

A Research Paper by



The Rising Cost of Wildfire Protection



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ABOUT THIS REPORT

Headwaters Economics produced this report to better understand and address why wildfires are becoming more severe and expensive. The report also describes how the protection of homes in the Wildland-Urban Interface has added to these costs and concludes with a brief discussion of solutions that may help control escalating costs. Headwaters Economics is making a long-term commitment to better understanding these issues. For additional resources, see: <http://headwaterseconomics.org/wildfire>.

ABOUT HEADWATERS ECONOMICS

Headwaters Economics is an independent, nonprofit research group whose mission is to improve community development and land management decisions in the West.

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SUMMARY

Wildfires are getting larger and causing more damage. The six worst fire seasons since 1960 have occurred since 2000. Bigger wildfires are generally the result of two factors. First, biomass fuels have risen, due to historic management practices—overgrazing that reduced grass cover and encouraged seedling growth; logging of the large pines that led to a less fire-tolerant understory; and aggressive fire suppression that eliminated the natural, low-intensity fires which reduced biomass levels. The other factor is changing climatic conditions—higher temperatures, widespread drought, earlier snowmelt and spring growth, and expanded insect and disease infestations.

Not surprisingly, wildfire protection costs have risen substantially. In the 1990s, the average cost of federal wildfire protection and suppression was less than \$1 billion annually. Since 2002, the cost of federal wildfire protection and suppression has averaged more than \$3 billion per year. Wildfire protection now accounts for nearly half of the Forest Service annual budget, and more than 10 percent of the budget for all Department of the Interior agencies. These figures do not include the \$1-\$2 billion spent by states on wildfire protection or an untold amount spent by local governments.

This tripling of federal fire protection expenses is partly due to the more severe fire seasons, but it also results from building homes in and near forests and other wildlands that are at risk from wildfires—the Wildland-Urban Interface (WUI). While protecting the private lands of the WUI is largely a state and local responsibility, the development in the WUI has raised federal wildfire costs.

The presence of homes in the WUI affects federal firefighting strategies, and special efforts are often made to protect individual structures. The emphasis on protecting the WUI also diverts fire control from wildlands, thus increasing resource damages from wildfires. The increased fire control costs affect other Forest Service programs as well. The agency often must divert funds appropriated for other purposes, such as recreation management and watershed restoration, for firefighting. Such “borrowed” funds at a minimum delay other activities, and are not always repaid. Emphasis on WUI protection also has shifted fuel reduction efforts, limiting treatments that are needed to reduce the fuels that have accumulated in many non-WUI areas. Finally, the development of the WUI has increased the state and local demand for direct federal financial assistance in wildfire protection.

Wildfire threat and protection costs are likely to rise because of climate change and continued home development. Currently, the majority of private wildlands are undeveloped; only about 16 percent of the WUI in the West is now developed, and the remaining 84 percent is available for development. The potential development of these lands is a state and local responsibility, but their development would significantly increase the federal cost of wildfire protection.

To date, WUI protection efforts have focused largely on reducing fuels and making structures safer from fires. While these activities are necessary, they are not sufficient to control the rising cost of protecting the WUI from wildfires. Additional actions could include the increased development and dissemination of information for wildfire protection—increasing use of Firewise; mapping water sources and access routes; developing warning systems; and the like. Federal incentives and disincentives could be used to expand WUI protection—federal assistance for local planning; eliminating the mortgage interest tax deduction for homes in the WUI; and more. State and local governments can also take responsibility for WUI development, using local zoning ordinances, building codes, set-back requirements, and more to protect the WUI; federal incentives could encourage such state and local responsibility. Finally, the federal government could act unilaterally, such as by requiring federal wildfire insurance for any WUI development near federal lands.

INTRODUCTION

Wildfires generally are getting larger and causing more damage. The past decade has seen the six worst fire seasons of the past half-century, with three of them—2006, 2007, and 2012—exceeding 9 million acres.¹ In 2011, Arizona saw the largest wildfire in its history, the 538,049-acre Wallow Fire, surpassing the 2002 Rodeo-Chedeski Fire Complex (468,638 acres). The 2012 fire season saw the largest fires ever reported in Oregon (the 557,628-acre Long Draw Fire), Nevada (the 60,850-acre Holloway Fire), and New Mexico (the 297,845-acre Whitewater-Baldy Fire). The 2011 Bastrop Fire and other fires in Texas reportedly killed two civilians and destroyed more than 1,500 homes, with damages exceeding \$750 million. Bigger wildfires are likely the result of a widespread build-up of fuels, due to historic management practices, and changing climatic conditions, with resulting hotter, drier weather.

Wildfire protection is also getting more costly. Bigger fires cost more to control, but an additional factor is contributing significantly to the cost of wildfire protection—the development of homes on or near fire-prone lands. The expansion of this Wildland-Urban Interface (WUI) increases the pressure to control wildfires, even in areas where fires are natural and ecologically beneficial. Houses in the WUI also divert firefighting resources to protecting structures instead of controlling damaging wildfires. The responsibility for wildfire protection and development of private lands in the WUI lies with state and local governments, but the federal government bears a significant amount of the costs of protecting homes in the WUI from wildfires, with limited efforts or authority to control those costs.

I. WILDFIRE SEASONS ARE BECOMING MORE SEVERE

The two factors—fuel build-up and climate change—that have contributed to the increasing severity of fire seasons are likely to persist, and very possibly to get worse.

Many reports have been written on the increasing extent and severity of wildfires. Most generally conclude that there are two primary contributors to the more severe fire seasons.

One contributor is the widespread build-up of forest fuels from historic levels. Many forests have become overgrown, particularly those that historically experienced natural, relatively frequent, low severity wildfires. These so-called “frequent-fire” forests have become choked with dead and dying vegetation, with too many trees, with an understory of trees that differ from the overstory, and more.

This excess biomass is largely a result of three historic practices. First, heavy grazing in the past reduced grass cover and allowed more tree growth; the loss of grass cover removed many of the fine fuels that substantially contributed to the frequent, low-intensity fires. Another contributor is past logging practices, which favored cutting the large pines and allowing other, less fire-tolerant conifers (notably Douglas-fir and the true firs) to expand in the understory. This both added more woody biomass for more intense fires and further reduced the grass cover, since many western pine forests sustained extensive grasslands under the canopies.

Perhaps most significantly for the fuel build-up in frequent-fire forests, is the 20th century fire suppression policies that sought to eliminate all wildfires. The vision of eliminating wildfires grew from the severe 1910 fire season in northern Idaho and western Montana, where three million acres of heavy timberlands,

¹ National Interagency Fire Center, at http://www.nifc.gov/fireInfo/fireInfo_stats_totalFires.html, on April 19, 2013.

and a significant number of towns, burned in fire storms that lasted for a few weeks.² Fire suppression gave the fledgling USDA Forest Service (established in 1905) a coherent purpose that resonated with the American public and the Congress. Although the ecological benefits of frequent, low-intensity wildfires in many forests were recognized by some researchers and forest practitioners, the agency sought to eliminate all fires and to prevent fires from being set intentionally (now called prescribed fires), a practice denigrated as “Paiute forestry.”³ This vision and the resulting efforts eliminated many of the natural, low-intensity wildfires that eliminated excess biomass (grass, needles and leaves, twigs, many tree seedlings, etc.).

The second contributor to the increasingly severe fire seasons is changing climatic conditions. There are three well-documented aspects of climate change that are exacerbating wildfire severity. The most obvious, but probably least important, is higher temperatures. When air temperatures are higher, fires burn hotter and are more difficult to control. Related to the higher temperatures is the earlier snowmelt and spring growth. Regional fire seasons commonly begin in the dry period that follows spring growth—early spring in the South; April and May in the Southwest; midsummer in the Northern Rockies and Pacific Northwest.⁴ With less snow and more rain, and earlier snowmelt for the snow that does fall, western fire seasons are starting earlier and ending later, thus leading to more wildfires. Finally, climate change has caused years of drought for much of the West, making the vegetation drier, and thus more flammable.

These two factors—fuel build-up and climate change—that have contributed to the increasing severity of fire seasons are likely to persist, and very possibly to get worse. As discussed briefly below, and in more detail elsewhere, current levels of fuel reduction treatments are inadequate to even stabilize the current fuel levels, since forests continue to grow, adding more biomass to the lands. Climate change is exacerbating the situation, both directly and indirectly. Directly, as described above, climate change is raising temperatures and reducing and altering precipitation throughout the West. Hotter, drier weather will increase tree mortality at the southern reaches and lower elevations for most species, thus increasing flammable dead biomass in many areas for the foreseeable future.

In addition, climate change is indirectly exacerbating the fuel situation by affecting the spread of insects and diseases. The most significant pest in U.S. forests is currently the mountain pine beetle, which was the cause of 59 percent of all tree mortality in 2011.⁵ The current epidemic of this native insect has been far more extensive than the epidemic 30 years ago, especially in Canada; this is largely attributable to the warmer climate.⁶ Various authors have noted that insects are far more adaptable to changing climate conditions than are trees, and thus climate change is likely to lead to more extensive, more damaging infestations in the future, thus literally adding more fuel to the fires.⁷

² Steven J. Pyne, *Year of the Fires: The Story of the Great Fires of 1910* (New York: Viking Penguin Publishers, 2001).

³ For a discussion of the evolution of federal fire protection policies, see Julie K. Gorte and Ross W. Gorte, *Application of Economic Techniques to Fire Management—A Status Review and Evaluation*, Gen. Tech. Rept. INT-53 (Ogden, UT: USDA Forest Service, June 1979).

⁴ The commonly severe southern California fire season occurs in the late summer and autumn, rather than in the dry season following spring growth, largely as a result of the sere late-summer/autumn Santa Ana winds that dry out vegetation and drive wildfires.

⁵ USDA Forest Service, *Major Forest Insect and Disease Conditions in the United States: 2011*, FS-1000 (Washington, D.C.: June 2012), at http://www.fs.fed.us/foresthealth/publications/ConditionsReport_2011.pdf on April 19, 2013.

⁶ Jesse A. Logan and James A. Powell, “Ghost Forests, Global Warming, and the Mountain Pine Beetle (Coleoptera: Scolytidae),” *American Entomologist*, vol. 47, no. 3 (fall 2001), pp. 160-173. See also CRS Report R40203, *Mountain Pine Beetles and Forest Destruction: Effects, Responses, and Relationship to Climate Change*.

⁷ Jesse A. Logan, Jacques Règnière, and James A. Powell, “Assessing the Impacts of Global Warming on Forest Pest Dynamics,” *Frontiers in Ecology and the Environment*, vol. 1, no. 3 (2003): p. 130-137; W. Jan A. Volney and Richard A. Fleming, “Climate Change and Impacts of Boreal Forest Insects,” *Agriculture, Ecosystems and Environment*, vol. 82 (2000): 283-294.

Wildfire Season Severity

Fire season severity is commonly measured by acres burned, but acres burned measures fire extent, not severity of damage to resources. Even the largest wildfires include extensive areas, commonly more than half the total area, with little or no fire damage. Comprehensive data on wildfire deaths (civilians and firefighters), property damages (structures and value lost), and damages to natural resources are not reported consistently by any federal or state agencies.

II. FIGHTING WILDFIRES IS BECOMING MORE EXPENSIVE

From FY1991 through FY1999, average Forest Service and Department of the Interior wildfire protection appropriations were \$0.92 billion annually, while in the past decade (FY2002 through FY2012), wildfire protection funds for these agencies have averaged \$3.13 billion annually.

FEMA's fire management assistance grants averaged \$71.2 million annually between 2002 and 2011, more than triple the FEMA wildfire assistance in the 1990s.

Not surprisingly, more severe fire seasons have increased the cost of wildfire protection. Another factor driving costs is the development of homes on and near lands that are increasingly prone to severe wildfires. More people are moving to homes and communities that are near or in forests, the Wildland-Urban Interface (WUI). Beautiful scenery, a forested setting, nearby wildlife, and relative isolation from neighbors are increasingly desired for private homes. However, some of these desirable aspects, such as dense forests and isolation, also make these homes and their residents more vulnerable to wildfires at a time when the risk of severe wildfires is already rising. This exacerbates the economic and political pressures to control wildfires in the WUI, further increasing fire protection costs.

Wildfire Protection Cost Trends

Forest Service and Department of the Interior

The primary federal agencies responsible for fire protection are the Forest Service (FS), in the U.S. Department of Agriculture; and the Bureau of Land Management (BLM), National Park Service (NPS), Fish and Wildlife Service (FWS), and Bureau of Indian Affairs (BIA) in the U.S. Department of the Interior (DOI). Historically, more than 70 percent of federal fire protection funding has been appropriated to the FS, with the other third appropriated to DOI (through the BLM until 2009 and through a department-wide account since). The FS has traditionally received the lion's share of federal fire protection funding because (a) it is the oldest of the four federal land management agencies;⁸ (b) it has emphasized fire protection since the early years; and (c) it manages more forest land than all the DOI agencies combined.⁹

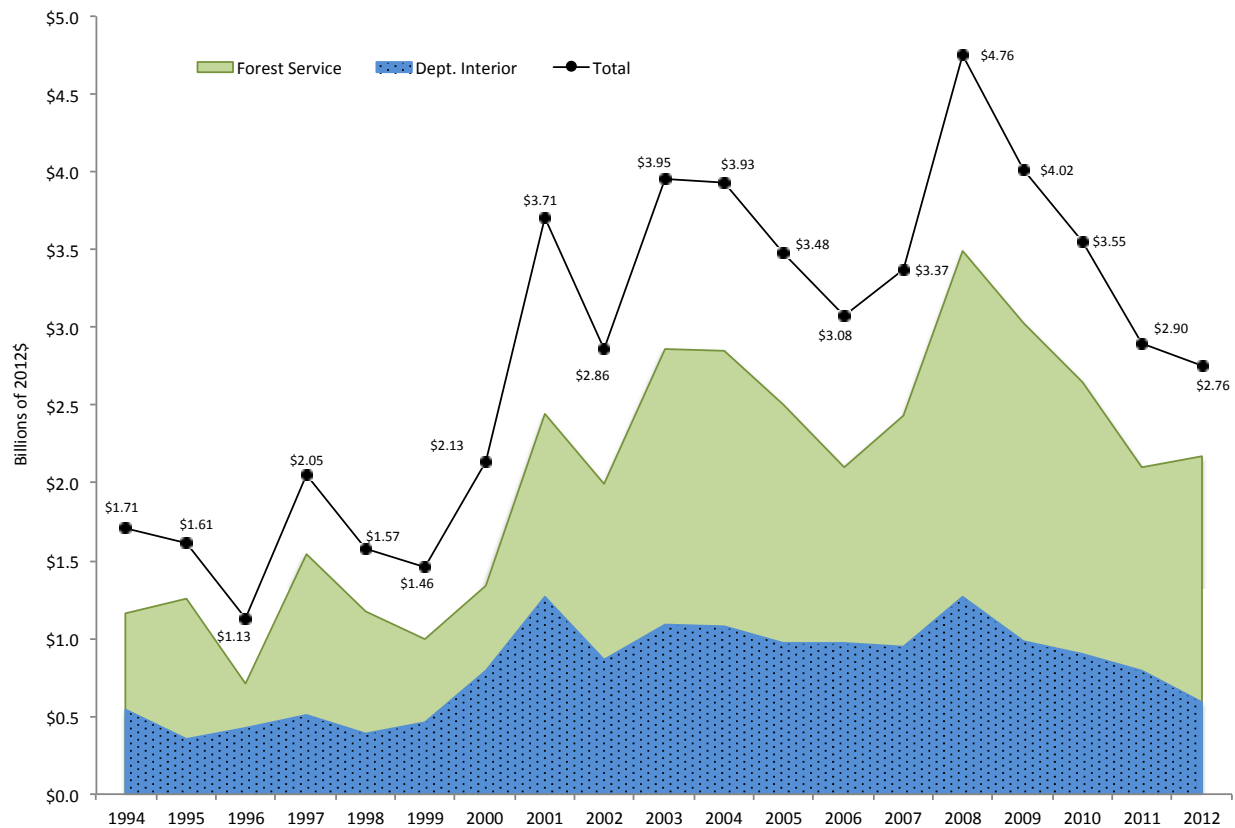
⁸ The BIA was established in 1824, but land management (including fire protection) has not been its primary mission.

⁹ DOI manages more federal land, but nearly half is in Alaska, and many of the extensive BLM lands in the West are rangelands, rather than forests. CRS Report R42346, *Federal Land Ownership: Overview and Data*.

Annual federal wildfire management appropriations in the past decade have been more than triple the annual funding in the 1990s. From FY1991 through FY1999, average FS and DOI wildfire protection appropriations (in nominal dollars; i.e., not adjusted for inflation) were \$0.92 billion annually, ranging from \$0.49 billion in FY1991 to \$1.40 billion in FY1997.¹⁰ In the past decade (FY2002 through FY2012), wildfire protection funds for these agencies have averaged \$3.13 billion annually, ranging from \$2.24 billion in FY2002 to \$4.47 billion in FY2008.¹¹

In real dollar terms (adjusted for inflation), annual wildfire protection funds for the FS and DOI averaged \$1.39 billion from FY1991 through FY 1999, and \$3.51 from FY2002 through FY 2012. The annual appropriations, in real terms, are shown in Figure 1, below.

Figure 1. Federal Wildfire Appropriations to the Forest Service and Department of the Interior, 1994 – 2012.¹²



¹⁰ CRS Report RS22024, *Wildfire Protection in the 108th Congress*.

¹¹ CRS Report RL33990, *Federal Funding for Wildfire Control and Management*.

¹² Ibid.

Federal Emergency Management Agency

In addition, the federal government, through the Federal Emergency Management Agency and other agencies, has paid substantial amounts for disaster recovery in the aftermath of the large wildfires that have occurred with increasing frequency over the past decade. Prior to 2000, FEMA had responded to 11 major or emergency wildfire disaster declarations, with two in the 1950s, three in the 1970s, three in the 1980s, and three in the 1990s.¹³ From 2000 through 2012, FEMA responded to 19 major or emergency wildfire disaster declarations.

Fire management assistance declarations have risen similarly in both number and grant amounts. There were 11 declarations in 1998, 12 in 2000, and 9 in 2001; from 2002 through 2012, there were 599 fire management assistance declarations.

FEMA's fire management assistance grants (FMAGs) averaged \$20.4 million annually between 1991 and 1999, with more half of the total being paid in 1998. FMAGs averaged \$71.2 million annually between 2002 and 2011, more than triple the FEMA wildfire assistance in the 1990s.

And these government expenditures do not even count the substantial costs borne by state and local agencies to deal with wildfires. The states are responsible for wildfire protection on far more land than the federal government—1.44 billion acres of state-protected lands, compared to 650 million acres of federal land.¹⁴ States spent \$1.43 billion on wildfire programs in 2010, down from \$1.68 billion in 2008. While less than the federal appropriations, state expenditures on wildfire protection are still significant. There is no tabulation of wildfire protection expenditures by local governments, although spending is also likely to be substantial.

Wildfire Funding Data

Wildfire funding data can be confusing because fire seasons and fiscal years rarely match. Fire seasons begin in early spring and may run through November. Federal appropriations are enacted for fiscal years ending on September 30; thus, appropriations for a severe fire season may be enacted in two different fiscal years. Further complicating the picture is that (1) Congress often enacts supplemental and emergency appropriations, which may not match the fiscal years and fire seasons; and (2) the agencies can carry over unspent fire control appropriations, thus shifting funding from one fiscal year to another. However, the agencies are required to report and track their appropriations, not actual expenditures. Thus, it is not clear whether the available wildfire funding data reflect the actual costs of wildfire protection.

¹³ U.S. Dept. of Homeland Security, Federal Emergency Management Agency, http://www.fema.gov/disasters/grid/year?field_disaster_type_term_tid_1=6847&=GO.

¹⁴ *State Foresters by the Numbers: Data and Analysis from the 2010 NASF State Forestry Statistics Survey*, National Association of State Foresters, August 2012, at <http://www.stateforesters.org/sites/default/files/publication-documents/State%20Foresters%20by%20the%20Numbers%20Final.pdf> on April 19, 2013.

III. HOME DEVELOPMENT HELPS DRIVE WILDFIRE COSTS

Wildfire fuel levels are currently increasing, and shifting more fuel reduction efforts to the WUI will exacerbate the current situation. This is likely to lead to more severe wildfire seasons in the future.

As noted above, the expanding Wildland-Urban Interface (WUI) has contributed to the high and rising costs of wildfire protection. The WUI is generally defined as where homes are built in or near forests or other wildlands, such that they are at risk from wildfires. Various specific definitions have been used at different times or in different situations, depending on the authors' purposes. Regardless of the details of the definition, however, the WUI encompasses human structures and presence that can be threatened by fire.

The WUI increases total wildfire protection costs compared to undeveloped wildlands. Since residential development does not occur on federal lands, fire protection in the WUI is largely a state and local responsibility. Also, many state and local governmental decisions not directly related to wildfire protection affect the cost of fire protection. For example, state and local decisions and regulations about structures (e.g., housing density requirements, building codes) and about access (e.g., road standards and design) affect fire protection.

Effects of the WUI on the Federal Government

Fire protection in the WUI imposes costs on the federal agencies. The federal government provides financial and technical assistance to states, and through the states to local agencies, for wildfire protection. More significantly, however, the existence and expansion of the WUI also imposes direct and indirect costs on the federal agencies in wildfire control efforts and in fuel reduction treatments. The existing and expanding WUI affects fire control efforts on federal lands. Federal wildfire suppression policy explicitly states that protecting human lives is the priority, and that protecting private property and natural resources are equal as the second priority. However, the political reality is that protecting people's homes is given priority over protecting lands and resources. The Government Accountability Office (GAO) has noted that structures adjacent to federal lands can significantly alter fire control strategies and raise costs, because protecting structures commonly requires additional, special firebreaks and because fire managers often rely on expensive aircraft to drop fire retardant on and around the structures.¹⁵ In a survey of FS land managers, some estimated that 50 to 95 percent of firefighting costs were attributable to protection of private property.¹⁶

In 2008, a Headwaters Economics study for the Montana State Legislature reported that suppression costs were highly correlated with the number of houses threatened by wildfire and the pattern of those houses (e.g., a dense subdivision added less cost than the same number of houses dispersed over a wider area).¹⁷ Another study by Headwaters Economics in 2011 found that fire control costs in the Sierra Nevada Mountains of California were correlated to the number and location of houses.¹⁸ In Oregon, building new

¹⁵ U.S. Government Accountability Office, *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. 2007).

¹⁶ USDA Office of Inspector General, *Audit Report: Forest Service Large Fire Suppression Costs*, Report No. 08601-44-SF (Nov. 2006).

¹⁷ Headwaters Economics, *Montana Wildfire Cost Study Technical Report* (Aug. 2008), at http://www.headwaterseconomics.org/wildfire/HeadwatersEconomics_FireCostStudy_TechnicalReport.pdf, accessed on April 19, 2013.

¹⁸ Headwaters Economics, *Evidence for the Effect of Homes on Wildfire Suppression Costs* (July 2011), at http://headwaterseconomics.org/wphw/wp-content/uploads/CAfire_Manuscript_July11.pdf, accessed on May 9, 2013.

homes in otherwise undeveloped areas has the greatest potential to increase firefighting costs, and an increase in average summer temperature of 1°F is associated with an increase of 420 wildfires.¹⁹ Such federal efforts to protect private property in the WUI not only add to the cost of federal fire control, they also divert federal efforts from protecting natural resources. In one example that led to the 1995 shift in federal fire policy (to equal priority for natural resources and private property), federal fire control efforts on one fire in the State of Washington focused on protecting private property at the cost of thousands of additional acres of timberland burned.²⁰ The full effects of the WUI on federal fire control efforts on federal lands are described in more detail elsewhere in this paper.²¹

Impact of Increased Fire Protection Funding to Protect Homes

The high and rising cost of wildfire protection on federal lands, including the costs of protecting homes in the WUI, has affected other federal land programs. Firefighting costs commonly exceed wildfire appropriations. While normally it is illegal for agencies to spend more than is appropriated, the annual Interior appropriations acts²² have included provisions authorizing the agencies to borrow unobligated funds from other accounts for emergency firefighting once wildfire appropriations have all been spent. Such transfers of funds among accounts (called reprogramming) without direct congressional approval of each transfer are relatively rare among federal agencies.

Historically, this borrowing authority was not a significant problem. First, Congress commonly provided supplemental emergency funds to repay the borrowed funds, although this has not always been the case. For example, in 2004, the FS borrowed \$50 million from the Forest Land Enhancement Program (FLEP), a mandatory spending program for FS forestry assistance to private landowners, but Congress chose not to reimburse the borrowed funds, effectively terminating the FLEP funding. Traditionally, the FS borrowed funds from the Knutson-Vandenberg (K-V) Fund, a trust fund for reforestation with funds from timber sale revenues. Since the K-V Fund balance of about \$500 million was for reforestation for up to three years after timber harvesting, Congress had time to provide the supplemental funding. However, as firefighting costs have risen and timber sale revenues have fallen, the FS has had to borrow from other accounts to pay for firefighting.

Second, fire protection funding was a much smaller proportion of total agency appropriations prior to 2000. From 1993 to 2000, FS fire protection funding was 25 percent of total FS discretionary appropriations. However, since 2001, fire protection funding has been 47 percent of total FS discretionary appropriations, and reached 56 percent of total FS discretionary appropriations in 2008. (This is less of an issue for DOI, since DOI fire protection funding is only a third to a half of FS fire protection funding, while available DOI discretionary funding is roughly double FS discretionary appropriations.)

Borrowing by FS of an increasing proportion of non-fire funds has affected numerous other programs. The effect has been to delay land acquisitions, defer needed road and building maintenance, and reduce other resource management activities, such as recreation and wildlife habitat programs. Thus, the

¹⁹ Headwaters Economics, Oregon Home Building, Higher Temperatures Drive Price Tag Ever Higher <http://headwaterseconomics.org/wildfire/oregon-homes-and-cost-of-wildfires> accessed on May 17, 2013.

²⁰ Bob Armstrong, DOI Assistant Secretary for Lands and Minerals Management, "Statement," *Fire Policy and Related Forest Health Issues*, joint oversight hearing, House Committees on Resources and on Agriculture, October 4, 1994 (Washington, D.C.: U.S. GPO, 1995), p. 9. Serials No. 103-119 (Committee on Resources) and 103-82 (Committee on Agriculture).

²¹ See Timothy Ingalsbee, *Getting Burned: A Taxpayer's Guide to Wildfire Suppression Costs* (Eugene, OR: Firefighters United for Safety, Ethics, & Ecology, Aug. 2010), pp. 11-13.

²² Even though the FS is in the Department of Agriculture, the Interior appropriations acts have provided appropriations to the FS since 1955.

increasing fire protection costs are affecting many of the individuals and groups interested in FS lands and uses.

In 2010, Congress enacted the Federal Land Assistance, Management and Enhancement (FLAME) Act, in Public Law 111-88. It established FLAME Wildfire Suppression Reserve Funds for the FS and DOI, to be funded from annual appropriations, with conditions on the use of these reserve funds.

The FLAME funds were intended to insulate federal land and resource management programs from the financial impacts of borrowing to pay for fire control. However, there can still be lost resource management time when agency personnel are assigned to wildfire efforts. In addition, FLAME provides no incentives to reduce or constrain the firefighting costs and reduces the linkage between funding and fire protection activities. (See the issue discussed in *Wildfire Funding Data*, above.) In addition, while Congress enacted appropriations for the FLAME reserve funds, it has also enacted rescissions, taking funds from the accounts to pay for other federal programs. Thus, the “assurance” of reserve funding, to avoid borrowing from other accounts and affecting federal land users, is less assured than it appeared when the FLAME funds were created.

Fuel Reduction on Federal Lands

Programs to protect the WUI also affect fuel reduction on other federal lands. First, the Healthy Forests Restoration Act directed that half of federal fuel reduction funds were to be used in the WUI. As a result, the proportion of fuel treatments in the WUI increased after FY2001 (the first year for which such data are available), from 37 percent (45% for the FS, 22% for DOI) to about 60 percent from FY2003 to FY2006 (73% for the FS, 42% for DOI), and 70 percent in FY2008 (83% for the FS, 47% for DOI). More recent comparable data are not available, because the FS has modified the way fuel treatments are reported and has proposed shifting non-WUI fuel treatment funding to land and resource management accounts (instead of wildfire protection accounts).

This shift in fuel treatments to the WUI has two effects on federal fuel reduction efforts:

1. It raises the average costs of reducing fuels on an acre of land. Treatments in the WUI are closer and more visible to humans and thus the public involvement process commonly takes longer and costs more. Mechanical treatments may require additional steps to reduce the visual impacts of removing biomass. Also, prescribed burning is, in many ways, the most effective means of reducing fuels, but the higher values and closer proximity of humans necessitate more personnel and more oversight to try to prevent the prescribed fires from becoming wildfires.²³ One study found per-acre fuel reduction in the WUI costs 43 percent more for prescribed burning and nearly three times more for mechanical fuel reduction than in non-WUI areas.²⁴
2. It results in less fuel reduction on other lands. The level of fuel reduction over the past decade has remained relatively stable—averaging about 3 million acres annually according to the agency budget justifications. Because efforts are increasingly being focused on the WUI, the level of fuel reduction on non-WUI lands is probably declining. Furthermore, as discussed in more detail in other reports,²⁵ the 3 million-acre effort is insufficient to treat the 230 million acres of federal lands at high or moderate risk of ecological damage from wildfires in a timely manner. Thus, wildfire fuel levels are currently increasing, and shifting more fuel reduction to the WUI will exacerbate the current situation. This is likely to lead to more severe wildfire seasons in the future.

²³ See CRS Report R40811, *Wildfire Fuels and Fuel Reduction*.

²⁴ Hayley Hesseln and Alison H. Berry, “The Economic Effects of the Wildland-Urban Interface on Prescribed Burning Costs in the Pacific Northwestern United States,” *Proceedings of the Second International Symposium on Fire Economics, Planning, and Policy: A Global View* (Apr. 2004: Cordoba, Spain).

²⁵ For example, see CRS Report RL33990, *Federal Funding for Wildfire Control and Management*.

Federal Wildfire Assistance to Communities

Most federal assistance for fire protection has been provided through two FS programs: state fire assistance and volunteer fire assistance. State fire assistance was first authorized in the Clarke-McNary Act of 1924; this authority was revised and updated in the Cooperative Forestry Assistance Act of 1978 (Pub.L. 95-313; 16 U.S.C. 2106). The funds are provided to the state agencies responsible for wildfire protection on a 50-50 cost-share (i.e., the state must match the federal grant). Many types of activities are feasible, such as fuel reduction, equipment acquisition, fire training for state and other firefighters, community fire protection planning, and more.²⁶ The projects are planned and completed by each state, and are not chosen or controlled by the FS.

Volunteer fire assistance was originally established as the Rural Community Fire Protection Program in 1973. The program authorization was terminated in 1996, but Congress transferred the activities to the FS and has continued appropriating funds for the program. The FS provides funds in grants to the states, again with a 50-50 cost share, for equipment, training, and other support for fire departments in rural areas and communities.

The federal agencies have supported two particular programs aimed at fire protection in the WUI: Firewise, and Community Wildfire Protection Planning. Firewise is a program of the non-profit National Fire Protection Association with funding from the FS, DOI, and the National Association of State Foresters. The program website was created in 1997, after the loss of nearly 1,400 homes in 1985 led to discussions of how to protect homes from wildfires.²⁷ Firewise is substantially a community and homeowner education program of strategies and actions for communities and individuals to protect homes, such as fire-safe roofing and decking materials and landscaping. Many communities have also adopted the Firewise program to encourage, or even to require, homeowner actions.

The 2002 farm bill (Pub.L. 110-246) created a Community and Private Land Fire Assistance Program to assist communities and private landowners in planning and other activities to protect themselves from wildfires. Congress has not appropriated funds explicitly for this program, but the FS has included such activities in state fire assistance. Community Wildfire Protection Planning was authorized in the Healthy Forests Restoration Act of 2003 (Pub.L. 108-148; 16 U.S.C. 6501-6591), and also has been funded through state fire assistance. These are local plans, developed in consultation with state and federal agencies and with interested parties, to identify and prioritize areas and methods of fuel reduction for protecting structures and communities, and to recommend measures to reduce the ignitability of structures.

FEMA, in the Department of Homeland Security, also provides wildfire assistance to state and local governments. FEMA can provide Fire Management Assistance Grants to state, local, or tribal agencies for firefighting expenses when a state declares that the threat of a major disaster exists. FMAGs can cover up to 75 percent of the costs for a single fire or for a group of fires, when the total costs exceed the FEMA threshold levels.

²⁶<http://www.fs.fed.us/aboutus/budget/2014/FY%202014%20Forest%20Service%20Master%20Budget%20Justification%20Final.pdf>, p. 9-24 – 9-25, accessed on April 19, 2013.

²⁷<http://www.firewise.org/about/history.aspx>, accessed on April 19, 2013.

The Expanding WUI Wildfire Problem

The threat and cost of wildfire protection in the WUI is growing, and could expand rapidly. There is no definitive measure of the current extent or the growth rate of the WUI, in part because there is no universally accepted definition of the WUI. Nonetheless, one study in 2009 reported that, despite the substantial emphasis on the WUI in wildfire protection, only 14 percent of the available private land in the WUI is developed.²⁸ More recently, in 2013, the same researchers calculated that 16 percent of the WUI is developed, leaving 84 percent undeveloped but available for development.²⁹ Thus, the WUI could expand by 6 times its current extent, and various reports have suggested that the expansion is continuing rapidly.

A contributing factor in the expanding problem is that the WUI is almost entirely a state and local responsibility. Federal expenditures are significantly affected by the extent and expansion of the WUI, but the federal government has almost no authority to directly influence that growth. State and local governments have a variety of tools available to affect the expansion of the WUI and its impacts on wildfire protection costs. For example, some states require fuel treatments on private lands.³⁰ In July 2011, the State of California enacted a wildland fire prevention services fee of \$150 per habitable structure for houses in the WUI to cover the state's additional fire protection costs.³¹

Some argue that current federal wildfire policies and practices effectively subsidize development in the WUI, and make state and local action to constrain WUI expansion unnecessary. As noted in the USDA OIG report:

The increase in homes and lack of wildfire defense for them are significant in the WUI because FS bears a disproportionate share of protection costs. As the number of private homes in the WUI increase, FS costs rise.... Assigning the financial responsibility for WUI wildfire protection to State and local government is critical because Federal agencies do not have the power to regulate WUI development. Zoning and planning authority rests with State and local government.... Homeowner reliance on the Federal government to provide wildfire suppression services places an enormous financial burden on FS, as the lead Federal agency providing such services. It also removes incentives for landowners moving into the WUI to take responsibility for their own protection and ensure their homes are constructed and landscaped in ways that reduce wildfire risks.... In addition to bearing an inequitable portion of fire suppression costs for protecting private property, FS continues to prioritize private property over natural resource protection with little to no consideration of their relative values.³²

Others have suggested that FEMA disaster assistance reduces the incentives for the state-regulated private insurance industry to reflect the risk to homes in the WUI.³³

²⁸ Headwaters Economics, *Solutions to the Rising Costs of Fighting Fires in the Wildland-Urban Interface* (Dec. 2009).

²⁹ Headwaters Economics, *As Wildland Urban Interface (WUI) Develops, Firefighting Costs Will Soar*, at <http://headwaterseconomics.org/interactive/wui-development-and-wildfire-costs> on May 10, 2013. This site contains an interactive map showing in graphs and tables the undeveloped WUI land in each county in the 11 coterminous western states. Note: estimates of the size of the WUI development with homes reported in 2009 used 2000 census figures. These are not exactly comparable to the same measure in 2013, using 2010 census figures, because the Bureau of the Census changed a number of geographic boundaries between the two decennial census periods.

³⁰ Heidi J. Albers, "Wildfire Risk Management on a Landscape With Public and Private Ownership: Who Pays For Protection?" *Environmental Management*, vol. 45 (2010): 296-310.

³¹ "California Starts Sending Out Fire Protection Bills," *Sacramento Bee* (Aug. 13, 2012), at <http://www.sacbee.com/2012/08/13/v-print/4719859/state-starts-sending-out-fire.html>, accessed on April 19, 2013.

³² USDA Office of Inspector General, *Audit Report: Forest Service Large Fire Suppression Costs*, Report No. 08601-44-SF (Nov. 2006), pp. 7, 8, 9, and 10.

³³ Karen M. Bradshaw, "A Modern Overview of Wildfire Law," *Fordham Environmental Law Review*, vol. 21 (Fall 2010): 445-468.

Finally, the WUI fire problem will likely continue to expand as long as efforts to address the problem continue to focus primarily on fuel reduction and fire-safe structures. Reducing fuels and modifying structures are necessary parts of fire protection in the WUI. However, individual actions only protect individual homes and lands. The decisions of others not to act also affect the threat to those that do act, as well as the fire control and other costs of federal, state, and local agencies. Furthermore, as noted briefly above, many community and state and local agency decisions (e.g., zoning regulations, building codes, access standards, and more) also affect fire protection in the WUI and wildfire protection costs generally.

IV. POSSIBLE SOLUTIONS TO ESCALATING WILDFIRE COSTS

The rising costs of wildfire protection can only be addressed by reducing biomass fuels on all lands and by constraining the development of the WUI.

The wildfire problem in the United States is large and growing. Biomass fuels continue to accumulate faster than they are being removed, increasing the wildfire threat. Climate change is causing earlier, longer, hotter, and drier summer conditions throughout the West, making for more severe fire seasons. And the WUI continues to expand—84 percent of the WUI in the West is not yet developed—increasing the demand for wildfire protection even as the threat of wildfire increases. These changes will all contribute to escalating wildfire protection costs for all levels of government.

What can be done about it? Ameliorating climate change is, in many ways and for many reasons, highly desirable, but such efforts are beyond the scope of efforts to control wildfire protection costs. Fuel treatment efforts must be expanded, both in the WUI and also in other parts of the forest. This includes mechanical treatments to remove biomass, for wood products and/or for energy production, as well as much more prescribed burning, despite the risks inherent in such burning. Incentives and protections for government employees,³⁴ as well as early and open dialogue with WUI interests, might assist in expanding fuel reduction efforts.

Several basic approaches are feasible for addressing WUI fire costs.³⁵ One is development and dissemination of better information. Firewise needs to be continued and expanded, to assure that existing and potential WUI homeowners understand the risks and actions needed to minimize those risks. Additional information is needed at the community level, such as maps of current and anticipated fire-prone areas, information on access routes, a warning system to alert residents of fire-related evacuations, and real-time data on the location and availability of water and other firefighting resources. Research can also provide information on firefighting techniques, assessment of fire control technologies, and documentation of the financial and ecological consequences of construction in fire-prone areas.

Another approach focuses on incentives and disincentives to reduce the costs related to WUI fire protection. Federal assistance for community wildfire protection plans is a start, but such assistance could be extended to local land use planning. States could be encouraged to work with the insurance industry to authorize higher insurance premiums for houses in the WUI. The federal tax code could be modified to reduce or eliminate the mortgage interest deduction for houses in the WUI. Federal, state, and private funds could be used to acquire easements that could be managed to provide a firebreak/buffer for WUI communities. Federal fire control efforts or funding assistance could be withheld from state and local governments that do not sign firefighting cost-share agreements.

³⁴ Prescribed burning is risky and government employees might need to take more risks than they otherwise would, and therefore need some protection from political and administrative responses if things go wrong (e.g., a prescribed burn escapes and causes damages).

³⁵ For a discussion of several options for addressing WUI fire protection costs, see Headwaters Economics, *Solutions to the Rising Costs of Fighting Fires in the Wildland-Urban Interface* (Dec. 2009).

A third approach is through state and local requirements for the WUI, such as through local zoning ordinances, building codes, easements and set-backs, and the like. State and local governments can act independently, and many have done so. The federal government cannot require state and local government action, but can make grants and other federal assistance contingent upon state and local actions, incentives, regulations, and more to control the costs of WUI fire protection.

Finally, unilateral federal action to reduce WUI fire costs may be feasible. A national wildfire insurance program, akin to the National Flood Insurance Program, could be required for all construction in the WUI that has a federal nexus (e.g., permit approval, financing assistance) or for post-fire disaster assistance. It might even be possible, with real-time mapping, to withhold federal fire control efforts (unless withholding the efforts would increase federal costs or reduce the overall effectiveness of fire control) where no federal-local cost-share agreement exists or where WUI landowners do not have national or some form of state wildfire insurance.

In sum, wildfires continue to burn more acres, damage more resources, and threaten more people and houses. The rising costs of wildfire protection can only be addressed by reducing biomass fuels on all lands and by constraining the development of the WUI. Because the WUI is private property, the primary responsibility lies with state and local governments, but the federal government has borne a disproportionate share of the cost of WUI fire protection. State and local governments must become partners with the federal government, willingly or unwillingly, to control the burgeoning cost of wildfire protection in the WUI.

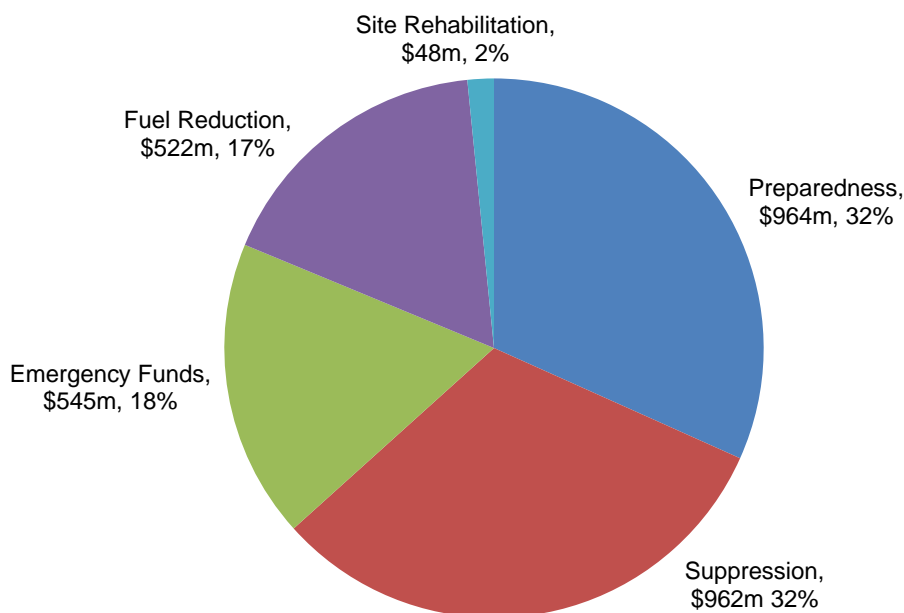
ADDENDUM: HOW WILDFIRE PROTECTION IS FUNDED

Congress provides annual funding for wildfire protection. Federal wildfire protection funding is used for three primary purposes: protection of federal lands; assistance for state and local fire protection; and other purposes. Of the \$3.33 billion in average annual federal wildfire funding since 2002, 91 percent has been used for protecting federal lands; more than 70 percent of the funding for federal land protection has been appropriated to the FS, with just less than 30 percent appropriated to DOI. Nearly 7 percent has been used for wildfire protection assistance to state and local governments; 65 percent of assistance funding has been through the FS, and 32 percent has been through FEMA, with DOI providing 3 percent. The remainder (more than 2%) has been used for other activities, such as fire research and fire facilities.³⁶

Federal Land Protection

The federal agencies have several appropriations accounts for wildfire protection on federal lands (see Figure 2). These have averaged more than \$3 billion per year from FY2002 to FY2012. The largest two accounts are wildfire preparedness and wildfire suppression. Preparedness (previously called presuppression) includes hiring and training firefighters and acquiring and maintaining equipment. Preparedness funding is fairly stable, averaging \$964 million annually since 2002 (72% to the FS). Suppression funding—paying firefighters (federal employees, and hired state, tribal, and private crews, etc.)—is more variable because of the variations in fire season severity; it has also averaged nearly \$1 billion (\$962 million) annually since 2002 (73% to the FS), but has ranged from \$383 million to \$1.39 billion. Suppression funding has also been supplemented with emergency appropriations, averaging \$545 million annually since 2002 (77% to the FS); supplemental emergency appropriations are also highly variable, ranging from \$151 million in 2011 to \$1.28 billion in 2008.

Figure 2. Wildfire Protection Funding on Federal Lands, Average FY2002-FY2012



³⁶ For detailed annual federal funding, see CRS Report RL33990, *Federal Funding for Wildfire Control and Management*.

The two other federal land wildfire accounts are post-fire site rehabilitation and fuel treatment. Site rehabilitation funding has been relatively modest, \$48 million annually (47% to the FS), but this is somewhat misleading, because the agencies (especially the FS) can and do spend substantial (but unspecified) amounts from other accounts (e.g., watershed management) on post-fire rehabilitation.

Fuel treatment has been described as critical to effective, long-term control of wildfires and fire protection costs. The federal agencies have spent \$522 million annually on fuel reduction treatments since 2002 (62% to the FS). However, fuel reduction funding peaked in 2009 at \$791 million, and in 2012 declined to less than \$500 million for the first time since 2006. As discussed in more detail in other reports,³⁷ this level of effort will certainly not reduce the backlog of fuel reduction needed and is probably insufficient to prevent further fuel accumulation on federal lands.

Federal Assistance for State and Local Wildfire Protection

The federal government provides financial and technical assistance to state and local governments for wildfire protection. Historically, assistance funds were provided through the FS's State and Private Forestry (S&PF) branch, which provides financial and technical assistance to state and local governments for many forestry and land management activities. Following the severe 2000 fire season, Congress has included appropriations for assistance in the agencies' Wildland Fire Management appropriation, as well. In the 2014 budget, the President has proposed transferring all the FS fire assistance programs to Wildland Fire Management.³⁸

Since 2002, federal appropriations for state and local wildfire protection assistance have averaged \$141 million annually (96% to the FS, with \$0 to DOI in 2011 and 2012). State fire assistance (86% of the total) is provided as grants to states to enhance state, local, and rural firefighting capacity, and can fund a wide variety of activities, such as fuel reduction, capacity-building, and fire prevention.³⁹ Funding for each of the various activities is not reported. Volunteer fire assistance (10% of the total) is in grants to states to support fire departments in rural areas and communities (defined as having a population of fewer than 10,000 people).⁴⁰ DOI rural assistance (4% of the total) has been grants to enhance the preparedness of rural fire departments that often provide first response to fires on DOI lands;⁴¹ the program has not been funded since 2010.

In addition, FEMA provides wildfire assistance to state, local, and tribal governments. When states designate that certain fires or groups of fires threaten to become disasters, they can apply to FEMA for Fire Management Assistance Grants for up to 75 percent of the fire control costs. FMAGs averaged \$71 million annually from 2002 through 2011, ranging from \$24.4 million in 2010 to \$104.5 million in 2007.

³⁷ For example, see CRS Report RL33990, *Federal Funding for Wildfire Control and Management*.

³⁸ <http://www.fs.fed.us/aboutus/budget/2014/FY%202014%20Forest%20Service%20Master%20Budget%20Justification%20Final.pdf>, p. 9-24 – 9-25, on April 19, 2013.

³⁹ See <http://www.na.fs.fed.us/fire/sfa.shtm>, accessed on April 19, 2013.

⁴⁰ See <http://www.fs.fed.us/fire/partners/vfa/>, accessed on April 19, 2013.

⁴¹ http://www.doi.gov/budget/appropriations/2010/upload/FY2010_WFM_Greenbook.pdf, p. 49, accessed on April 19, 2013.



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