

Appendix II: Forest Service and Interior Agency Obligations for Preparedness, Fuel Reduction, and Suppression, Fiscal Years 2004 through 2014

Table 1 and figure 7 show annual Forest Service wildland fire management obligations for fiscal years 2004 through 2014. Preparedness obligations increased from nearly \$760 million in fiscal year 2004 to about \$1.0 billion in fiscal year 2014, an average increase of 3.2 percent per year, or 1.2 percent after adjusting for inflation.¹ Fuel reduction obligations increased from about \$284 million in fiscal year 2004 to about \$302 million in fiscal year 2014, an average annual increase of 0.6 percent, or a 1.4 percent decrease after adjusting for inflation. Suppression obligations fluctuated from year to year, with a high of about \$1.4 billion in fiscal year 2012 and a low of about \$525 million in fiscal year 2005.

Table 1: Forest Service Wildland Fire Obligations for Preparedness, Fuel Reduction, and Suppression, Fiscal Years 2004 through 2014

Dollars in millions

Fiscal year	Preparedness		Fuel reduction		Suppression		Total	
	Nominal	Inflation-adjusted	Nominal	Inflation-adjusted	Nominal	Inflation-adjusted	Nominal	Inflation-adjusted
2004	\$759.3	\$927.1	\$284.2	\$347.0	\$726.0	\$886.4	\$1,769.6	\$2,160.6
2005	841.2	995.7	294.5	348.6	524.9	621.3	1,660.6	1,965.7
2006	852.8	977.7	274.3	314.5	1,280.4	1,468.0	2,407.5	2,760.1
2007	905.6	1,010.7	310.6	346.7	1,149.7	1,283.2	2,365.8	2,640.5
2008	898.4	982.4	364.5	398.6	1,193.1	1,304.6	2,456.0	2,685.6
2009	1,002.2	1,083.3	541.6	585.4	702.1	758.9	2,245.9	2,427.5
2010	1,021.8	1,094.9	348.2	373.1	578.3	619.6	1,948.3	2,087.6
2011	1,057.4	1,110.4	343.6	360.8	1,055.7	1,108.7	2,456.7	2,579.9
2012	1,013.2	1,045.0	295.3	304.6	1,436.6	1,481.8	2,745.1	2,831.4
2013	1,026.7	1,042.4	293.7	298.2	1,356.5	1,377.3	2,676.9	2,717.9
2014	1,040.0	1,040.0	301.7	301.7	1,196.0	1,196.0	2,537.7	2,537.7

Source: GAO analysis of Forest Service funding data. | GAO-15-772

Notes: Inflation-adjusted figures represent obligations in fiscal year 2014 dollars.

Totals may not add due to rounding.

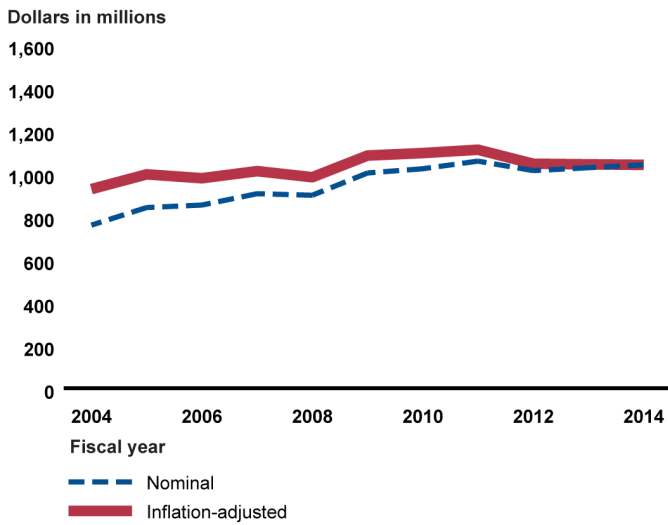
¹According to Forest Service budget justifications, the Forest Service shifted aviation costs from the suppression account to the preparedness account beginning in fiscal year 2012. The Forest Service has retroactively adjusted the figures in both of these accounts for fiscal years 2005 through fiscal year 2011 to reflect this correction and allow comparability of numbers before and after this shift.

Appendix II: Forest Service and Interior Agency Obligations for Preparedness, Fuel Reduction, and Suppression, Fiscal Years 2004 through 2014

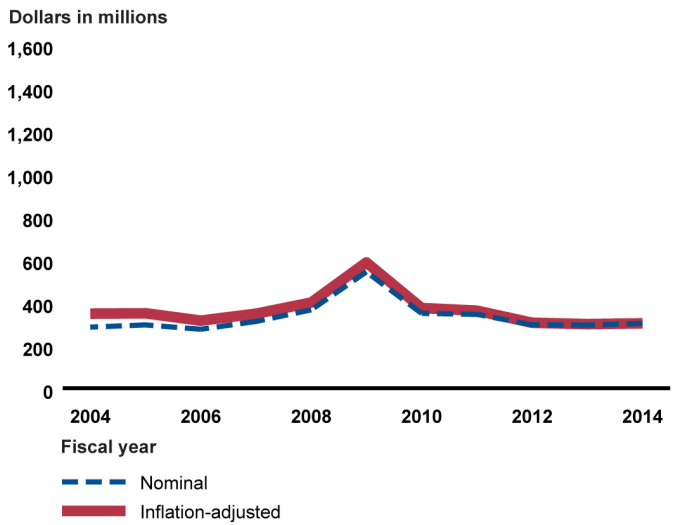
Figure 7: Forest Service Wildland Fire Obligations for Preparedness, Fuel Reduction, and Suppression, Fiscal Years 2004 through 2014

Forest Service (obligations)

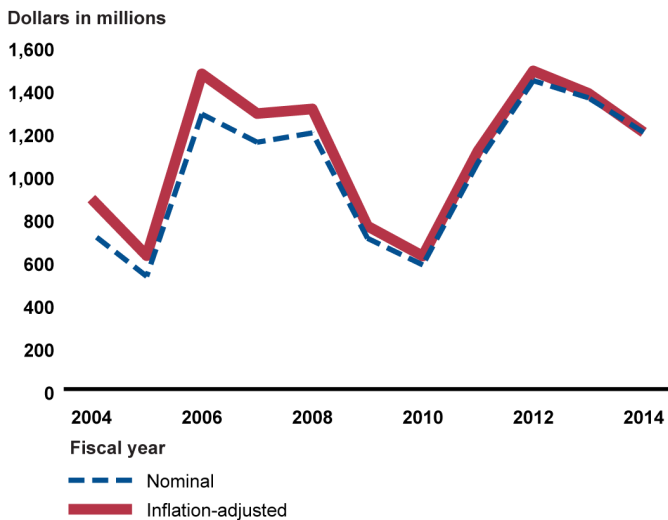
Preparedness



Fuel reduction



Suppression



Source: GAO analysis of Forest Service funding data. | GAO-15-772

Note: Inflation-adjusted figures represent obligations in fiscal year 2014 dollars.

Appendix II: Forest Service and Interior Agency Obligations for Preparedness, Fuel Reduction, and Suppression, Fiscal Years 2004 through 2014

Table 2 and figure 8 show annual Bureau of Indian Affairs wildland fire management obligations for fiscal years 2004 through 2014. Preparedness obligations decreased from nearly \$58 million in fiscal year 2004 to about \$51 million in fiscal year 2014, an average annual decrease of 1.3 percent per year, or 3.2 percent after adjusting for inflation. Fuel reduction obligations decreased from about \$39 million in fiscal year 2004 to about \$30 million in fiscal year 2014, an average annual decrease of 2.6 percent, or 4.5 percent after adjusting for inflation. Suppression obligations fluctuated from year to year, with a high of about \$105 million in fiscal year 2012 and a low of about \$43 million in fiscal year 2010.

Table 2: Bureau of Indian Affairs Wildland Fire Obligations for Preparedness, Fuel Reduction, and Suppression, Fiscal Years 2004 through 2014

Dollars in millions

Fiscal year	Preparedness		Fuel reduction		Suppression		Total	
	Nominal	Inflation-adjusted	Nominal	Inflation-adjusted	Nominal	Inflation-adjusted	Nominal	Inflation-adjusted
2004	\$57.6	\$70.3	\$38.7	\$47.2	\$67.5	\$82.4	\$163.8	\$200.0
2005	53.0	62.8	41.8	49.5	62.4	73.9	157.3	186.2
2006	48.5	55.6	41.7	47.8	82.9	95.1	173.1	198.5
2007	47.7	53.2	41.5	46.3	83.1	92.7	172.2	192.2
2008	55.0	60.1	41.7	45.6	87.9	96.2	184.6	201.8
2009	52.3	56.5	44.6	48.2	51.1	55.2	147.9	159.9
2010	54.4	58.3	43.2	46.3	43.2	46.3	140.8	150.8
2011	56.2	59.1	39.7	41.7	58.5	61.4	154.5	162.2
2012	54.8	56.6	33.0	34.0	105.4	108.7	193.1	199.2
2013	49.3	50.0	26.1	26.5	63.6	64.6	139.0	141.2
2014	50.8	50.8	29.7	29.7	53.2	53.2	133.7	133.7

Source: GAO analysis of Department of the Interior funding data. | GAO-15-772

Notes: Inflation-adjusted figures represent obligations in fiscal year 2014 dollars.

Totals may not add due to rounding.

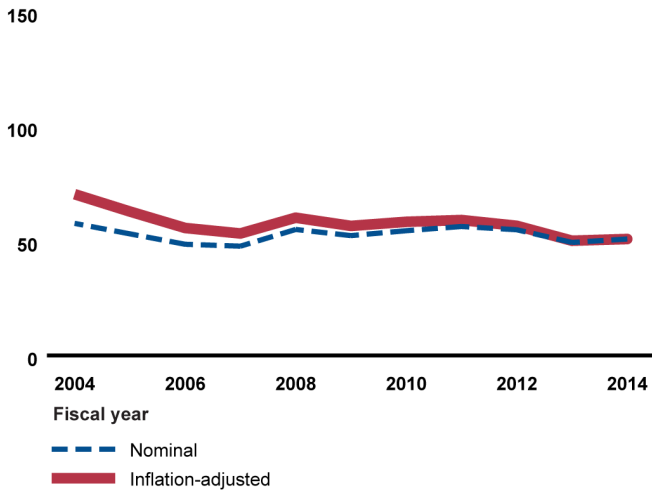
Appendix II: Forest Service and Interior Agency Obligations for Preparedness, Fuel Reduction, and Suppression, Fiscal Years 2004 through 2014

Figure 8: Bureau of Indian Affairs Wildland Fire Obligations for Preparedness, Fuel Reduction, and Suppression, Fiscal Years 2004 through 2014

Bureau of Indian Affairs (obligations)

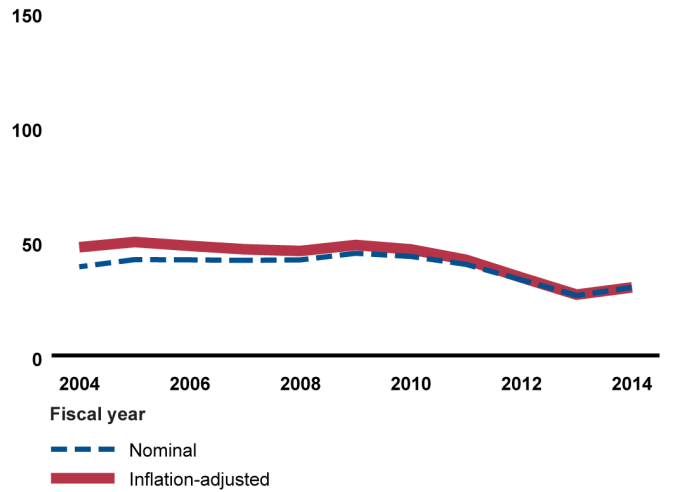
Preparedness

Dollars in millions



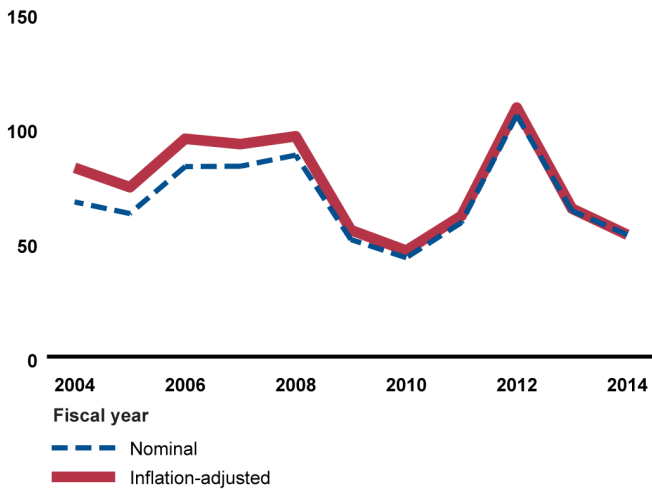
Fuel reduction

Dollars in millions



Suppression

Dollars in millions



Source: GAO analysis of Department of the Interior funding data. | GAO-15-772

Note: Inflation-adjusted figures represent obligations in fiscal year 2014 dollars.

Appendix II: Forest Service and Interior Agency Obligations for Preparedness, Fuel Reduction, and Suppression, Fiscal Years 2004 through 2014

Table 3 and figure 9 show annual Bureau of Land Management wildland fire management obligations from fiscal years 2004 through 2014. Preparedness obligations increased from nearly \$152 million in fiscal year 2004 to about \$160 million in fiscal year 2014, an average annual increase of 0.6 percent per year, or a 1.4 percent decrease after adjusting for inflation. Fuel reduction obligations decreased from about \$98 million in fiscal year 2004 to about \$75 million in fiscal year 2014, an average annual decrease of 2.6 percent, or 4.6 percent after adjusting for inflation. Suppression obligations fluctuated from year to year, with a high of about \$299 million in fiscal year 2007 and a low of about \$130 million in fiscal year 2009.

Table 3: Bureau of Land Management Wildland Fire Obligations for Preparedness, Fuel Reduction, and Suppression, Fiscal Years 2004 through 2014

Dollars in millions

Fiscal year	Preparedness		Fuel reduction		Suppression		Total	
	Nominal	Inflation-adjusted	Nominal	Inflation-adjusted	Nominal	Inflation-adjusted	Nominal	Inflation-adjusted
2004	\$151.6	\$185.1	\$97.7	\$119.3	\$170.5	\$208.1	\$419.8	\$512.5
2005	157.6	186.6	99.2	117.4	184.4	218.2	441.2	522.2
2006	162.2	185.9	97.2	111.4	262.7	301.2	522.1	598.5
2007	168.7	188.3	96.6	107.8	298.5	333.1	563.8	629.3
2008	163.3	178.6	109.4	119.6	198.0	216.5	470.7	514.7
2009	169.6	183.3	96.8	104.6	129.9	140.5	396.3	428.3
2010	166.2	178.0	98.3	105.4	160.0	171.4	424.5	454.8
2011	171.9	180.5	86.6	90.9	182.6	191.8	441.1	463.3
2012	161.1	166.2	91.8	94.7	292.2	301.3	545.1	562.2
2013	153.3	155.7	66.1	67.1	268.2	272.3	487.6	495.1
2014	160.2	160.2	74.8	74.8	211.3	211.3	446.4	446.4

Source: GAO analysis of Department of the Interior funding data. | GAO-15-772

Notes: Inflation-adjusted figures represent obligations in fiscal year 2014 dollars.

Totals may not add due to rounding.

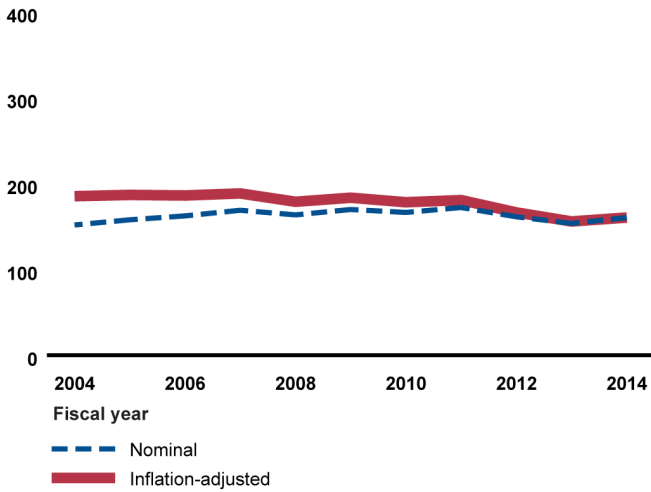
Appendix II: Forest Service and Interior Agency Obligations for Preparedness, Fuel Reduction, and Suppression, Fiscal Years 2004 through 2014

Figure 9: Bureau of Land Management Wildland Fire Obligations for Preparedness, Fuel Reduction, and Suppression, Fiscal Years 2004 through 2014

Bureau of Land Management (obligations)

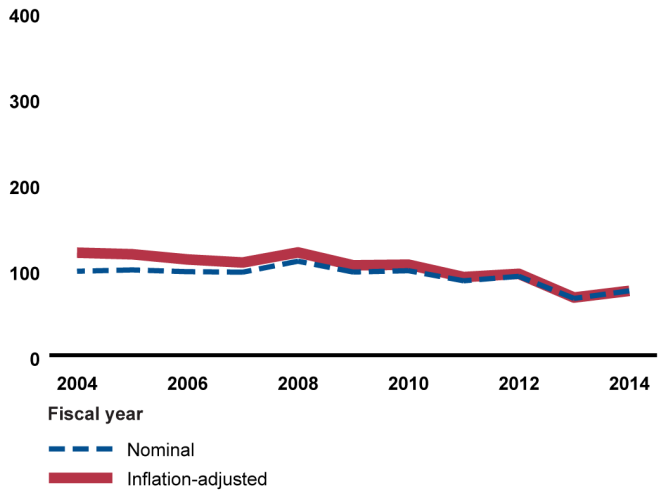
Preparedness

Dollars in millions



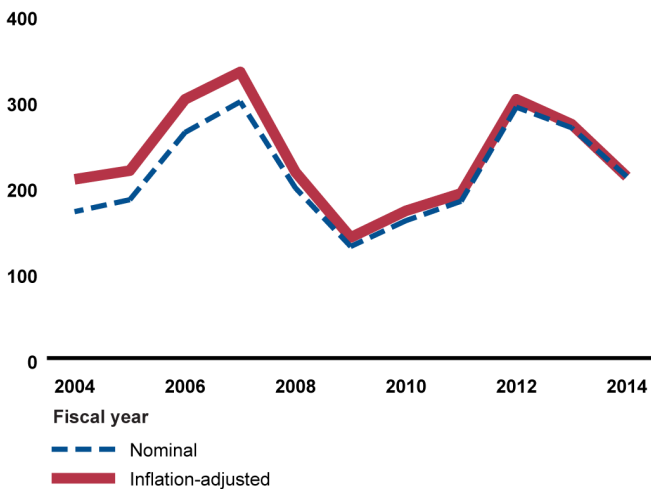
Fuel reduction

Dollars in millions



Suppression

Dollars in millions



Source: GAO analysis of Department of the Interior funding data. | GAO-15-772

Note: Inflation-adjusted figures represent obligations in fiscal year 2014 dollars.

Appendix II: Forest Service and Interior Agency Obligations for Preparedness, Fuel Reduction, and Suppression, Fiscal Years 2004 through 2014

Table 4 and figure 10 show annual Fish and Wildlife Service wildland fire management obligations for fiscal years 2004 through 2014. Preparedness obligations decreased from about \$33 million in fiscal year 2004 to about \$27 million in fiscal year 2014, an average annual decrease of 2.1 percent per year, or 4.1 percent after adjusting for inflation. Fuel reduction obligations decreased from about \$24 million in fiscal year 2004 to about \$21 million in fiscal year 2014, an average annual decrease of 1.5 percent, or 3.5 percent after adjusting for inflation. Suppression obligations fluctuated from year to year, with a high of about \$41 million in fiscal year 2011 and a low of about \$4 million in fiscal year 2010.

Table 4: Fish and Wildlife Service Wildland Fire Obligations for Preparedness, Fuel Reduction, and Suppression, Fiscal Years 2004 through 2014

Dollars in millions

Fiscal year	Preparedness		Fuel reduction		Suppression		Total	
	Nominal	Inflation-adjusted	Nominal	Inflation-adjusted	Nominal	Inflation-adjusted	Nominal	Inflation-adjusted
2004	\$33.4	\$40.7	\$24.2	\$29.6	\$8.4	\$10.3	\$66.0	\$80.6
2005	26.8	31.7	27.9	33.0	14.3	16.9	69.0	81.7
2006	25.6	29.3	33.0	37.8	19.9	22.9	78.5	90.0
2007	27.7	30.9	33.0	36.8	31.4	35.1	92.1	102.8
2008	28.4	31.1	33.9	37.1	22.5	24.6	84.9	92.8
2009	28.2	30.5	34.8	37.6	15.0	16.2	78.0	84.4
2010	29.4	31.5	32.6	34.9	4.3	4.6	66.3	71.0
2011	29.0	30.4	27.5	28.8	40.5	42.6	97.0	101.8
2012	27.9	28.8	25.5	26.3	20.8	21.4	74.2	76.5
2013	25.9	26.3	20.2	20.5	14.1	14.3	60.2	61.1
2014	26.9	26.9	20.7	20.7	9.4	9.4	57.0	57.0

Source: GAO analysis of Department of the Interior funding data. | GAO-15-772

Notes: Inflation-adjusted figures represent obligations in fiscal year 2014 dollars.

Totals may not add due to rounding.

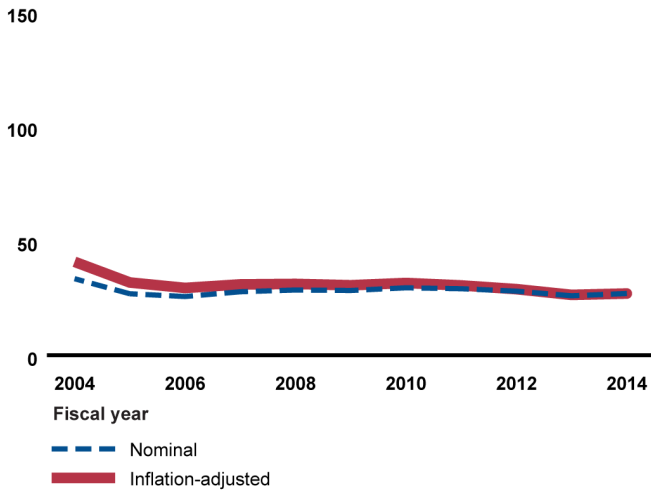
Appendix II: Forest Service and Interior Agency Obligations for Preparedness, Fuel Reduction, and Suppression, Fiscal Years 2004 through 2014

Figure 10: Fish and Wildlife Service Wildland Fire Obligations for Preparedness, Fuel Reduction, and Suppression, Fiscal Years 2004 through 2014

Fish and Wildlife Service (obligations)

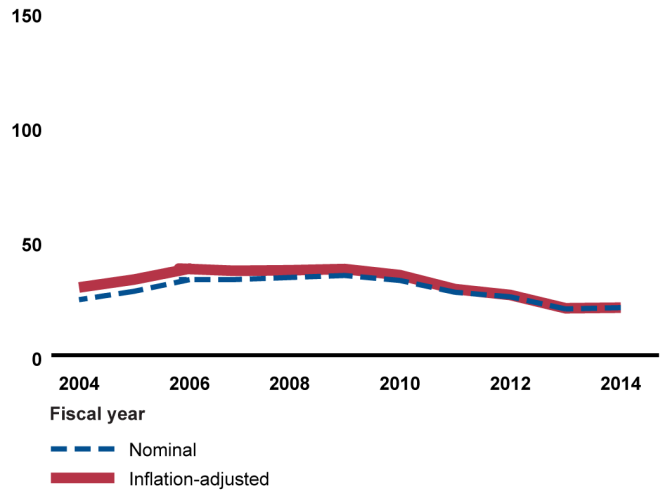
Preparedness

Dollars in millions



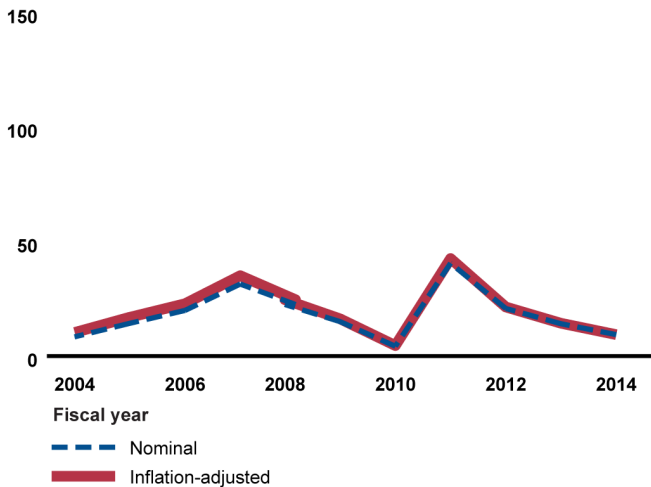
Fuel reduction

Dollars in millions



Suppression

Dollars in millions



Source: GAO analysis of Department of the Interior funding data. | GAO-15-772

Note: Inflation-adjusted figures represent obligations in fiscal year 2014 dollars.

Appendix II: Forest Service and Interior Agency Obligations for Preparedness, Fuel Reduction, and Suppression, Fiscal Years 2004 through 2014

Table 5 and figure 11 show annual National Park Service wildland fire management obligations for fiscal years 2004 through 2014. Obligations for preparedness increased from about \$35 million in fiscal year 2004 to about \$36 million in fiscal year 2014, an average annual increase of 0.5 percent per year, or a 1.5 percent decrease after adjusting for inflation. Fuel reduction obligations decreased from about \$31 million in fiscal year 2004 to about \$21 million in fiscal year 2014, an average annual decrease of 3.7 percent, or 5.6 percent after adjusting for inflation. Suppression obligations fluctuated from year to year, with a high of about \$58 million in fiscal year 2006 and a low of about \$22 million in fiscal year 2009.

Table 5: National Park Service Wildland Fire Obligations for Preparedness, Fuel Reduction, and Suppression, Fiscal Years 2004 through 2014

Dollars in millions

Fiscal year	Preparedness		Fuel reduction		Suppression		Total	
	Nominal	Inflation-adjusted	Nominal	Inflation-adjusted	Nominal	Inflation-adjusted	Nominal	Inflation-adjusted
2004	\$34.6	\$42.2	\$31.1	\$38.0	\$34.9	\$42.6	\$100.6	\$122.8
2005	31.5	37.3	31.8	37.7	32.9	39.0	96.3	114.0
2006	31.9	36.6	30.9	35.4	58.5	67.0	121.2	139.0
2007	34.1	38.1	28.6	31.9	57.4	64.1	120.1	134.1
2008	33.9	37.1	33.9	37.0	44.3	48.5	112.1	122.6
2009	34.4	37.2	33.9	36.6	22.4	24.2	90.6	98.0
2010	39.7	42.5	34.4	36.8	23.7	25.4	97.8	104.7
2011	36.4	38.2	30.3	31.8	37.0	38.9	103.7	108.9
2012	39.3	40.6	30.4	31.3	47.4	48.9	117.1	120.8
2013	31.0	31.5	21.0	21.3	53.1	53.9	105.2	106.8
2014	36.2	36.2	21.4	21.4	52.2	52.2	109.8	109.8

Source: GAO analysis of Department of the Interior funding data. | GAO-15-772

Notes: Inflation-adjusted figures represent obligations in fiscal year 2014 dollars.

Totals may not add due to rounding.

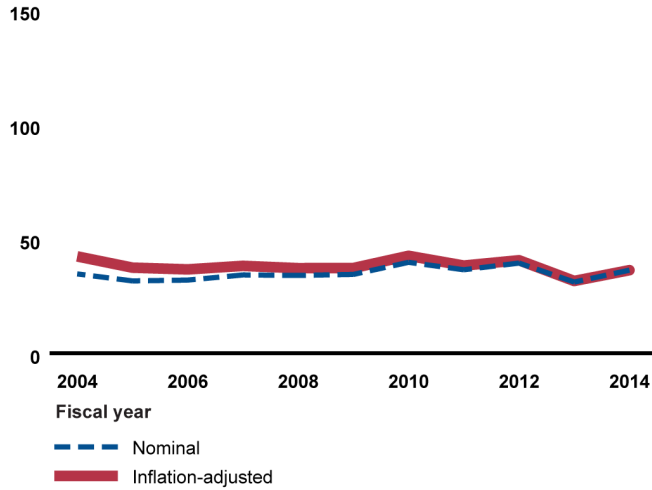
Appendix II: Forest Service and Interior Agency Obligations for Preparedness, Fuel Reduction, and Suppression, Fiscal Years 2004 through 2014

Figure 11: National Park Service Wildland Fire Obligations for Preparedness, Fuel Reduction, and Suppression, Fiscal Years 2004 through 2014

National Park Service (obligations)

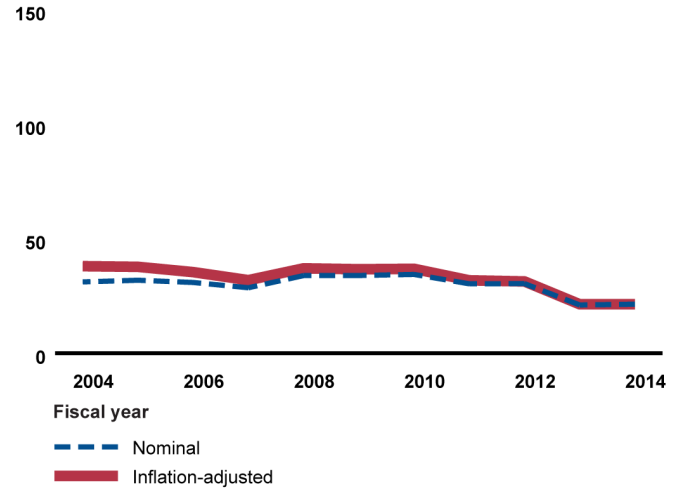
Preparedness

Dollars in millions



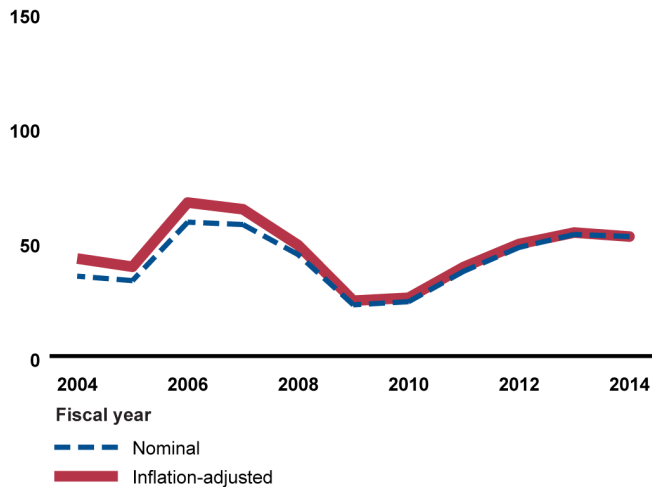
Fuel reduction

Dollars in millions



Suppression

Dollars in millions



Source: GAO analysis of Department of the Interior funding data. | GAO-15-772

Note: Inflation-adjusted figures represent obligations in fiscal year 2014 dollars.

Appendix III: Differences in Forest Service and Department of the Interior Salary Payments Using Preparedness and Suppression Funding

The Forest Service and the Department of the Interior use different approaches for paying the base salaries of their staff during wildland fire incidents.¹ For periods when firefighters are dispatched to fight fires, the Forest Service generally pays its firefighters' base salaries using *suppression* funds, whereas Interior pays its firefighters' base salaries primarily using *preparedness* funds.² Forest Service officials told us that under this approach, regional offices, which are responsible for hiring firefighters in advance of the fire season, routinely hire more firefighters than their preparedness budgets will support, assuming they can rely on suppression funds to pay the difference. Forest Service officials told us that their funding approach helps the agency maintain its firefighting capability over longer periods of time during a season and accurately track the overall costs of fires. Interior officials told us they choose to use preparedness funds to pay their firefighters' base salaries during a wildland fire because it constitutes a good business practice. According to a Wildland Fire Leadership Council document, in 2003, the council agreed that the agencies would use a single, unified approach and pay firefighters' base salary using Interior's method of using preparedness funds. However, the council subsequently noted that in 2004 the Office of Management and Budget directed the Forest Service to continue using suppression funds to pay firefighters' base salaries. The agencies have used separate approaches since 2004.

¹Base salary represents the salary paid for a standard 8-hour work shift.

²Interior uses preparedness funds to pay for its firefighters' standard 8-hour work shift on a wildland fire, and suppression funds to pay for any overtime. The Forest Service uses suppression funds to pay for any time a firefighter spends on a wildland fire.

Appendix IV: Comments from the Department of Agriculture



United States
Department of
Agriculture

Forest
Service

Washington Office

1400 Independence Avenue, SW
Washington, DC 20250

File Code: 1420
Date: Sep 3 2015

Ms. Anne-Marie Fennell
Director, Natural Resources and Environment
U.S. Government Accountability Office
441 G Street, NW
Washington, DC 20548

Dear Ms. Fennell:

The U.S. Department of Agriculture (USDA) appreciates the opportunity to respond to the U.S. Government Accountability Office (GAO) draft report "Wildland Fire Management: Agencies Have Made Several Key Changes, but Could Benefit from More Information about Effectiveness, (GAO-15-772)." The USDA generally agrees with the findings and recommendation in the GAO draft report.


We value the GAO's assistance in reporting on key changes and effectiveness of the Federal Wildland Fire program. The Forest Service is currently developing criteria for selecting fires to be reviewed. These criteria may include things such as:

- Fires that posed a significant challenge, requiring a heavy resource commitment to meet objectives, or with complex ownership and critical values threatened.
- Fires where innovation or extraordinary events provide a learning opportunity.

In addition, we are now developing criteria for the fire review process to ensure we are providing oversight of our decisions and investments as part of appropriate management and fiscal control. The reviews help us learn and improve, by challenging our assumptions and evaluating areas for gained efficiency and alignment with policy, doctrine and partners.

Thank you again for the opportunity to review the draft report. If you have any questions, please contact Thelma Strong, Chief Financial Officer, at 202-205-0429 or tstrong@fs.fed.us.

Sincerely,


THOMAS L. TIDWELL
Chief



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Appendix V: Comments from the Department of the Interior



United States Department of the Interior

OFFICE OF THE SECRETARY
Washington, DC 20240

SEP 04 2015

Ms. Anne-Marie Fennell
Director, Natural Resources and Environment
U.S. Government Accountability Office
441 G Street, NW
Washington, DC 20548

Dear Ms. Fennell:

Thank you for providing the Department of the Interior (Department) the opportunity to review and comment on the draft Government Accountability Office (GAO) Report entitled *Wildland Fire Management: Agencies Have Made Several Key Changes, but Could Benefit from More Information about Effectiveness* (GAO-15-772). We appreciate GAO's review of the key changes in the agencies' approach to wildland fire management since 2009 and their effectiveness.

This report underscores the success of the interagency wildland fire management program. The Department of the Interior is proud to be part of this ongoing effort to provide safe and effective protection and response to wildfires, to promote healthy and resilient forest and rangeland landscapes, and to strengthen the resilience of communities to wildland fire. We are committed to continuing to work with our interagency and intergovernmental partners to improve policy and program delivery.

We are requesting an addition to the factual portion of the report, one technical comment in "What GAO Found," and a comment on the phrasing of the recommendations.

1. Addition to the factual portion of the Report

GAO did not include an important component of work to improve information and technology in support of the wildland fire management program (page 22 of the draft report) in the report. The Departments of the Interior and Agriculture are working together to take a common, integrated approach to information and technology management. This effort began in 2012. We would like the following text added to the report at the end of this section:

The report titled "Wildland Fire Information and Technology - Strategy, Governance, and Investments" was reviewed and accepted jointly by senior leadership in DOI and the Forest Service on March 23, 2012. Formal implementation of this effort was put into place on August 24, 2012, again, jointly by DOI and the Forest Service. This involved developing and implementing a common wildland fire information and technology vision and strategy for use in evaluating current and new investments and developing a single, interagency governance process for managing and overseeing those investments. The two Departments entered into a Memorandum of

Understanding that establishes a common management and governance approach for standardizing business processes and providing standardized information and technology services in a timely, consistent, reliable, integrated, innovative, and cohesive manner to meet business requirements and priorities of the wildland fire business community. Senior leadership in both the agencies report that they are completing a multi-year integrated investment strategy for wildland fire applications and supporting infrastructure.

2. Technical comment on “What GAO Found” in the summary page

We suggest the following to replace the second and third sentences:

One key change was the issuance of guidance in 2009 on implementing the Interagency Federal Wildland Fire Management Working Group’s January 2001 “Review and Update of the 1995 Federal Wildland Fire Management Policy” that provided managers with more flexibility in responding to wildland fires. This change allowed managers to consider strategic management options, in the context of the risk posed by the wildfire, ensuring that the selected course of action is consistent with land management objectives.

3. Recommendations

The GAO issued two recommendations to the Department in response to its overall findings. We generally agree with the findings and concur with the recommendations and offer the following responses.

Recommendation 1: To better ensure that the agencies have sufficient information to understand the effectiveness of their approach to wildland fires, and to better position them to develop appropriate and effective strategies for wildland fire management, we recommend that the Secretary of the Interior direct the Directors of BIA, BLM, FWS, and NPS develop specific criteria for selecting wildland fires for review and for conducting the reviews as part of their efforts to improve their approach to reviewing fires.

The responsibility for Department-wide wildland fire policy rests with the Office of Wildland Fire, and therefore, we request revising Recommendation 1 as follows (new wording in *italics*):

Recommendation 1: To better ensure that the agencies have sufficient information to understand the effectiveness of their approach to wildland fires, and to better position them to develop appropriate and effective strategies for wildland fire management, we recommend that the Secretary of the Interior direct the *Office of Wildland Fire* develop specific criteria for selecting wildland fires for review and for conducting the reviews as part of *the Department of the Interior* efforts to improve its approach to reviewing fires, *in coordination with the Forest Service*.

Response: The Department continues to undertake steps to understand the effectiveness of its actions including a recently completed examination of “Large Fire Cost Reviews.” From this examination we identified a number of substantive procedural issues that are

**Appendix V: Comments from the Department
of the Interior**

fundamental for the Department's Office of Wildland Fire to formulate new criteria for reviewing wildland fires in the context of protecting life, property, and resource values, as well as other public benefits, such as landscapes that are resilient to impacts from wildfire. In addition, the BLM established a process in 2015 for conducting large fire assessments for wildfires occurring in sage grouse habitat. The Office of Wildland Fire is reviewing current policies and practices for conducting fire reviews and will be developing Department-wide standards and criteria in collaboration with the Forest Service.

Recommendation 2: To better ensure that the agencies have sufficient information to understand the effectiveness of their approach to wildland fires, and to better position them to develop appropriate and effective strategies for wildland fire management, we recommend that the Secretary of the Interior direct the Directors of BIA, BLM, FWS, and NPS, revise agency policies to align with the specific criteria developed by the agencies.

The responsibility for Department-wide wildland fire policy rests with the Office of Wildland Fire. Thus we request revising Recommendation 2 as follows (new wording in *italics*):

Recommendation 2: To better ensure that the agencies have sufficient information to understand the effectiveness of their approach to wildland fires, and to better position them to develop appropriate and effective strategies for wildland fire management, we recommend that the Secretary of the Interior direct the *Office of Wildland Fire* revise *Department wildland fire management policy* to align with the specific criteria developed in *Recommendation 1*.

Response: The Department recognizes the limitations of current standards for review of wildland fire and initiated discussions with the Forest Service about coordinating revised policy direction. Both Departments seek to compile sufficient information to understand the effectiveness of their wildland fire program activities, which will include policy revision that articulates the purpose, objectives, criteria, and methodology for incorporating review information into current and future program activities.

If you have any questions, or need additional information, please contact me.

Sincerely,



Kristen J. Sarri
Principal Deputy Assistant Secretary
Policy, Management and Budget

Appendix VI: GAO Contact and Staff Acknowledgments

GAO Contact

Anne-Marie Fennell, (202) 512-3841 or fennella@gao.gov

Staff Acknowledgments

In addition to the individual named above, Steve Gaty (Assistant Director), Ulana M. Bihun, Richard P. Johnson, Lesley Rinner, and Kyle M. Stetler made key contributions to this report. Important contributions were also made by Cheryl Arvidson, Mark Braza, William Carrigg, Carol Henn, Benjamin T. Licht, Armetha Liles, and Kiki Theodoropoulos.

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