



ADDRESSING THE RISE OF FOREST SERVICE SUPPRESSION COSTS

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Prepared By:

ARIANNA KHAN

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Disclaimer

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The contents of this report are not endorsed by the Office of Management and Budget.

Honor Pledge

On my honor as a student, I have neither given nor received unauthorized aid on this assignment.

A handwritten signature in black ink, appearing to read "Amin Khan".

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Executive Summary

Wildfire suppression spending has been on the rise over the last decade, given the increase in fire severity and frequency of fire. However, the Forest Service costs to suppression have been increasing each year, regardless of severity of the fire season. **The agency is spending too much money focusing on wildfire suppression. The Forest Service spent \$3.1 billion on suppression in 2021.** This excess spending has contributed to a decline in the Forest Service's duties to manage forestland, and instead has made firefighting the main priority of the agency.

The first half of this report walks through an in-depth look at the problem, the background of how the Forest Service is funded, previous ways in which the Forest Service attempted to tackle overwhelming suppression costs, and evidence on potential solutions to combat rising costs. The second half of the report provides alternatives that may decrease the Forest Service's suppression spending. It ends with a final recommendation and implementation steps.

The four alternatives to attempt to mitigate suppression costs are:

- Let present trends continue,
- Alter the funding formula,
- Create a community-based incentive program, and
- Prioritize hazardous fuels treatments in the Wildland Urban Interface

The alternatives are evaluated on three criteria: political feasibility, administrative feasibility, and net cost.

Ultimately, the final recommendation given is to prioritize hazardous fuels treatments in the Wildland Urban Interface by transferring \$300 million from the Wildfire Suppression Reserve Account into the Hazardous Fuels Account. This alternative is both politically and administratively feasible, although not without challenges, and has a low net cost. A low net cost indicates that this alternative's cost savings on suppression outweigh the cost to implementation by greater than \$2 billion. In other words, the predicted decrease in suppression costs over the 10-year evaluation period is between \$2.5 and \$4 billion.

Implementation requires Congressional approval, the hiring of an additional Office of Management and Budget employee, creation of a tracking system to follow these hazardous fuels treatments, and the hiring of between 500 to 1000 additional Forest Service personnel to carry out such treatments.

Key Terms and Abbreviations

Key Terms:

Suppression: The act of extinguishing fire. Costs include equipment costs such as aircraft, engines, and fire retardant.

Hazardous Fuels: The buildup of debris and other vegetation that creates inviting space for fire to break out.

Hazardous Fuels Treatments: The burning, thinning, and removal of burnable vegetation.

Wildland Urban Interface: The zone where human development and wildland meet, very susceptible to wildfire.

Wildfire Management Account: Where the baseline amount of suppression funding goes (\$1.01 billion).

Wildfire Suppression Operations Reserve Fund: Additional funding for suppression that can be transferred once wildfire management account funding is exhausted (\$2.2 billion).

Abbreviations:

BIL: Bipartisan Infrastructure Law

CWDG: Community Wildfire Defense Grant

GAO: Government Accountability Office

NFIP: National Flood Insurance Program

OMB: Office of Management and Budget

USDA: United States Department of Agriculture

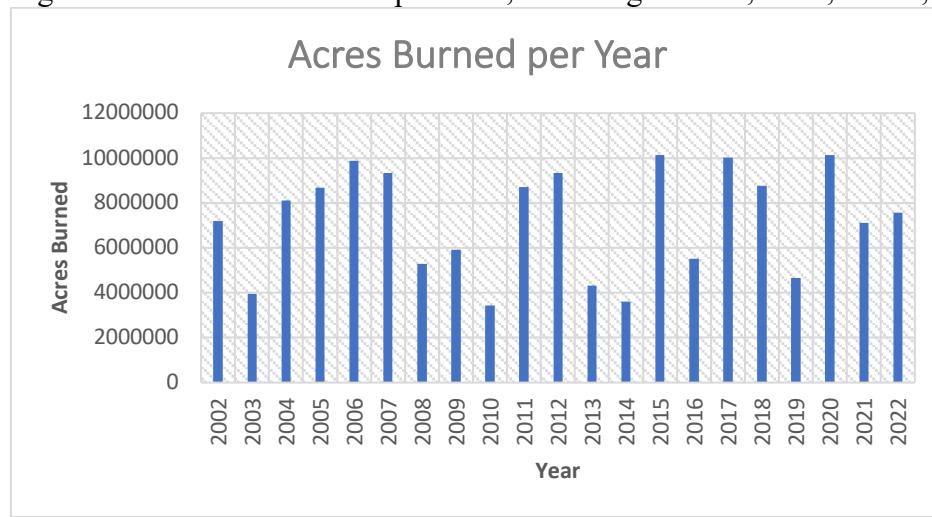
WFM: Wildfire Management Account

WUI: Wildland Urban Interface

Introduction

Over the past decade, climate change has been one of the key contributing factors severely worsening the wildfire problem in the United States. Hotter and drier conditions, severe drought, and longer fire seasons have been significant factors to the large increase in wildland acres burning each year (Environmental Defense Fund, n.d.) The three years with the most total acres burned have all occurred in the past eight years, with over ten million acres burned in 2015, 2017, and 2020 (National Interagency Fire Center, n.d.). Figure 1, below, shows that the ten years with the most acreage burned in the United States have all occurred in the last two decades, further emphasizing the way in which climate change is impacting wildfires.

Figure 1. Total Acres Burned per Year, including Federal, State, Tribal, and Private Lands



Source: (National Interagency Fire Center, n.d.)

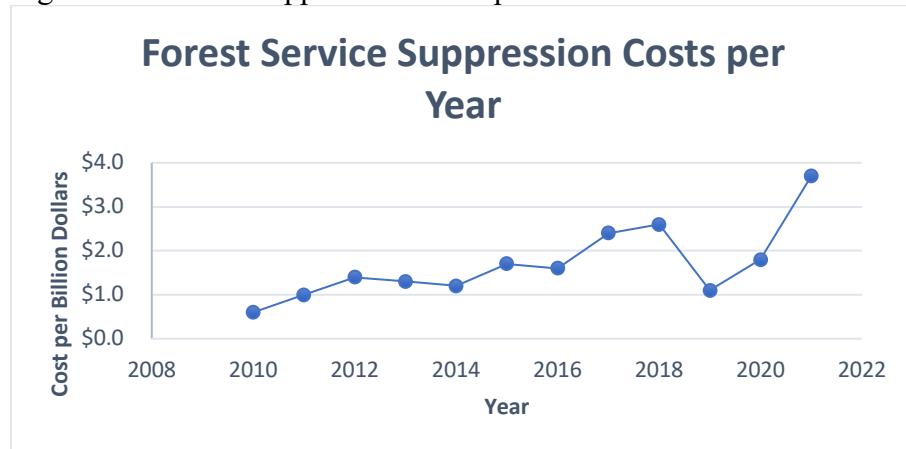
Wildfire not only endangers human life and property, but also has enormous cost considerations. Fire suppression can be extremely costly, as it includes resources like aircraft, engines, fire retardant, and water (U.S. Department of Interior, 2015b). While the number of acres burned varies each year, the cost of suppression is not necessarily increasing only in high-fire years. Rather, the cost of suppression has been steadily on the rise for several years (National Interagency Fire Center, n.d.). This report focuses on the Forest Service's concerning increase in wildfire suppression spending. A background of the problem, analysis of literature, and policy alternatives are given, followed by an evaluation of these alternatives on three evaluative criteria. Following analysis of each alternative, a final recommendation and implementation timeline are given to support the alternative that appears most favorable.

Problem Statement

The United States Forest Service is spending too much money on wildfire suppression each year, with \$3.7 billion being spent in 2021. The amount spent on wildfire suppression continues to increase almost every year, even in years with less severe fire seasons and fewer acres burned.

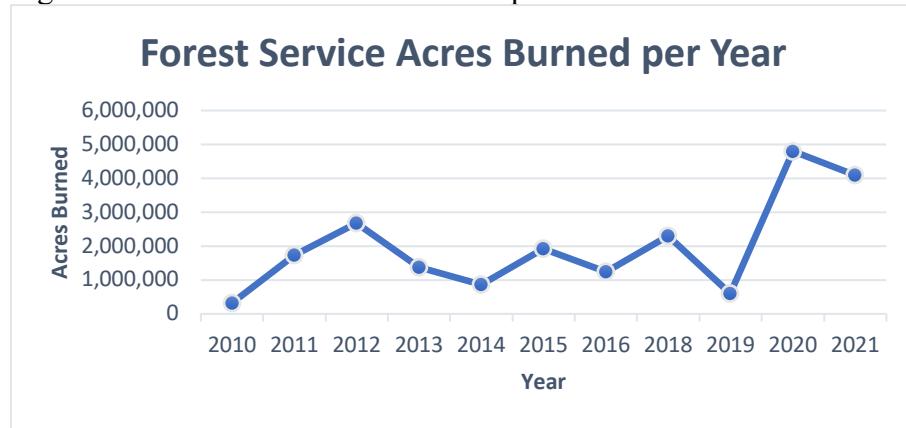
Figure 2, below, shows the trend in Forest Service wildfire suppression costs. A notable comparison here is that in 2020, 4.8 million Forest Service acres burned, and \$1.8 billion dollars were spent on wildfire suppression. However, in 2021, 4.1 million Forest Service acres burned, with a total suppression cost of \$3.7 billion (Hoover & Hanson, 2023). Figure 3 shows the total Forest Service acres burned per year, to provide a comparison between the costs and acres burned.

Figure 2. Wildfire Suppression Costs per Year



Source: (National Interagency Fire Center, n.d.)

Figure 3. Forest Service Acres Burned per Year



Source: (U.S. Department of Agriculture Forest Service, 2017); (Hoover & Hanson, 2023)

*2017 is excluded from the data, as there was not a number that accounted for the full year acres burned.

Background

Client Overview

The Office of Management and Budget is responsible for overseeing the implementation of the President's vision across the Executive Branch (The White House, n.d.-b). OMB carries out this mission by developing and executing the federal budget, managing federal agencies, coordinating significant federal regulations, clearing legislative materials with Congress, and clearing Executive Orders (The White House, n.d.-b). OMB has 6 Resource Management Offices and the client for this report resides within the Climate, Energy, Environment, & Sciences (CEES) Resource Management Office (The White House, n.d.-a). Within CEES, there are two divisions which are then broken off into branches (Riccard et al., 2020). The client for this report is the Agriculture Branch, the branch responsible for overseeing the Department of Agriculture. The Forest Service falls under the Agriculture Branch's responsibilities, hence the client interest in this topic.

Forest Service:

The Forest Service is responsible for overseeing approximately 193 million acres of land (U.S. Department of Agriculture Forest Service, 2016a). Originally established by Congress in 1905 to provide quality water and timber, the agency has broadened its scope to include forage, wildlife, and recreation in addition to water and timber management (U.S. Department of Agriculture Forest Service, 2016a). The agency mission is to "sustain the health, diversity, and productivity of the nation's forest and grasslands to meet the needs of present and future generations," (U.S. Department of Agriculture Forest Service, 2016a).

With the large uptick in wildfire needs over the past 25 years, the Forest Service has seen a tremendous shift in its primary responsibilities. In 1998, there were over 17,500 Forest Service staff dedicated to land management of National Forest System lands and only 5,000 fire personnel. As of 2015, there were about 11,000 fire personnel, and only 10,000 personnel dedicated to land management (U.S. Department of Agriculture, 2015). In addition to this shift in personnel, the Forest Service has seen drastic changes in its budget allocation to accommodate for wildfire management. In 1995, Wildland Fire Management accounted for 16 percent of the Forest Service's total budget, whereas in 2015, it was 52 percent of the total budget (U.S. Department of Agriculture, 2015). Because of this increase in appropriations for fire management, the agency has seen cuts in other non-fire areas. These include, but are not limited to:

- A 24 percent funding reduction in vegetation and watershed management,
- A 15 percent reduction in funding for recreation, heritage, and wilderness,
- An 18 percent reduction in wildlife & fisheries habitat management funding,
- And a 64 percent reduction in funding for land management planning (U.S. Department of Agriculture, 2015).

This large shift in responsibilities has created difficulties for the Forest Service in trying to accomplish many of its forest management duties that allow the agency to carry out its mission.

Causes of the Problem

Climate Change

As previously mentioned, wildfire suppression spending may also be on the rise because of climate change. Weather patterns, which lead to an increase in fire severity, are just one factor that contributes to the large amount of money spent per acre. Climate change and global warming appear to influence fire severity, as well as the number of wildfires that occur each year. The worst fire year in terms of acres burned was 2015, with 10,125,149 acres burned (U.S. Environmental Protection Agency, 2016).

Hazardous Fuel Treatments are Lagging

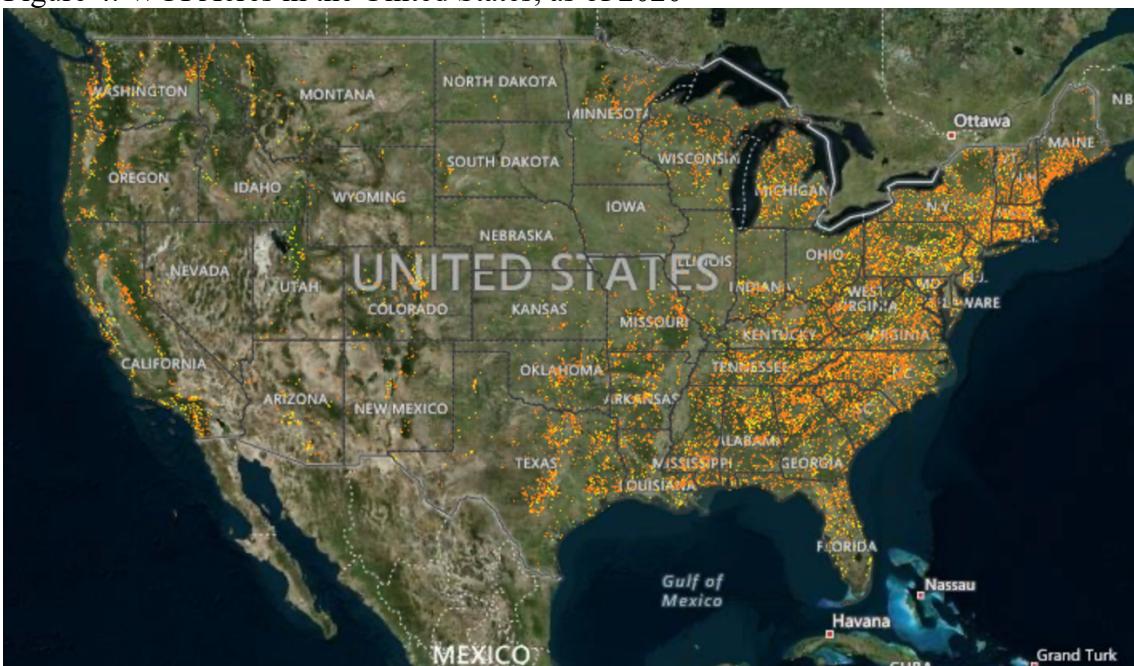
By spending such large amounts of money on wildfire suppression, the Forest Service has continuously neglected its duties surrounding forest management. This includes being behind on completion of clean-up projects following a fire, as well as not prioritizing wildfire prevention techniques like forest thinning and prescribed fires. This creates an environment that invites more fire, as hazardous fuels build up in these scenarios. Hazardous fuel is vegetation in forests that accumulate and allow for more severe fires that burn faster (U.S. Department of Interior National Park Service, 2017). Because the Forest Service's primary method of attack is to fully suppress a fire, more resources have been diverted to fighting fire, and thus resources are taken away from fire management practices that help reduce fire severity and possibly prevent future forest fires. This decision to divert focus to wildfire suppression has direct impacts on those who live in the Wildland Urban Interface (WUI). The WUI is the zone where human development and wildland meet and it is very susceptible to wildfires (U.S. Fire Administration, 2022).

Increased Development in the Wildland Urban Interface

Figure 4, below, shows the location of WUI zones throughout the United States. About one-third of the United States population lives in the Wildland Urban Interface and the number continues to increase, putting more and more individuals at risk of fire damage (Mowery, 2018). As of 2010, the WUI covers almost 10 percent of United States land (Radeloff et al., 2018). In 2010, there were 12.7 million more houses and 25 million more people residing in the WUI compared to 1990 data (Radeloff et al., 2018).

In 1990, 177,000 houses were within perimeters of fires that occurred in the previous 25 years. In 2010, there were 286,000 houses in the perimeter of recent wildfires, resulting in an increase of 109,000 housing units or a 62 percent increase in housing development in burned areas (Radeloff et al., 2018). Increased WUI development has negative effects on wildfire activity and suppression costs, often resulting in more wildfires (Radeloff et al., 2018). Houses in the WUI make firefighting efforts more complicated, as there is more property and residents to protect (Radeloff et al., 2018). Climate change is likely to further exacerbate the number of wildfires occurring each year, thereby increasing the number of fires occurring in the WUI. Expansion of housing in the WUI has created more communities with high vulnerability and susceptibility to severe wildfire, which further drive up the costs of wildfire suppression (Radeloff et al., 2018).

Figure 4. WUI Acres in the United States, as of 2020



Source: (University of Wisconsin-Madison Silvis Lab, n.d.)

Political Incentives

Political interests have also contributed to the rise in suppression costs. Wildfire is currently a politically charged topic, with many politicians in support of the Forest Service and the use full suppression tactics (O'Toole, 2002). These politicians are willing to continue allocating as much money as needed to please their constituent base and ensure that the Forest Service has enough resources to suppress a fire in their district. This can be problematic, as the Forest Service is aware of the political support, making the agency more willing to ask for annual increases in budget allocation.

Lack of Incentives

In addition to political interests, the Forest Service also lacks incentives to take more cost-effective suppression measures. In a survey of firefighters, almost 25 percent reported that a lack of incentives to reduce costs is one of the factors contributing to the increase of suppression costs (Ingalsbee, 2010). Full suppression techniques are often more expensive than allowing a fire to run its course. However, political pressure encourages full suppression, even if that is not the best method of attack (O'Toole, 2002). Ninety-nine percent of fires on federal lands are fully suppressed (O'Toole, 2002). Pressure to fully extinguish all fires paired with an understanding that fire suppression money will never expire has resulted in Forest Service personnel abandoning any sort of cost-effective suppression measures. There are not enough incentives in place for the Forest Service to consider other less costly techniques. If this overemphasis of suppression continues, the United States will never be able to control the destruction caused by these disastrous wildfires, as the Forest Service will continue to neglect its other critical fire related duties while burning through their budget.

Costs to Society

Direct Costs

It is not surprising that wildfires are costly. Direct costs include suppression costs, private property and structure losses, and deaths. Federal suppression spending exceeds \$1 billion per year. Suppression costs include equipment like engines, aircraft, as well as firefighting crews and personnel (Dale, 2010). In terms of property losses, it is estimated that about \$617 million was lost in 2016 with 4,312 structures being destroyed. This number is likely an underestimate of the actual cost, as there is not a comprehensive database that tracks the number of structures burned along with the value of the lost property (Thomas et al., 2017). Deaths and injuries of both civilians and firefighters vary in number from fire to fire. Assume the value of a statistical life is \$9.6 million. To calculate the cost of death due to fire, Thomas et al. (2017) use an average of 15 civilian deaths, 18 firefighter deaths, and anywhere from 2,940 to 21,095 indirect deaths to find that the loss of life could cost anywhere from \$28.5 to \$202.8 billion per year (Thomas et al., 2017). The total direct cost to society of wildfire can be up to \$204 billion with a large part of the number coming from casualties.

Indirect Costs

Indirect costs are of abundance when looking at wildfires. Such costs may include the loss of timber, loss of tax revenue, loss of wildfire, smoke exposure, carbon sequestration, and housing market decline (Thomas et al., 2017). Indirect costs to society can result in loss of greater than \$76 billion (Thomas et al., 2017). However, many of these costs do not have data readily available to accurately calculate across the United States.

Forest Service Funding

The Forest Service receives its annual appropriations the same way as all other federal agencies – through the Budget of the U.S. Government (Office of Management and Budget, 2022). Each year, the President shares his budget priorities. OMB then works with agencies to produce a budget that falls within the President’s goals. Once the budget is formulated and approved by the President, the budget request makes its way to Congress to be amended and passed (Center on Budget and Policy Priorities, 2003).

Currently, the Forest Service receives wildfire funding through its Wildfire Management Account, Wildfire Suppression Operations Reserve Fund, and Hazardous Fuels Account. There is also a section of the budget appropriated for “Other Wildfire Activities,” such as wildfire assistance programs, science and research, burned area recovery, and postfire restoration activities (Hoover, 2023).

Wildfire Management Account (WFM)

The WFM Account includes funding for salaries and expenses, preparedness, suppression, and other unallocated funds. Preparedness includes funds to maintain and train personnel, manage infrastructure and equipment, develop and advance technological tools, and prepare fire management plans (Hoover, 2023). For Fiscal Year 2023, the Wildfire Management Account received a total of \$5.4 billion (Hoover, 2023). This total includes regular and supplemental funding. Within this account, \$914 million was allocated toward salaries and expenses, \$32

million toward preparedness, and \$36 million was unallocated but appropriated to the account (Hoover, 2023). Suppression was appropriated a total of \$1.5 billion through the Wildfire Management Account, including both regular and supplemental funding (Hoover, 2023).

Wildfire Suppression Operations Reserve Fund (also known as the Wildfire Adjustment)
The Wildfire Adjustment Account is a relatively new way of allocating suppression money. Congress appropriates a baseline amount of funding to the Forest Service's Wildland Fire Management account, which is equal to the 10-year suppression average in 2015. This is \$1.011 billion (Hoover, 2023). Then, Congress appropriates funds to the Wildfire Suppression Operations Reserve Fund, which was created in Fiscal Year 2020. This fund is available each year through Fiscal Year 2027 and the amount available increases every year (Hoover, 2023). For example, in Fiscal Year 2022, \$2.1 billion was available and for Fiscal Year 2023, \$2.2 billion was appropriated (Hoover, 2023).

Since this method of allocation is new to the agency, causal impacts have not yet been seen. This method of funding is not necessarily the key to proper allocation of funds. If anything, the use of an adjustment account allows for other Forest Service programs to properly carry out their business, without fear that fire suppression will eat the budget. While this adjustment has provided an ample amount of suppression money, it does not resolve the issue of overspending on suppression activities.

Hazardous Fuels

The National Forest System Hazardous Fuels Account provides funding for fuels reductions to remove vegetation that may reduce wildfire risk (Hoover, 2023). For Fiscal Year 2023, this account received \$207 million in regular appropriations and an additional \$103 million in supplemental appropriations, for a total of \$310 million (Hoover, 2023).

Forest Service Attempts to Address Problem

Repeal Blank Check Policy

The Forest Service used a method known as the “blank check” policy for several years to provide additional funding for wildfire suppression if appropriated funds ran out. Beginning in 1908, the Forest Service was allowed to spend any amount of money necessary for emergency fire suppression, hence the name “blank check,” (O’Toole, 2002). There were no incentives for the agency to limit its suppression activity.

After a continuous increase in the cost of fire suppression, OMB pressed the Forest Service to control the cost of fire suppression in the 1970s. (O’Toole, 2002). In 1978, Congress repealed the blank check policy, and instead tried to appropriate fire suppression as it would any other programs: with a fixed budget. If the Forest Service ran out of funds, they were allowed to use money from a restoration fund, on the grounds that they reimburse the fund (O’Toole, 2002). This resulted in suppression costs decreasing from about \$125 million per year in the 1970s to \$61 million per year in the early 1980s (O’Toole, 2002). While this new mechanism of funding appeared to be having a positive effect on suppression spending, the severity of fires in the late 1980s caused the Forest Service to spend all the money in the restoration fund (O’Toole, 2002).

Congress responded by tripling the Forest Service's appropriations and provided supplemental appropriations to the restoration fund (O'Toole, 2002). Since the Forest Service was given additional money with no repercussions, the agency understood that Congress would never let fire suppression funds fully deplete. This removed the incentives to implement cost-effective suppression techniques, thereby increasing the cost of suppression once again.

As can be seen from the large increases in fire suppression costs from the early 1970s, the blank check policy did not provide appropriate incentives to lower suppression costs. While this policy may have been effective in the early 1900s, that was before fire severity became so extreme and was also prior to the usage of costly, advanced technology.

Prevention Tactic: Hazardous Fuels Treatments

In 2003, Congress passed the Healthy Forests Restoration Act, which increased the number of hazardous fuels reduction projects being carried out on federal lands (108th Congress, 2003). This Act incentivized the Forest Service to focus on its treatments and prevention techniques, rather than solely on suppression. From 2003 to 2006, the Forest Service treated 8.5 million acres for hazardous fuels reduction. Sixty-five percent of those acres were in the Wildland Urban Interface (Steelman & Burke, 2007).

Recently, the Bipartisan Infrastructure Law, passed in 2021, provided additional funding to the Forest Service to prioritize its hazardous fuels management. For Fiscal Year 2022, \$102.8 million was appropriated (Forest Service, 2022). This increase in funding for hazardous fuels reduction further incentivizes the Forest Service to reemphasize the importance of treating forest lands. Given the recent passage of this Act, it is not yet possible to know whether the increased funding 1) increased the number of hazardous fuels reduction projects and 2) reduced fire severity and suppression costs.

The Forest Service recently released its 10-year strategy (*Confronting the Wildfire Crisis*), which increases forest management activities like forest thinning and prescribed fire. The plan calls for treatment of 20 million acres of Forest Service lands and treatment of an additional 30 million acres of other federal, state, private, and tribal lands (U.S. Department of Agriculture Forest Service, 2022a). The Forest Service has estimated that there are about 80 million acres in need of restoration, so this 10-year strategy is only the beginning of such treatments (Fretwell & Wood, 2021). In previous years, the Forest Service has not been able to treat more than 5 million acres per year, given a lack of resources and short window of opportunity to carry out such projects (Fretwell & Wood, 2021). Again, since this plan was only released last year, the effects of the strategy are unknown.

Although these recently implemented policies do not yet have results, we do know that these treatments are effective at reducing the severity of wildfires. A study in 2007 found that fuel treatment prior to the Bell Fire in California increased the ability of fire retardant to penetrate the flame, improved visibility, and allowed for quick suppression (Moghaddas & Craggs, 2007). The use of fuels treatment in this forest increased the suppression effectiveness, thereby decreasing the cost of putting out the fire (Moghaddas & Craggs, 2007). Multiple studies have found similar effects of fuel treatments, that they reduce fire severity. However, it cannot be concluded that

these reductions in fire severity are necessarily correlated with a decrease in suppression funding, given the other variables that must be accounted for, like weather patterns.

Prevention Tactic: Prescribed Fire

Prescribed fires are planned fires that agencies use to manage forestland (National Park Service, 2020). Prescribed fires are known to reduce hazardous fuels buildup and reduce the risk of unwanted wildfires (U.S. Department of Agriculture Forest Service, 2016b). The Forest Service uses these controlled burns as one method of hazardous fuels treatment. In Fiscal Year 2021, the agency used prescribed burns to treat almost 1.3 million of the total 1.4 million acres that were treated (Forest Service Office of the Chief, 2022). While these prescribed burns are extremely beneficial ways to reduce hazardous fuels, the technique is under great scrutiny following the New Mexico Calf Canyon/Hermits Peak wildfire disaster of 2022. This wildfire began as a small 1,200 acre prescribed burn project, and instead resulted in the largest, most destructive wildfire in New Mexico state history (Porter, 2023). The fire destroyed more than 900 structures and burned more than 340,000 acres (Porter, 2023). Following this escaped burn, the Forest Service Chief, Randy Moore, put a 90-day pause on all prescribed burns and required a team to conduct a review of the incident. The report found an array issues:

- Weather conditions were rapidly changing, and no warnings were given,
- Weather stations were offline for periods in the year,
- Humidity values fell below the minimum 12 percent allowed to carry out a prescribed burn and reached six percent at one point during the burn, and
- The crew underestimated potential for escape (Forest Service Office of the Chief, 2022).

Following the tragedy of the Calf Canyon/Hermits Peak fire, the Forest Service has resumed prescribed burning, but with the understanding of how detrimental an escaped fire can be. Regardless of this incident, prescribed burns are still an important tool in the Forest Service's hazardous fuels treatment toolbox, with a 99.84 percent success rate (Butikofer & Isom, 2022). Continuous implementation of prescribed fires remains vital to decreasing wildfire severity, and in turn decreasing suppression costs.

Community Wildfire Defense Grants

The Community Wildfire Defense Grant Program (CWDG) was announced in July 2022 and receives BIL funding. It is a newly established, five-year program that seeks to provide at-risk communities with funding for planning and mitigating wildfire risks (U.S. Department of Agriculture, 2022). Priority is given to areas with high wildfire hazard potential, low-income communities, and communities impacted by disaster (U.S. Department of Agriculture Forest Service, 2022b). Grants will fund up to \$250,000 to update community wildfire protection plans and provide education to the community. The grants will allocate up to \$10 million for infrastructure and resilience projects (U.S. Department of Agriculture, 2022). The number of projects will be determined on available funding. The Bipartisan Infrastructure Law allocates \$200 million annually over five years to the CWDG program (U.S. Department of Agriculture, 2022). The program took effect in Fiscal Year 2022 and expires at the end of Fiscal Year 2026 (Forest Service, 2022). The CWDG program is one of the Biden Administration's attempts to put some of the risk management responsibility onto communities, rather than the federal

government bearing all risk. The goal is that in providing funding to the most at-risk communities, they will adopt strategies to increase their fire resilience, resulting in less severe and less costly fires in those communities. It is too early in implementation of the program to understand the effects it has had on fire severity and suppression costs.

Evidence on Potential Solutions

Reformulating Wildfire Suppression Funding

There is limited literature regarding a straight-forward cut to suppression and available literature has little to no precedent to fall back on. One potential solution to the suppression spending problem is to eliminate the idea of having unlimited funds to fight fire (Berry, n.d.). As Congress did in the 1970s, a reformulation of the way in which fire suppression is funded could go a long way. However, the effect would likely be similar to that in the 1970s, where spending decreases for a few years until devastating fires overwhelm the budget.

Rather, another method that may incentivize fire managers to reduce spending is to fund fire suppression out of each individual forest budget (Berry, n.d.). A Forest Service investigation found that managers would have fought fire differently and in a more cost-effective way if the funds came from a forest's allocated budget, rather than from the federal suppression budget (Berry, n.d.). Given the political pressure behind fire suppression, Congress is unlikely to vote for this idea. If an individual forest budget were to run out of money and have no emergency funds, the political backlash from constituents would likely be too much to bear. Because of this, additional research is needed to identify more feasible suppression funding options. The best suited policy proposal will need to address what to do in years with severe fire activity.

Moving the Forest Service to Department of Interior

In 2008, the House Interior Appropriations subcommittee asked the Government Accountability Office to conduct a study regarding relocating the Forest Service to the Department of Interior (U.S. Government Accountability Office, 2009). The committee was weighing the idea as a means of saving money and improving federal land management (U.S. Government Accountability Office, 2009). In 2009, GAO reported its observations, but did not give any recommendations. The office found that moving the Forest Service into the Department of Interior might improve federal land management, as it would put all agencies with land management missions into one department (U.S. Government Accountability Office, 2009). Additionally, Forest Service and Interior lands are often adjacent or intermingled with one (U.S. Government Accountability Office, 2009). Working with one large department budget, the two agencies may be more willing to collaborate and work on all lands. This is especially important regarding wildfire, as fire does not have boundaries and will move from Forest Service to Interior as it wants.

The GAO observations also indicate that the move to Interior would not achieve many short term efficiencies, given the need for a large restructuring and integration of the two agencies' programs (U.S. Government Accountability Office, 2009). Agency officials felt that moving the Forest Service into Interior as its own separate bureau may not increase collaboration (U.S.

Government Accountability Office, 2009) GAO uses wildland fire management as a prime example as to how the agencies have cross-collaborated but still have many notable differences in their methods. Both the Forest Service and Interior work to coordinate assets and incident command teams, as well as hazardous fuels reductions and habitat restoration (U.S. Government Accountability Office, 2009). Despite this collaboration, finances and business operations are still different. One difference is the way firefighters receive certification. Interior firefighters must receive additional training to receive a Forest Service certification because there are different qualification standards between the agencies (U.S. Government Accountability Office, 2009). Additionally, the fire budgets are drastically different between the two agencies, with the Forest Service receiving \$5.4 billion dollars of wildfire funding for Fiscal Year 2023, and the Department of Interior receiving \$1.8 billion (Hoover, 2023). On top of this discrepancy in funding, Department of Interior land is located in more remote locations, allowing for different fire suppression techniques to take place. For example, approximately 75 million acres of Interior's 420 million acre jurisdiction is located in Alaska, an area where fires are often allowed to run their course with little to no suppression costs (Alaska Department of Fish and Game, n.d.).

Finally, GAO found that moving the Forest Service to Interior would require a number of transition costs and disruptions (U.S. Government Accountability Office, 2009). The report notes that a clash of cultures, decreasing productivity of employees, and integrating technology and business systems would require significant time and (U.S. Government Accountability Office, 2009). GAO also notes that a variety of stakeholders will be involved in this transition, including tribal entities, Congress, and interest groups (U.S. Government Accountability Office, 2009). Each of these stakeholders would also need to make reorganizational changes to accommodate the move.

Obviously, the Forest Service is still a part of the Department of Agriculture, and the agency did not move to the Department of Interior. While suppression costs may have been reduced by increasing collaboration and adopting some of the Department of Interior's spending habits, the costs and discrepancies between the agencies are still too large. In the short term, there are likely to be too few benefits to truly consider this as an alternative that can decrease fire suppression spending.

Takeaways from the National Flood Insurance Plan

In 1990, the National Flood Insurance Plan created the voluntary Community Rating System program, which incentivizes communities to prioritize flood risk management (Kousky & Rasker, 2014). By participating in certain risk reduction measures, communities received points that allowed movement through different levels of the program. Movement through each level gave residents of the community an additional five percent discount on insurance premiums (Kousky & Rasker, 2014). There are certain activities that allow for earned points, which include mapping, flood damage reduction, and flood preparedness. The activities that are more effective at reducing flood damages receive more points (Kousky & Rasker, 2014). King County, Washington was the first county to make it to the second rank. Risk management activities this county implemented included providing information on flood hazards, conducting flood hazard mapping, preserving over 100,000 acres of open space in flood-susceptible areas, adopting

higher elevation requirements, restricting development in high-risk areas, and elevating structures (Kousky & Rasker, 2014).

Studies have found that community participation in this program reduces flood claims and property damage (Kousky & Rasker, 2014). In Mississippi and Alabama, research shows that participating in the Community Rating System reduced flood damage by about six percent for those communities in the middle of the ranking system (Class 5). However, the same research shows that there is no effect for communities on the lower end of the ranking system, meaning that these are the communities with less points (Rypel, 2022). Rypel (2022) found that percent reduction in claims is roughly equal to the premium discount the communities are receiving. For example, communities receiving a premium discount of 15 percent had flood damage reductions of about 18 percent (Rypel, 2022). Rypel (2022) concludes that the cost of implementing the Community Rating System and its estimated benefits are about equal. Rypel (2022) supports continuation of the program because society will incur greater benefits from this program as climate change worsens. While the cost of this program paired with a relatively low take up rate (1500 communities) may seem discouraging, the program has been effective in reducing flood risk in those higher ranked communities (FEMA, n.d.).

Hazardous Fuels Treatments

As previously mentioned, hazardous fuels are an integral piece of forest management. A study conducted by Thompson et al. (2013) found that fuel treatments conducted on 46 percent of 145,000 acres would lead to smaller fires. The researchers using modelling to obtain results. They estimate that these treatments would reduce average per-fire size by 4.7 percent and average per-fire cost by 6.7 percent (Thompson et al., 2013). Fitch et al. (2013) also utilized modelling to determine the effectiveness of hazardous fuels treatments on suppression costs. However, this research focused on fire severity, rather than fire size. Following treatment, landscape that burned with high severity reduced from 28.6 percent to 2.6 percent, **a 26 percentage point reduction** (Fitch et al., 2013). These results found that per-acre costs reduced by 59.3 percent and total fire cost reduced by 10 percent, post treatment (Fitch et al., 2013).

These modelling results provide a sense of reassurance that investment in hazardous fuels treatments will help decrease suppression costs, in the long run. However, the current focus is to treat as many acres as possible, rather than the acres most susceptible to causing outrageous fire suppression costs. Berry (n.d.) suggests concentrating hazardous fuels reduction treatments in the WUI, and specifically around development. This would significantly reduce the number of acres needing treatment, as well as protect the most fire-prone areas (Berry, n.d.). Hazardous fuels treatments have shown beneficial in preventing severe fires, and take up of these treatments in the WUI should be significantly increased to bring down the cost of fire suppression.

Alternatives

Alternative 1: Keep the current course of funding

The Forest Service receives appropriations in the Budget of the United States, each Fiscal Year. For Fiscal Year 2023, the Forest Service received \$1.5 billion for suppression, \$914 million for salaries and expenses, \$32 million for preparedness, \$2.2 billion for the wildfire adjustment, and \$310 million for hazardous fuels treatment (Hoover, 2023).

The Biden Administration has taken recent steps to emphasize the importance of wildland fire management in reducing the severity and cost of wildfires, through the passage of BIL.

Bipartisan Infrastructure Law funding includes \$407.4 million to increase hazardous fuels treatments, as well as an additional \$3.5 billion over the next five years to help mitigate and reduce wildfire risk. The idea behind this funding is that an increase in wildland fire management will decrease the cost of suppression activities. This funding will:

- Increase recruitment and retention of National Park Service firefighters (U.S. Department of Interior National Park Service, 2023)
- Increase the size of the federal firefighting workforce (U.S. Department of Interior National Park Service, 2023)
- Ensure all federal firefighters make at least \$15 per hour (Office of Management and Budget, 2022)
- Support a more permanent firefighting workforce, making some seasonal employees shift to permanent status (The White House, 2022)
- Establish Community Wildfire Defense Grants, providing communities with grants to reduce risk of wildfire (The White House, 2022)

In addition to the increase in funding, the Forest Service 10-year strategy, *Confronting the Wildfire Crisis*, calls for an increase in fuels and forest health treatments, as was mentioned earlier in this report (U.S. Department of Agriculture Forest Service, 2022a).

Overall, the current course increases wildfire suppression funding, while also increasing funding for wildland fire management. Effects of these efforts to treat the forests will not be seen immediately, but the hope is that the increase in wildland fire management will lead to less money spent on wildfire suppression.

Alternative 2: Change the wildfire suppression funding formula

As was mentioned earlier in the report, the Forest Service 10-year suppression average from Fiscal Year 2015 determines how much money is allocated to the Wildfire Management Account. This 10-year suppression average is a lagged variable, that has underestimated spending in all but two of the ten fiscal years between 2007 and 2016 (Congressional Research Service, 2017). Since the 10-year suppression obligation average determines the discretionary appropriations for wildfire suppression and has been increasing each year, this may not be the most efficient way to create cost-effective incentives.

Instead of having both the WFM and Adjustment accounts, the Office of Management and Budget (OMB) should **give a set discretionary budget to the Forest Service for wildfire suppression.** For example, for Fiscal Year 2023, there is \$1.01 billion available in the Wildfire Management Account and an additional \$2.2 billion in the Adjustment Account that can be transferred into the Management Account when needed. Instead of this, OMB should **use the median of the 10-year suppression spending to calculate the amount of funding for the Wildfire Management Account**, which would eliminate the outlier low-spend and high-spend years. **For fiscal years 2012-2021, the median would be \$1,658,403,000. This should be the amount appropriated in the budget, with no reserve fund easily available.** Any additional money left in the account at the conclusion of the fiscal year will carry over to the next year, incentivizing the Forest Service to use cost-effective suppression measures. In place of a reserve fund that is directly in Forest Service control, there should be an additional \$1 billion set aside for extra funding that must receive Congressional approval to transfer. To receive this additional funding, the Forest Service will have to prove use of adequate cost-effective measures and exhausted resources. If this \$1 billion is exhausted, the Forest Service would need to take funding from its other programs. This would be a multiyear alternative, until a better method to funding is established. This should take effect in the Fiscal Year 2025-26 budget, as creation of the 2024 budget is already in process.

Rather than reducing the number or severity of fires, this alternative would create an incentive for the Forest Service to adopt more cost-effective suppression techniques. Because this alternative would not provide as much excess funding as the Forest Service managers are used to, they would have to consider other modes of controlling fires that are more cost-effective, like rethinking the number of airtankers required on a scene. This alternative directly cuts the wildfire suppression budget; therefore, it immediately lowers suppression costs, if no additional money is required by the Forest Service.

Alternative 3: Create an incentive program to prioritize building fire safe communities

Estimates vary regarding what percent of suppression expenses are directed at defending private property. Rasker (2014) reported that at least one-third of suppression expenses go towards defending private homes, while Bagdon & Huang (2016) found that between 50 to 95 percent of large wildfire costs can be attributed to protecting private property. It is estimated that about \$547 million to \$1 billion was spent in 2003 and 2004 on protecting private property (Bagdon & Huang, 2016). To reduce suppression spending in these fire-susceptible communities, an incentive program should be created for wildfire risk reduction, as was done for flood risk reduction through the National Flood Insurance Program.

The Office of Management and Budget should **create a program using the Community Wildfire Defense Grants that provides incentives like those in the National Flood Insurance Plan.** This plan differs from the CWDG program by creating a ranking system. However, the incentive program will have the same intent as the CWDG program by keeping at-risk low-income communities as the main recipients of funding. **The incentive program will rank communities who have received funding based on their risk reduction efforts.** Rewards for the top-ranked could include management priority for forest thinning and hazardous fuel reductions, as well as land use planning grants (Kousky & Rasker, 2014). For example, a

community that is ranked higher in risk reduction efforts would receive priority to have their wildland managed. Risk reduction efforts may include clearing of flammable vegetation, spacing of large trees from structures, and usage of fire-resistant building materials (Sommer, 2022). Creation of this incentive program would shift some of the burden off of the federal government and onto states, tribes, and local entities to build fire-safe communities.

Because much of current wildfire suppression spending is diverted to the WUI and protection of private structures, creation of a community incentive program may result in less costly suppression measures in these areas. The Community Wildfire Defense Grants receive \$200 million annually for 5 years with BIL funding. This alternative proposes an additional \$200 million annually for 5 years, beginning after BIL funding ends. This means \$200 million per year will be required beginning in Fiscal Year 2027. Creation of this program should take effect in Fiscal Year 2025-26, as creation of the 2024 budget is already in process.

Alternative 4: Increase hazardous fuels treatments in the Wildland Urban Interface

The current focus on hazardous fuels treatments is to treat as many acres of land as possible. This incentivizes land managers to treat the easier acres of land, rather than those that are more susceptible to devastating fires (Lueck & Yoder, 2016). However, the cost of treating high fire risk land, like the WUI, are extremely costly. Research shows that these costs may range from \$1,321 to \$3,195 per acre (Bagdon & Huang, 2016). Given these large costs, more hazardous fuels funding is needed to adequately target WUI acres in need of treatment.

The Executive Office of the President should direct the Forest Service to prioritize hazardous fuels treatments in the Wildland Urban Interface. The Office of Management and Budget should create a tracking system that identifies the number of WUI acres being treated yearly compared to the total number of acres being treated by the Forest Service. **OMB can help the Forest Service prioritize such fuels treatment by transferring \$300 million from the suppression reserve account to the hazardous fuels account.** This would allow for approximately \$700 million to be appropriated to hazardous fuels, between the Bipartisan Infrastructure Law and this transfer. The transfer would create an incentive for the Forest Service to treat the costliest acres, as those are the acres that dramatically increase the costs of wildfire suppression. This transfer of suppression funding should occur in Fiscal Year 2025-26, as creation of the 2024 budget is already in process.

Evaluative Criteria

The Office of Management and Budget prioritizes alternatives that are politically feasible, do not require a large increase in staffing and resources, and that have a greater suppression savings than cost of implementation. Given the goals of OMB, the criteria I will use for evaluation are political feasibility, administrative feasibility, and net cost.

Political Feasibility (35%): I will decide if the alternative is politically feasible by looking at whether the alternative needs to receive Congressional approval and how the key stakeholders feel about the alternative. This will be measured using a low-medium-high-scale.

Administrative Feasibility (30%): I will decide administrative feasibility by determining the required resources of each policy alternative. The number of staff and additional resources required will be measured in terms of low, medium, and high.

Cost (35%): Cost is the net cost of the cost to implementation and cost savings. Cost savings is operationalized as how much suppression spending is reduced. The cost calculation is determined by subtracting total cost savings from the cost of implementation. If the cost is negative, savings outweigh implementation costs. If the cost is positive, implementation costs are larger than overall cost savings. For simplicity, cost will be evaluated on a low-medium-high scale.

See Appendix A for an explanation of how the low, medium, and high scores will be determined, as well as justification for not including equity and effectiveness criteria.

Evaluation of Alternatives

Alternative 1: Current Course

Political Feasibility: Political feasibility for the current course of funding is **high**, as both the Fiscal Year 2023 Budget and the Bipartisan Infrastructure Law have passed and been signed by the President.

The Fiscal Year 2023 Budget passed in the House of Representatives with a vote of 225 Yea's and 201 Nay's (117th Congress, 2022). The bill passed the Senate with a vote of 68 Yea's and 29 Nay's (117th Congress, 2022). The Bipartisan Infrastructure Law was signed into Law on November 15, 2021. The bill received 228 Yea's and 206 Nay's in the House of Representatives and had 69 Yea's to 30 Nay's in the Senate (117th Congress, 2021).

Despite the relatively partisan lines that these votes fell on, it is important to remember that wildfire policies compiled only a very small portion of these pieces of legislation. The wildfire-related aspects of these bills were mostly bipartisan, with a large majority of legislators supporting an increased firefighting workforce and funding for the agency (O'Toole, 2002).

There is debate amongst legislators regarding whether an increase in hazardous fuels treatments is the correct course of action to fighting the increasing severity and costs of wildfires. Proponents of these treatments feel that buildup of vegetation is to blame for the severity of fires, while opponents are worried that using such treatment methods will create an environment for excessive logging (Yurk, 2022). While both sides have solid arguments, the funding has already been allocated for use and the Biden administration has declared its desire to increase hazardous fuels treatments.

Administrative Feasibility: Administrative feasibility for the current course, or status quo, is **medium**. It calls for an increase in the size of the federal firefighting workforce and an increase in the retention rates of the workforce. Additionally, the attempt to treat an additional 20 million acres of Forest Service lands over the next 10 years will inevitably require an even larger workforce to carry out these treatments. This is difficult given the ongoing labor shortage of federal firefighters (Safo, 2022). However, steps have already been taken to address the shortage of labor in the firefighting workforce, with wildland firefighting pay now beginning at a minimum \$15 per hour to help increase retention (U.S. Government Accountability Office, 2022). The Forest Service, as of 2022, reached 90 percent of its hiring target of 11,300 firefighters (Katz, 2022). While obtaining these additional employees is challenging, the agency has already made significant strides towards achieving this goal, needing only an **additional 1,130 firefighters to reach the target**.

Cost: The cost of implementation for this alternative is based on funding that has already been passed through the Fiscal Year 2023 Budget and BIL. BIL funding is in effect for five years. Cost savings are estimated based on the assumption that all pieces combined will lead to a 20 percent reduction in suppression costs.

The net cost, over the 10-year evaluation period is **\$118 million** with a 7 percent discount rate, and **-\$189 million** with a 3 percent discount rate. This means that the cost of implementation is higher than the cost savings or only slightly outweighs implementation costs for the current trends. Cost is ranked **high**.

See Appendix B for full cost calculations and assumptions.

Alternative 2: Alter the suppression funding formula

Political Feasibility: Political feasibility for this alternative is **low**. Politicians are typically not willing to cut funding for emergencies like natural disasters. There will be a hesitancy to adopt this alternative, because of the high probability that the Forest Service will run out of money in the first few years this change is made.

Such a change would require Congressional approval. Legislators are likely to approve of the carry-over aspect of this alternative; however, most will not be in favor of setting aside only \$1 billion for emergency funds. In a severe fire year, this money can be easily run through. The Forest Service would have to resort to its old “blank check” method, where the agency moves funds from its other programs to provide additional suppression money if its appropriated budget runs out (O’Toole, 2002).

Administrative Feasibility: Administrative feasibility for this alternative is **high**. This alternative does not require any additional employees for OMB or the Forest Service. Rather, it would require additional hours spent by OMB calculating whether the use of the median is the correct change to make to the suppression funding formula, along with further analysis on the benefits of the proposed alternative.

Cost: The net cost over 10 years is slightly under **-\$4.4 billion** with a 7 percent discount rate. With a 3 percent discount rate, the net cost is slightly over **-\$5.3 billion**. This means that the cost of implementation is much lower than the cost savings for this alternative. Cost is ranked **low** for this alternative.

See Appendix B for the full cost calculations.

Alternative 3: Create an incentive program to prioritize building fire safe communities

Political Feasibility: Political feasibility for this alternative is **medium**. Since this alternative builds on the Community Wildfire Defense Program, there should not be much hesitancy to continue funding these grants following expiration of the Bipartisan Infrastructure Law funds. Continuing to fund a previously established program is likely less controversial than deciding to cut the program.

However, the creation of the incentives itself may create some political opposition. The program will likely bring out some equity concerns, in that favoring communities who have taken more risk reduction measures than others will likely put wealthier communities at the forefront. However, because grant funding is only given to the highest risk and low-income communities,

there is hope that this will eliminate the equity concerns. The argument can go both ways, which will create some debate in Congress but is unlikely to block the program from continuing, as any risk reduction will be seen as progress.

Administrative Feasibility: Administrative feasibility is **high**. The program will require one additional Forest Service member per each of the nine regions, plus one in the Washington DC office. These employees will be responsible for tracking the risk reduction measures taken in each of the communities in their regions, as well as aide in the approval and dispersal of grant funding.

Cost: The net cost over the course of 10 years to implement this alternative is about **\$250 million** with a 7 percent discount rate. With a 3 percent discount rate, the net cost is **\$298 million**. This means that the cost of implementation is higher than the cost savings for this alternative. Cost for this alternative is ranked **high**.

See Appendix B for full cost calculations.

Alternative 4: Increase hazardous fuels treatments in the Wildland Urban Interface

Political Feasibility: Political feasibility for this alternative is **medium**. Because this alternative does not significantly take away from suppression funding, nor does it require additional approval of hazardous fuels funds, Congress should not have much opposition.

This transfer of funding would still leave a large amount of the suppression reserve account untouched and provide adequate funding for the Forest Service to fall back on, should they run out of the money in their Wildfire Management Account. This alternative would require Congressional approval to transfer the funds. However, both political parties should be in favor, as it might incentivize the Forest Service to spend their suppression money in a more cost-effective manner. Congressional opposition to this alternative may stem from administrative feasibility concerns, given the need for an even larger firefighting workforce to carry out the hazardous fuels treatments.

Administrative Feasibility: Administrative feasibility of this alternative is **medium**. While it may be difficult to hire all new Forest Service employees in the first year, eventually it will be manageable, with the current changes in funding for the federal firefighting workforce (The White House, 2022).

This alternative would require one additional OMB employee to focus on tracking and monitoring the hazardous fuels treatments. The employee would begin at the General Schedule 9 pay grade and would move up the ranks as applicable throughout the years. For the Forest Service, this alternative would require at least an additional 500 employees to focus solely on conducting hazardous fuel treatments. This number may be as high as 1000 employees. These numbers are estimated by assuming the alternative requires about a three to eight percent increase in the size of the current workforce of about 12,800 firefighting personnel (U.S. Government Accountability Office, 2022).

Cost: If we hire 500 additional Forest Service employees, the net cost is **-\$2.9 billion** with a 7 percent discount rate, and **-\$3.8 billion** with a 3 percent discount rate. With 1000 additional Forest Service employees, the net cost is **-\$2.8 billion** with a 7 percent discount rate, and **-\$3.4 billion** with a 3 percent discount rate. Cost, over 10 years, may range from **-\$2.8 billion to -\$3.8 billion**.

This means that, regardless of whether we hire 500 or 1000 Forest Service employees, the cost of implementation is much lower than the cost savings for this alternative. Cost for this alternative is **low**.

Note that aside from labor considerations, there is no additional cost to implement the \$300 million transfer, as this money is already allocated to the Forest Service through the creation of the Wildfire Suppression Operations Reserve Fund in the United States Code (Cornell Law School, n.d.).

See Appendix B for full cost calculations and assumptions.

Outcomes Matrix

| | Political Feasibility (35%) | Administrative Feasibility (30%) | Net Cost (35%) | Weighted Average |
|-----------------------------------------------|-----------------------------|----------------------------------|----------------|------------------|
| Current Course | High (3) | Medium (2) | High (1) | 2.00 |
| Change in Funding Formula | Low (1) | High (3) | Low (3) | 2.30 |
| Incentive Program | Medium (2) | High (3) | High (1) | 1.95 |
| Transfer to Hazardous Fuels Treatments | Medium (2) | Medium (2) | Low (3) | 2.35 |

See Appendix A for scoring breakdown.

Final Recommendation

After evaluating each alternative on the feasibility and cost components, **I recommend a transfer of \$300 million from the Adjustment Reserve Account to the Hazardous Fuels Treatments Account.** I recommend this alternative in addition to the current trends that are occurring already, from passage of the Bipartisan Infrastructure Law. This alternative scores well in the political feasibility criterion, which is of importance to the client. There is also hope that this increase in funding for treatments will lead to a significant decrease in annual suppression costs, the ultimate problem that was brought to me. While this alternative scores medium in administrative feasibility given the need for additional firefighters, it is possible that the Biden administration's push for increased retention of firefighters will help with the feasibility of this alternative. Implementation costs stem from the cost of employment of these firefighters, which is a cost that OMB and the Forest Service are willing to bear.

Implementation

While this transfer of money will not occur until Fiscal Year 2025, the steps toward implementation will need to begin relatively soon to secure the necessary approval.

This recommendation is not without implementation challenges. Issues surrounding implementation include how the Forest Service will fund suppression, should they run out of money in the Suppression Reserve Account due to the transfer, as well as whether this additional funding will actually result in an increase in the number of acres treated. Congressional approval may also require negotiation, as the original intent of the Wildfire Suppression Operations Reserve Fund was to provide a safety net for suppression and was not intended to be transferred elsewhere (Wang & Blackband, 2023). Following Congressional approval, the rest of implementation should be rather smooth on the Office of Management and Budget side. The Forest Service will have to hire additional personnel, which should be feasible given the funding set aside for an increase in pay in the Proposed 2024 Fiscal Year Budget (U.S. Department of Agriculture, 2023).

Stakeholders:

The Office of Management and Budget Program Associate Director of the Natural Resource Divisions and OMB Director Shalanda Young will be crucial in advocating for this transfer. These political appointees will be the ones doing much of the negotiation with Congress. Additionally, the support of Agriculture Secretary Vilsack and Forest Service Chief Moore will be necessary. The opinions of these two will also likely alter the opinion of firefighting unions, who might have mixed feelings surrounding the recommendation. On one hand, firefighters will likely support the idea because it will provide more work, but on the other hand, they might be worried that it increases the workload too greatly (U.S. Department of Agriculture Forest Service, 2022c). Currently, both Secretary Vilsack and Chief Moore are advocates of an increase in hazardous fuel treatments, so their support will be vital in gaining approval of the Forest Service employees themselves (Moore, 2022). The Department of Interior will also be an important stakeholder in this, as the two agencies work closely together to carry out suppression and hazardous fuels activities. Finally, Congress is, perhaps, the most important stakeholder in

the process. As the ones who actually pass the budget, their support is needed to get the recommendation into place.

Necessary Steps:

See Appendix C for a timeline of necessary steps.

Worst Case Scenario:

The worst-case scenario with this alternative and the most important consideration is that the Forest Service may run out of suppression funding in a particularly bad fire season. Unfortunately, these risks are likely given the increase in fire severity caused by climate change (U.S. Department of Agriculture Forest Service, 2022a). Should this happen, the Forest Service will require a transfer of funds back into the suppression account, which can be done rather easily and would not require Congressional approval, just notification to the House and Senate Appropriations Committees (117th Congress, 2022). It is also important to consider that it will take years to see a decrease in fire suppression costs that can be connected to this increase in hazardous fuels funding. However, we have already seen the benefits of some fire prevention tactics with the Mariposa Grove fire last year. Consistent fuel treatments and prescribed fires saved the California sequoias from burning down by steering the flames away from the historical trees (Borunda, 2022). To address the likely lag in seeing results, close monitoring of these treatments and acres burned in fires will be needed for many years following implementation, as was done in this Mariposa Grove example. Finally, we also must consider the fact that this transfer of money might not increase the Forest Service's capacity to carry out more hazardous fuels treatments. To address this issue, it will be even more crucial that the hazardous fuels workforce and suppression firefighting teams are kept separate, ensuring that the hazardous fuels treatments can continue to be carried out even while fighting large fires.

As was stated above, this recommendation does not come without its challenges. However, the potential benefits it may have in reducing the cost of suppression, while also providing safety to communities is undeniable.

Conclusion

If one thing is clear after reading this report, it should be that rising suppression costs are not caused solely by an increase in fire severity and acres burned. While changing weather patterns do play a role in the increase of these costs, other factors to consider are the lack of incentives, the growing development in the Wildland Urban Interface, and the neglect of forest management. My final recommendation is to tackle the last of these factors: forest management. By increasing the resources dedicated to hazardous fuels treatments, long-run suppression costs should decrease substantially. This recommendation, regardless of its success rate, will have a positive impact on preventing future costly fires, as previous research already indicates. Hazardous fuels treatments have been linked to both a decrease in fire severity, as well as a decrease in suppression costs. While an increase in the treatments will likely be effective, it is pertinent that OMB and the Forest Service take additional steps to mitigate the cost of suppression, as well.

Appendix A: Explanation of Criteria

Political Feasibility:

Political feasibility is based on the likelihood of receiving Congressional approval. It is measured on a low-medium-high scale. **Low is scored as a 1, medium as 2, and high as 3.** This means that low political feasibility is unlikely to receive Congressional approval, while high is extremely likely. This criterion is weighted at 35 percent because each alternative requires Congressional approve. Without approval, the alternative cannot proceed.

Administrative Feasibility:

Administrative feasibility is based on the number of additional resources required. A low score will require greater than 1500 employees, medium will require less than 1500 employees but greater than 500 employees, and high will be anything less than 500 employees.

I am choosing these numbers based on the current number of Forest Service employees. Of the 35,000 employees, about 10,000 are firefighters. An increase of 1500 employees results in a 4 percent increase in total agency staffing levels. Additionally, I am assuming that there are another 1000 or so administrative personnel with the sole responsibility of managing wildfire, and the remaining employees are in charge of other Forest Service duties, like maintaining the national parks, coordinating with state agencies, and conducting research (U.S. Department of Interior, 2015a).

Low administrative feasibility is scored as 1, medium as 2, and high as 3.

Cost:

Cost is net cost of the cost to implementation and cost savings. A high cost will be any positive net cost, as that indicates savings does not cancel out implementation costs. High cost will also include net costs that are only slightly decreasing suppression costs. For these alternatives, I will operationalize high cost as ranging from -\$200 million to +\$1 billion. Medium cost will be between -\$201 million to -\$2 billion. Low cost will be -\$2 billion and lower. Cost is weighted at 35 percent because without a reduction in cost, these alternatives will not fix the issue at hand – too much suppression spending. The cost will be calculated using Net Present Value. A three and seven percent discount rate are used.

Low net cost is scored as 3, medium as 2, and high as 1.

I do not include equity in my list of criteria because wildfires affect all communities, and the Forest Service cannot discriminate on which communities it provides aide to. There is one alternative that may have an equity concern – creating an incentive program. This alternative may put poorer communities at a disadvantage to receive priority for forest thinning and management. However, the other three alternatives did not have obvious equity concerns, so I chose to leave this criterion out.

Additionally, I do not include an individual effectiveness criterion. To measure effectiveness of each alternative, we would need to look at avoided costs, or cost savings (Simon et al., 2022). Therefore, effectiveness is being addressed, though minimally, within the cost criterion, specifically when looking at cost savings of each alternative. I assume that these cost calculations are enough to determine how effective each policy is at reducing wildfire suppression costs. However, because I do not examine effectiveness and cost outside of the federal government, there are flaws in this methodology. While these policy alternatives may appear effective in reducing wildfire suppression costs for the Forest Service, they may increase costs elsewhere thereby reducing overall effectiveness. Because this report only concerns the Forest Service suppression costs, this does not hinder the conclusions and recommendation.

Appendix B: Cost Calculations

OMB uses a 7% and 3% discount rate. Both are calculated for each alternative.

Inflation calculations come from the Congressional Budget Office's Economic Projections Excel Sheet for Fiscal Years 2023-2033 (Congressional Budget Office, n.d.).

Alternative 1: Let Present Trends Continue

Assumptions:

- Assume that following the 5-year BIL funding, the additional 5 years in the evaluation period will require \$100 million for maintenance of the newly implemented programs.
- Assume that the sum of each of the pieces being implemented in present trends leads to a 20 percent reduction in cost of suppression
 - Since the attempts are a combination of hazardous fuels treatments and Community Wildfire Defense Grants, I took the sum of the estimates from Alternatives 3 and 4: that an increase in hazardous fuels reductions leads to a 17 percent reduction in suppression cost (Borunda, 2022) and that implementing the CWDG program will reduce suppression cost by 3 percent (Parijanlar & Welch, 2012).
- Since BIL funding has already begun, this alternative has a slightly different 10-year evaluation period (2022-2031) to account for implementation costs. BIL funding is only allocated for fiscal years 2022 through 2026.

Cost to Implementation:

- Hazardous Fuel Treatment Funding: \$407,400,000 over first 5 years
- Mitigation and Reduction of Wildfire Risk Funding: \$3,500,000,000 over first 5 years
- 5 Years Following BIL: \$100,000,000 per year for maintenance

| Metric | Year 1 [2022] | Year 2 [2023] | Year 3 [2024] | Year 4 [2025] | Year 5 [2026] | Year 6 [2027] | Year 7 [2028] | Year 8 [2029] | Year 9 [2030] | Year 10 [2031] |
|----------------------------------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| COST OF IMPLEMENTATION | | | | | | | | | | |
| Increased Hazardous Fuels Treatment | \$81,480,000.00 | \$81,480,000.00 | \$81,480,000.00 | \$81,480,000.00 | \$81,480,000.00 | | | | | |
| Mitigate and Reduce Wildfire Risk | \$700,000,000.00 | \$700,000,000.00 | \$700,000,000.00 | \$700,000,000.00 | \$700,000,000.00 | | | | | |
| Additional Years post BIL funding | | | | | | \$100,000,000.00 | \$100,000,000.00 | \$100,000,000.00 | \$100,000,000.00 | \$100,000,000.00 |
| Total Costs | \$781,480,000.00 | \$781,480,000.00 | \$781,480,000.00 | \$781,480,000.00 | \$781,480,000.00 | \$100,000,000.00 | \$100,000,000.00 | \$100,000,000.00 | \$100,000,000.00 | \$100,000,000.00 |
| CPI Annual Percent Change from Previous Year | 0.079 | 0.057 | 0.034 | 0.023 | 0.021 | 0.02 | 0.022 | 0.022 | 0.023 | 0.023 |
| Rolling Net CPI | 1.079 | 1.136 | 1.17 | 1.193 | 1.214 | 1.234 | 1.256 | 1.278 | 1.301 | 1.324 |
| CPI Adjusted Cost Program | \$843,216,920.00 | \$887,761,280.00 | \$914,331,400.00 | \$932,305,640.00 | \$948,716,720.00 | \$123,400,000.00 | \$125,600,000.00 | \$127,800,000.00 | \$130,100,000.00 | \$132,400,000.00 |
| Discount Factor 7% | 0.934579439 | 0.873436728 | 0.816297877 | 0.762895212 | 0.712986179 | 0.666342224 | 0.622749742 | 0.582009105 | 0.543933743 | 0.508349292 |
| NPV of Total Inflation-Adjusted Cost 7% Discount | \$788,053,196.26 | \$775,405,083.41 | \$746,366,943.85 | \$711,251,508.92 | \$676,421,909.61 | \$82,226,630.42 | \$78,217,367.58 | \$74,380,763.56 | \$70,765,779.91 | \$67,305,446.28 |
| Total NPV of Program Costs 7% Discount Rate | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| Discount Factor 3% | 0.970873786 | 0.942595909 | 0.915141659 | 0.888487048 | 0.862608784 | 0.837484257 | 0.813091511 | 0.789409234 | 0.766416732 | 0.744039315 |
| NPV of Total Inflation-Adjusted Cost 3% Discount | \$818,657,203.88 | \$836,800,150.82 | \$836,742,937.62 | \$828,341,485.84 | \$818,371,376.56 | \$103,345,557.27 | \$102,124,293.82 | \$100,886,500.15 | \$99,710,816.88 | \$98,518,034.33 |
| Total NPV of Program Costs 3% Discount Rate | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |

Cost Savings:

- The current 5-year suppression cost average is \$2,336,084,200 (National Interagency Fire Center, n.d.)
 - A 20 percent reduction in this is:
 - $\$2,336,084,200 \times 0.2 = \$467,216,840$ per year

| COST SAVINGS | | | | | | | | | | | |
|----------------------------------------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|--------------------|
| | \$467,216.840 | \$467,216.840 | \$467,216.840 | \$467,216.840 | \$467,216.840 | \$467,216.840 | \$467,216.840 | \$467,216.840 | \$467,216.840 | \$467,216.840 | \$467,216.840 |
| CPI Annual Percent Change from Previous Year | 0.079 | 0.057 | 0.034 | 0.023 | 0.021 | 0.02 | 0.022 | 0.022 | 0.023 | 0.023 | 0.023 |
| Rolling Net CPI | 1.079 | 1.136 | 1.17 | 1.193 | 1.214 | 1.234 | 1.256 | 1.278 | 1.301 | 1.324 | |
| CPI Adjusted Cost Savings Program | \$504,126,970.36 | \$530,758,330.24 | \$546,643,702.80 | \$557,389,690.12 | \$567,201,243.76 | \$576,545,580.56 | \$586,824,351.04 | \$597,103,121.52 | \$607,849,108.84 | \$618,595,096.16 | |
| Discount Factor 7% | 0.934579439 | 0.873438728 | 0.816297877 | 0.762895212 | 0.712986179 | 0.666342224 | 0.622749742 | 0.582009105 | 0.543933743 | 0.508349292 | |
| NPV of Total Inflation-Adjusted Cost 7% Discount | \$471,146,701.27 | \$463,584,880.99 | \$446,224,094.01 | \$425,229,925.84 | \$404,406,647.79 | \$384,176,664.28 | \$365,444,713.14 | \$347,519,453.09 | \$330,629,640.70 | \$314,462,379.25 | |
| Total NPV of Cost Savings 7% Discount Rate | | | | | | | | | | | \$3,952,825,100.35 |
| Discount Factor 3% | 0.970873786 | 0.942595909 | 0.915141659 | 0.888487048 | 0.862608784 | 0.837484257 | 0.813091511 | 0.789409234 | 0.766416732 | 0.744093915 | |
| NPV of Total Inflation-Adjusted Cost 3% Discount | \$489,443,660.54 | \$500,290,630.82 | \$500,256,425.26 | \$495,233,520.31 | \$489,272,775.38 | \$482,847,846.98 | \$477,141,898.48 | \$471,358,717.97 | \$465,865,727.76 | \$460,292,846.84 | |
| Total NPV of Program Cost Savings 3% Discount Rate | | | | | | | | | | | \$4,832,004,050.33 |

Net Cost:

- 7% Discount Rate: \$4,070,394,629.81 - \$3,952,825,100.35 = **\$117,569,529.45**
- 3% Discount Rate: \$4,643,498,357.18 - \$4,832,004,050.33 = **-\$188,505,693.15**

Alternative 2: Change Funding Formula

Assumptions:

- Assume it will take 200 hours of labor in year 1 and 100 hours in years 2-10 to implement funding formula change.
- Assume the OMB employee is a GS-15 on the federal pay schedule and makes about \$150,000 per year (U.S. Office of Personnel Management, n.d.)
- Assume that a “work year” is 2,080 hours (U.S. Department of Interior, 2015b)
- Assume that the Forest Service will not require extra funding for suppression activities.
- Assume this alternative will cut suppression costs because of OMB’s past success in lowering suppression costs by decreasing funding.

Cost to Implementation:

- \$150,000/2,080 work hours = OMB employee’s cost of labor is \$72 per hour
- Cost of 200 hours of labor: \$72 x 200 = \$14,400
- Cost of 100 hours of labor each year for years 2-10: \$72 x 100 = \$7,200

| Metric | Year 1 (2025) | Year 2 (2026) | Year 3 (2027) | Year 4 (2028) | Year 5 (2029) | Year 6 (2030) | Year 7 (2031) | Year 8 (2032) | Year 9 (2033) | Year 10 (2034) |
|--------------------------------------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|----------------|
| COST OF IMPLEMENTATION | | | | | | | | | | |
| Alternative 2 | | | | | | | | | | |
| Hours employee puts in | 200 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Cost of labor | \$14,400 | \$7,200 | \$7,200 | \$7,200 | \$7,200 | \$7,200 | \$7,200 | \$7,200 | \$7,200 | \$7,200 |
| CPI Annual Percent Change from Previous Year | 0.023 | 0.021 | 0.02 | 0.022 | 0.022 | 0.023 | 0.023 | 0.023 | 0.023 | 0.023 |
| Rolling Net CPI | 1.023 | 1.044 | 1.064 | 1.086 | 1.108 | 1.131 | 1.154 | 1.177 | 1.2 | 1.223 |
| CPI Adjusted Cost Program | \$14,731.20 | \$7,516.80 | \$7,660.80 | \$7,819.20 | \$7,977.60 | \$8,143.20 | \$8,308.80 | \$8,474.40 | \$8,640.00 | \$8,805.60 |
| Discount Factor 7% | 0.934579439 | 0.873438728 | 0.816297877 | 0.762895212 | 0.712986179 | 0.666342224 | 0.622749742 | 0.582009105 | 0.543933743 | 0.508349292 |
| NPV of Total Inflation-Adjusted Cost 7% Discount | \$13,767.48 | \$6,565.46 | \$6,253.49 | \$5,965.23 | \$5,687.92 | \$5,426.16 | \$5,174.30 | \$4,932.18 | \$4,699.59 | \$4,476.32 |
| Total NPV of Program Costs 7% Discount Rate | | | | | | | | | | \$62,948.13 |
| CPI Adjusted Cost Program | \$14,731.20 | \$7,516.80 | \$7,660.80 | \$7,819.20 | \$7,977.60 | \$8,143.20 | \$8,308.80 | \$8,474.40 | \$8,640.00 | \$8,805.60 |
| Discount Factor 3% | 0.970873786 | 0.942595909 | 0.915141659 | 0.888487048 | 0.862608784 | 0.837484257 | 0.813091511 | 0.789409234 | 0.766416732 | 0.744093915 |
| NPV of Total Inflation-Adjusted Cost 3% Discount | \$14,302.14 | \$7,085.30 | \$7,010.72 | \$6,947.26 | \$6,881.55 | \$6,819.80 | \$6,755.81 | \$6,689.77 | \$6,621.84 | \$6,552.19 |
| Total NPV of Program Costs 3% Discount Rate | | | | | | | | | | \$75,666.38 |

Cost Savings:

- Proposed Alternative Funding: Median suppression spending for Fiscal Years 2012-2021 would be \$1,658,403,000.
 - \$1,658,403,000 + \$1,000,000,000 emergency fund = \$2,658,403,000
- Actual Fiscal Year 2023 Funding: \$1,011,000,000 in WFM account + \$2,210,000,000 in Reserve Fund = \$3,221,000,000
- Cost Savings: \$3,221,000,000 - \$2,658,403,000 = **\$562,597,000 per year**

| COST SAVINGS | | | | | | | | | | | |
|----------------------------------------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|--------------------|
| | \$562,597,000.00 | \$562,597,000.00 | \$562,597,000.00 | \$562,597,000.00 | \$562,597,000.00 | \$562,597,000.00 | \$562,597,000.00 | \$562,597,000.00 | \$562,597,000.00 | \$562,597,000.00 | \$562,597,000.00 |
| CPI Annual Percent Change from Previous Year | 0.023 | 0.021 | 0.02 | 0.022 | 0.022 | 0.023 | 0.023 | 0.023 | 0.023 | 0.023 | 0.023 |
| Rolling Nef CPI | 1.023 | 1.044 | 1.064 | 1.086 | 1.108 | 1.131 | 1.154 | 1.177 | 1.2 | 1.223 | |
| CPI Adjusted Cost Savings Program | \$575,536,731.00 | \$587,351,268.00 | \$598,603,208.00 | \$610,980,342.00 | \$623,357,476.00 | \$636,297,207.00 | \$649,236,938.00 | \$662,176,669.00 | \$675,116,400.00 | \$688,056,131.00 | |
| Discount Factor 7% | 0.934579439 | 0.875438728 | 0.816297877 | 0.762895212 | 0.712986179 | 0.666342224 | 0.622749742 | 0.582009105 | 0.54933743 | 0.508349292 | |
| NPV of Total Inflation-Adjusted Cost 7% Discount | \$537,884,795.33 | \$513,015,344.57 | \$488,638,527.79 | \$466,113,977.57 | \$444,445,265.27 | \$423,991,695.92 | \$404,312,135.56 | \$385,392,850.19 | \$367,218,590.13 | \$349,772,847.14 | |
| Total NPV of Cost Savings 7% Discount Rate | | | | | | | | | | | \$4,380,786,029.47 |
| Discount Factor 3% | 0.970873786 | 0.942595909 | 0.915141659 | 0.888487048 | 0.862608784 | 0.837484257 | 0.813091511 | 0.789409234 | 0.766416732 | 0.744093915 | |
| NPV of Total Inflation-Adjusted Cost 3% Discount | \$558,773,525.24 | \$553,634,902.44 | \$547,806,733.06 | \$542,848,120.40 | \$537,713,634.61 | \$532,888,893.43 | \$527,889,043.14 | \$522,728,377.26 | \$517,420,505.24 | \$511,978,380.18 | |
| Total NPV of Program Cost Savings 3% Discount Rate | | | | | | | | | | | \$5,353,682,115.01 |

Net Cost:

- 7% Discount Rate: \$62,948.13 - \$4,380,786,029.47 = **-\$4,380,723,081.34**
- 3% Discount Rate: \$75,666.38 - \$5,353,682,115.01 = **-\$5,353,606,448.62**

Alternative 3: Create incentive program

Assumptions:

- Assume it will take 300 hours of labor in year 1 and 100 hours in years 2-10 to make improvements and fix issues.
 - Assume the OMB employee is a GS-15 on the federal pay schedule and makes about \$150,000 per year (U.S. Office of Personnel Management, n.d.)
 - Assume that a “work year” is 2,080 hours (U.S. Department of Interior, 2015b)
 - Assume that the value of time for the employee is \$72 per hour.
- Assume 10 additional employees are required to monitor the different regions.
- Assume these employees are at the GS-13 level on the federal pay schedule, earning an average salary of about \$93,398 (U.S. Office of Personnel Management, n.d.)
- Assume once BIL funding expires at the end of Fiscal Year 2026 (U.S. Department of Transportation Federal Highway Administration, n.d.), no additional funding, will be allotted for CWDG.
- Assume that if 50 percent of suppression costs go towards protecting private property (Parijanlar & Welch, 2012), then this alternative will have a 3 percent reduction in these costs per year.
 - Assume 3 percent is not too large of an assumption to make, and that a larger percentage is not used because the grants will only provide a small amount of funding to communities. It is unrealistic to estimate anything higher.

Cost to Implementation:

- Cost of 300 hours of labor: $\$72 \times 300 = \$21,600$
- Cost of 100 hours of labor each year for years 2-10: $\$72 \times 100 = \$7,200$
- Additional employees: $\$93,398 \times 10 \text{ employees} = \$933,980 \text{ per year}$
- \$200 million per year from 2027-2031 for grant funding

| Metric | Year 1 (2025) | Year 2 (2026) | Year 3 (2027) | Year 4 (2028) | Year 5 (2029) | Year 6 (2030) | Year 7 (2031) | Year 8 (2032) | Year 9 (2033) | Year 10 (2034) |
|--------------------------------------------------------------|---------------------|---------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|---------------------|---------------------|-------------------------|
| COST OF IMPLEMENTATION | | | | | | | | | | |
| hours to create program | 300 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| OMB Labor Cost | \$21,600.00 | \$7,200.00 | \$7,200.00 | \$7,200.00 | \$7,200.00 | \$7,200.00 | \$7,200.00 | \$7,200.00 | \$7,200.00 | \$7,200.00 |
| Forest Service Additional Regional Employees | 10 | | | | | | | | | |
| Forest Service Additional Regional Employees Salaries | \$933,980 | \$933,980 | \$933,980 | \$933,980 | \$933,980 | \$933,980 | \$933,980 | \$933,980 | \$933,980 | \$933,980 |
| Grant Funding post BIL | \$0.00 | \$0.00 | \$200,000,000.00 | \$200,000,000.00 | \$200,000,000.00 | \$200,000,000.00 | \$200,000,000.00 | \$200,000,000.00 | \$0.00 | \$0.00 |
| Total Costs | \$955,580.00 | \$941,180.00 | \$200,941,180.00 | \$200,941,180.00 | \$200,941,180.00 | \$200,941,180.00 | \$200,941,180.00 | \$941,180.00 | \$941,180.00 | \$941,180.00 |
| CPI Annual Percent Change from Previous Year | 0.023 | 0.021 | 0.02 | 0.022 | 0.022 | 0.023 | 0.023 | 0.023 | 0.023 | 0.023 |
| Rolling Net CPI | 1.023 | 1.044 | 1.064 | 1.086 | 1.108 | 1.131 | 1.154 | 1.177 | 1.2 | 1.223 |
| CPI Adjusted Cost Program | \$977,558.34 | \$982,591.92 | \$213,801,415.52 | \$218,222,121.48 | \$222,642,827.44 | \$227,264,474.58 | \$231,886,121.72 | \$1,107,748.86 | \$1,129,416.00 | \$1,151,063.14 |
| Discount Factor 7% | 0.934579439 | 0.873438728 | 0.816297877 | 0.762895212 | 0.712986179 | 0.666342224 | 0.622749742 | 0.58209105 | 0.543933743 | 0.508349292 |
| NPV of Total Inflation-Adjusted Cost 7% Discount | \$913,605.93 | \$858,233.84 | \$174,525,641.57 | \$166,480,611.64 | \$158,741,258.93 | \$151,435,915.39 | \$144,407,022.45 | \$644,731.56 | \$614,327.47 | \$585,142.13 |
| Total NPV of Program Costs 7% Discount Rate | | | | | | | | | | \$799,206,490.89 |
| Discount Factor 3% | 0.970873786 | 0.942595909 | 0.915141659 | 0.888467048 | 0.862608784 | 0.837484257 | 0.813091511 | 0.789409234 | 0.766416732 | 0.744093915 |
| NPV of Total Inflation-Adjusted Cost 3% Discount | \$949,085.77 | \$926,187.12 | \$195,658,582.17 | \$193,887,528.50 | \$192,053,658.73 | \$190,330,419.56 | \$188,544,437.17 | \$874,482.97 | \$865,603.32 | \$856,499.08 |
| Total NPV of Program Costs 3% Discount Rate | | | | | | | | | | \$964,946,684.39 |

Cost Savings:

- The current 5-year suppression cost average is \$2,336,084,200 (National Interagency Fire Center, n.d.)
 - A 3 percent reduction in this is:
 - $\$2,336,084,200 \times 0.03 = \$70,082,526 \text{ per year}$

| COST SAVINGS | \$70,082,526 | \$70,082,526 | \$70,082,526 | \$70,082,526 | \$70,082,526 | \$70,082,526 | \$70,082,526 | \$70,082,526 | \$70,082,526 | \$70,082,526 |
|-----------------------------------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-------------------------|
| CPI Annual Percent Change from Previous Year | | | | | | | | | | |
| CPI Annual Percent Change from Previous Year | 0.023 | 0.021 | 0.02 | 0.022 | 0.022 | 0.023 | 0.023 | 0.023 | 0.023 | 0.023 |
| Rolling Net CPI | 1.023 | 1.044 | 1.064 | 1.086 | 1.108 | 1.131 | 1.154 | 1.177 | 1.2 | 1.223 |
| CPI Adjusted Cost Savings Program | \$71,694,424.10 | \$73,166,157.14 | \$74,567,807.66 | \$76,109,623.24 | \$77,651,438.81 | \$79,263,336.91 | \$80,875,235.00 | \$82,487,133.10 | \$84,099,031.20 | \$85,710,929.30 |
| Discount Factor 7% | 0.934579439 | 0.873438728 | 0.816297877 | 0.762895212 | 0.712986179 | 0.666342224 | 0.622749742 | 0.58209105 | 0.543933743 | 0.508349292 |
| NPV of Total Inflation-Adjusted Cost 7% Discount | \$67,004,134.67 | \$63,906,155.25 | \$60,869,543.08 | \$58,063,667.16 | \$55,364,402.69 | \$52,816,508.18 | \$50,365,031.72 | \$48,008,262.47 | \$45,744,300.79 | \$43,571,090.24 |
| Total NPV of Cost Savings 7% Discount Rate | | | | | | | | | | \$545,713,096.25 |
| Discount Factor 3% | 0.970873786 | 0.942595909 | 0.915141659 | 0.888467048 | 0.862608784 | 0.837484257 | 0.813091511 | 0.789409234 | 0.766416732 | 0.744093915 |
| NPV of Total Inflation-Adjusted Cost 3% Discount | \$69,606,236.99 | \$68,966,120.41 | \$68,240,107.24 | \$67,622,414.47 | \$66,982,813.24 | \$66,381,796.79 | \$65,758,967.06 | \$65,116,104.58 | \$64,454,904.69 | \$63,776,980.93 |
| Total NPV of Program Cost Savings 3% Discount Rate | | | | | | | | | | \$666,906,446.39 |

Net Costs:

- 7% Discount Rate: $\$799,206,490.89 - \$545,713,096.25 = \$253,493,394.64$
- 3% Discount Rate: $\$964,946,684.39 - \$666,906,446.39 = \$298,040,238.00$

Alternative 4: Transfer \$300 million to Hazardous Fuels Account

Assumptions:

- Assume 1 additional OMB employee is needed to monitor hazardous fuels treatments. This employee will start at a GS-9 level and will work up the ranks during the duration of this evaluation period of 10 years.
 - GS-9 pay in Washington DC begins at \$64,957 and a GS-15 begins at \$155,700. Benefits are accounted for in the calculation (U.S. Office of Personnel Management, n.d.)
- Assume the alternative requires between 500-1000 additional Forest Service employees.

- Assume these employees make a minimum of \$31,000 per year (ZipRecruiter, n.d.). To account for lodging costs, I will use an average salary of \$41,000 per year.
- Assume that an increase in hazardous fuels treatments leads to a 17 percent reduction in suppression costs (Thompson et al., 2013).
- Assume that the Forest Service will not require extra funding for suppression activities.

Cost to Implementation:

- OMB employee pay, including benefits, begins at \$85,000 in year 1 and caps at \$235,000 in year 10
- If this alternative requires 500 additional employees:
 - $500 \times \$41,000 = \$20,500,000$ per year
- If 1000 additional employees are required:
 - $1000 \times \$41,000 = \$41,000,000$ per year

| Metric | Year 1 (2025) | Year 2 (2026) | Year 3 (2027) | Year 4 (2028) | Year 5 (2029) | Year 6 (2030) | Year 7 (2031) | Year 8 (2032) | Year 9 (2033) | Year 10 (2034) |
|--------------------------------------------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|------------------|
| COST OF IMPLEMENTATION | | | | | | | | | | |
| One Additional OMB Employee + Benefits (30% of salary) | \$85,000.00 | \$92,000.00 | \$104,000.00 | \$123,000.00 | \$130,000.00 | \$150,000.00 | \$176,000.00 | \$208,000.00 | \$221,000.00 | \$235,000.00 |
| 500 Additional FS Employees | \$20,500,000.00 | \$20,500,000.00 | \$20,500,000.00 | \$20,500,000.00 | \$20,500,000.00 | \$20,500,000.00 | \$20,500,000.00 | \$20,500,000.00 | \$20,500,000.00 | \$20,500,000.00 |
| 1000 Additional FS Employees | \$41,000,000.00 | \$41,000,000.00 | \$41,000,000.00 | \$41,000,000.00 | \$41,000,000.00 | \$41,000,000.00 | \$41,000,000.00 | \$41,000,000.00 | \$41,000,000.00 | \$41,000,000.00 |
| Total Costs w/ 500 FS | \$20,585,000.00 | \$20,592,000.00 | \$20,604,000.00 | \$20,623,000.00 | \$20,630,000.00 | \$20,650,000.00 | \$20,676,000.00 | \$20,708,000.00 | \$20,721,000.00 | \$20,735,000.00 |
| Total Costs w/ 1000 FS | \$41,085,000.00 | \$41,092,000.00 | \$41,104,000.00 | \$41,123,000.00 | \$41,130,000.00 | \$41,150,000.00 | \$41,176,000.00 | \$41,208,000.00 | \$41,221,000.00 | \$41,235,000.00 |
| CPI Annual Percent Change from Previous Year | 0.023 | 0.021 | 0.02 | 0.022 | 0.022 | 0.023 | 0.023 | 0.023 | 0.023 | 0.023 |
| Rolling Net CPI | 1.023 | 1.044 | 1.064 | 1.086 | 1.108 | 1.131 | 1.154 | 1.177 | 1.2 | 1.223 |
| CPI Adjusted Cost Program 500 FS Employees | \$21,058,455.00 | \$21,498,048.00 | \$21,922,656.00 | \$22,396,578.00 | \$22,858,040.00 | \$23,355,150.00 | \$23,860,104.00 | \$24,373,316.00 | \$24,865,200.00 | \$25,358,705.00 |
| CPI Adjusted Cost Program 1000 FS Employees | \$42,029,955.00 | \$42,900,048.00 | \$43,734,656.00 | \$44,659,578.00 | \$45,572,040.00 | \$46,540,650.00 | \$47,517,104.00 | \$48,501,816.00 | \$49,465,200.00 | \$50,430,405.00 |
| Discount Factor 7% | 0.934579439 | 0.873438728 | 0.816297877 | 0.762895212 | 0.712986179 | 0.666342224 | 0.622749742 | 0.582009105 | 0.543933743 | 0.508349292 |
| NPV of Total Inflation-Adjusted Cost 500 FS Employees 7% Discount | \$19,680,797.07 | \$18,777,227.71 | \$17,895,417.55 | \$17,086,242.12 | \$16,297,466.61 | \$15,562,522.59 | \$14,858,873.61 | \$14,185,491.82 | \$13,525,021.30 | \$12,891,181.41 |
| NPV of Total Inflation-Adjusted Cost 1000 FS Employees 7% Discount | \$39,280,331.78 | \$37,470,563.37 | \$35,700,568.84 | \$34,070,578.23 | \$32,492,234.69 | \$31,012,000.22 | \$29,591,264.25 | \$28,228,498.50 | \$26,905,791.36 | \$25,636,260.68 |
| Total NPV of Program Costs 500 FS Employees 7% Discount Rate | | | | | | | | | | \$231,546,452.00 |
| Total NPV of Program Costs 1000 FS Employees 7% Discount Rate | | | | | | | | | | \$320,388,029.92 |
| Discount Factor 3% | 0.970873786 | 0.942595909 | 0.915141659 | 0.888487048 | 0.862608784 | 0.837484257 | 0.813091511 | 0.789409234 | 0.766416732 | 0.744093915 |
| NPV of Total Inflation-Adjusted Cost 500 FS Employees 3% Discount | \$20,445,101.94 | \$20,243,972.10 | \$20,062,335.79 | \$19,899,069.47 | \$19,717,546.10 | \$19,559,570.44 | \$19,404,488.02 | \$19,240,520.72 | \$19,057,105.33 | \$18,869,404.90 |
| NPV of Total Inflation-Adjusted Cost 1000 FS Employees 3% Discount | \$40,805,781.55 | \$40,437,409.75 | \$40,023,405.66 | \$39,679,456.62 | \$39,310,842.03 | \$38,977,061.67 | \$38,635,753.91 | \$38,287,781.43 | \$37,910,956.95 | \$37,524,957.49 |
| Total NPV of Program Costs 500 FS Employees 3% Discount Rate | | | | | | | | | | \$196,515,076.81 |
| Total NPV of Program Costs 1000 FS Employees 3% Discount Rate | | | | | | | | | | \$391,593,407.02 |

Cost Savings:

- \$300 million saved in short term. However, only the long term is accounted for in net cost.
- The current 5-year suppression cost average is \$2,336,084,200 (National Interagency Fire Center, n.d.)
 - A 17 percent reduction in this is:
 - $\$2,336,084,200 \times 0.17 = \$397,134,314$ per year

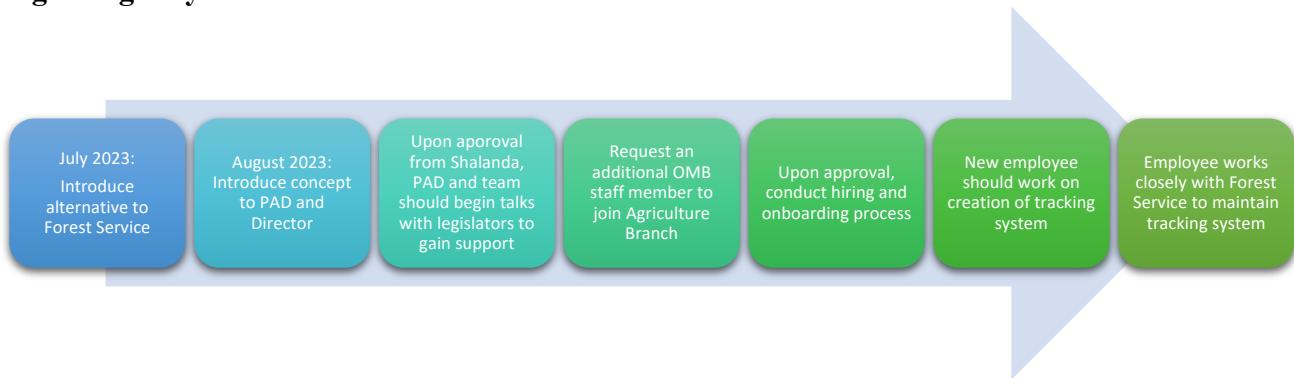
| COST SAVINGS | | | | | | | | | | |
|----------------------------------------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|--------------------|
| | \$397,134,314.00 | \$397,134,314.00 | \$397,134,314.00 | \$397,134,314.00 | \$397,134,314.00 | \$397,134,314.00 | \$397,134,314.00 | \$397,134,314.00 | \$397,134,314.00 | \$397,134,314.00 |
| CPI Annual Percent Change from Previous Year | 0.023 | 0.021 | 0.02 | 0.022 | 0.022 | 0.023 | 0.023 | 0.023 | 0.023 | 0.023 |
| Rolling Net CPI | 1.023 | 1.044 | 1.064 | 1.086 | 1.108 | 1.131 | 1.154 | 1.177 | 1.2 | 1.223 |
| CPI Adjusted Cost Savings Program | \$406,268,403.22 | \$414,608,223.82 | \$422,550,910.10 | \$431,287,865.00 | \$440,024,819.91 | \$449,158,909.13 | \$458,292,998.36 | \$467,427,087.58 | \$476,561,176.80 | \$485,695,266.02 |
| Discount Factor 7% | 0.934579439 | 0.873438728 | 0.816297877 | 0.762895212 | 0.712986179 | 0.666342224 | 0.622749742 | 0.582009105 | 0.543933743 | 0.508349292 |
| NPV of Total Inflation-Adjusted Cost 7% Discount | \$379,690,096.47 | \$362,134,879.74 | \$344,927,410.79 | \$329,027,447.23 | \$313,731,615.23 | \$299,293,546.36 | \$285,401,846.43 | \$272,046,820.69 | \$259,217,704.47 | \$246,902,844.68 |
| Total NPV of Cost Savings 7% Discount Rate | | | | | | | | | | \$3,092,374,212.08 |
| Discount Factor 3% | 0.970873786 | 0.942595909 | 0.915141659 | 0.888487048 | 0.862608784 | 0.837484257 | 0.813091511 | 0.789409234 | 0.766416732 | 0.744093915 |
| NPV of Total Inflation-Adjusted Cost 3% Discount | \$394,435,342.93 | \$390,808,015.66 | \$386,693,941.03 | \$383,193,681.98 | \$379,569,275.00 | \$376,163,515.15 | \$372,634,146.67 | \$368,991,259.30 | \$365,244,459.88 | \$361,402,891.94 |
| Total NPV of Program Cost Savings 3% Discount Rate | | | | | | | | | | \$3,779,136,529.55 |

Net Costs:

- 7% Discount Rate and 500 Forest Service Employees:
 - $\$231,546,452.00 - \$3,092,374,212.08 = \textbf{-\$2,860,827,760.08}$
- 7% Discount Rate and 1000 Forest Service Employees:
 - $\$320,388,029.92 - \$3,092,374,212.08 = \textbf{-\$2,771,986,182.16}$
- 3% Discount Rate and 500 Forest Service Employees:
 - $\$196,515,076.81 - \$3,779,136,529.55 = \textbf{-\$3,582,621,452.74}$
- 3% Discount Rate and 1000 Forest Service Employees:
 - $\$391,593,407.05 - \$3,779,136,529.55 = \textbf{-\$3,387,543,122.50}$

Appendix C: Implementation Timeline

Beginning July 2023:

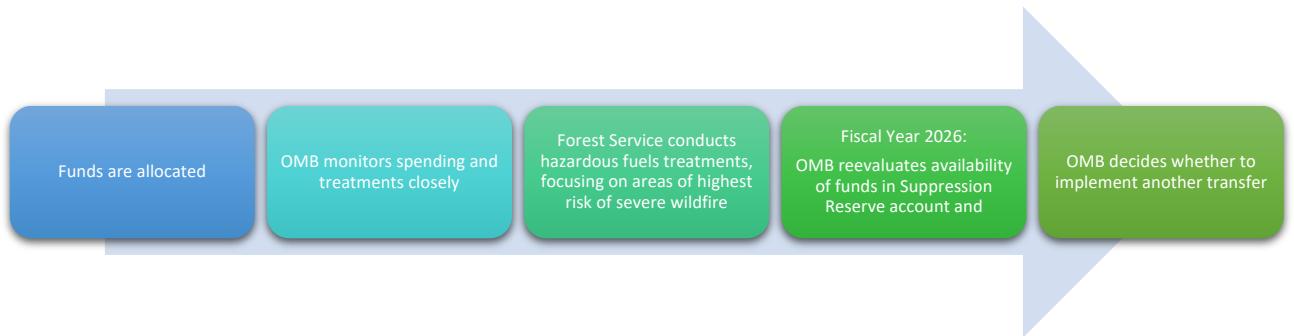


*If request for additional employee is denied, ask for detailee to come on to create tracking system

Beginning September 2023:



Fiscal Year 2025 and 2026:



The above timelines show the steps that OMB should take to implement the transfer of funds. **The Forest Service will also need to take steps to prepare for this increase in hazardous fuels funding:**



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