U.S. Department of the Interior

Wildland Fire Management

Fiscal Year 2021 ANNUAL REPORT AND LARGE FIRE REVIEW

The Department of the Interior's Wildland Fire Management Program works collaboratively with Federal, State, and Tribal partners to ensure firefighter and public safety while reducing wildfire risk across the country. The program includes the Office of Wildland Fire and four bureaus that manage wildland fire activities—the Bureau of Indian Affairs, Bureau of Land Management, National Park Service, and U.S. Fish and Wildlife Service.

This document addresses reporting requirements for fiscal year 2021, as described in Division O of the Consolidated Appropriations Act, 2018 (Public Law 115-141, 132 STAT. 1061).

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Executive Summary

Division O of the Consolidated Appropriations Act, 2018, (Public Law 115-141), amended the Balanced Budget and Emergency Deficit Control Act to provide additional new budget authority for Fiscal Years (FY) 2020 through 2027. Under this provision, otherwise known as the Stephen Sepp Wildfire Suppression Funding and Forest Management Activities Act, the Department of the Interior and Department of Agriculture (USDA) were provided $2.35 billion in additional new budget authority for wildfire suppression operations in FY 2021. The Consolidated Appropriations Act, 2021, appropriated $310.0 million for the Interior Department and $2.04 billion for the USDA Forest Service in the Wildfire Suppression Operations Reserve Fund.

The Interior Department's Wildland Fire Management (WFM) budget is coordinated by the Office of Wildland Fire (OWF), which develops budget guidance and allocates funding to the Bureau of Indian Affairs (BIA), Bureau of Land Management (BLM), National Park Service (NPS), and U.S. Fish and Wildlife Service (FWS). The bureaus use this funding to carry out work in accordance with established WFM policies, program direction, and guidance.

Public Law 115-141 requires the Secretaries of Agriculture and the Interior (as applicable) to submit to Congress and make available to the public a report within 90 days after the end of the fiscal year if the Secretary used the additional budget authority provided in that fiscal year. This report addresses the requirement included in Public Law 115-141, with review and analyses of (1) risk management, (2) suppression management, (3) landscape considerations, (4) fire summaries, (5) financial reporting, (6) lessons learned, and (7) recommended enhancements.

To complete the Interior Department's analysis for FY 2021, six large wildfires were selected representing wildfires from a wide range of geographic areas with varying incident objectives, strategic courses of action, and costs. Because wildfires are unique events subject to incident-specific conditions, risks, and management decisions, sampled fire information is supplemented with general program analysis information.

The Interior Department's total suppression activity costs for FY 2021 were $648.3 million, which includes $410.5 million funded from the WFM account and an additional $237.8 million transferred from the Wildfire Suppression Operations Reserve Fund to the WFM account for emergency wildfire suppression operations. Wildfire outlays included direct wildfire incident accounts, as well as non-incident-specific wildfire support accounts (e.g., aviation contracts servicing multiple fires).

Fires may span fiscal years, and costs associated with a wildfire incident may take multiple fiscal years to resolve as items like cost-share agreements, cost-recovery efforts, and invoice submissions are reconciled. Continuing costs from FY 2020 wildfires are reflected in the Interior Department's total costs in FY 2021. Similarly, some of the costs of fires that started in FY 2021 carried forward into FY 2022.

Although this report focuses on the Interior Department, it should be noted that wildfire cannot be managed independently by a single agency. The backbone of wildland fire management in the United States is partnership, collaboration, and assistance across boundaries—among Federal, Tribal, State, and local agencies and with the engagement of public and non-government organizations. Wildfire

outcomes vary considerably and are influenced by fire management plans; community and resource preparedness; and on-incident conditions, options, and decision-making.

The evaluation undertaken to prepare this report highlighted:

- Workforce challenges and progress;
- The impact of climate change and prolonged drought on fire; and
- The increasing, compounding complexities of firefighting and wildfire management at multiple levels (i.e., incidents, interagency coordination, and with organizations).

Fiscal Year 2021 Overview

Summary of National Fire Activity

In total, all agencies—including State and Tribal—reported over 61,000 wildfires nationally, across the United States, more than 7.4 million acres burned[1]. The number of wildfires reported for all jurisdictions was 4.5 percent below the 10-year annual average. The California, Southwest, Northern Rockies, and Northwest geographic areas reported above-average fire occurrences in 2021. The Eastern and Rocky Mountain geographic areas experienced relatively average fire activity, while the Southern and Alaska geographic areas experienced below-average activity.

The Interior Department had protection responsibility for over 7,000 fires that burned more than 1 million acres[2]. The Nation spent 69 days at the highest level of wildfire preparedness. More than 27,000 firefighters were deployed at one time this summer to support firefighting efforts. As fires started in FY 2020 continued to accrue costs in FY 2021, and as the challenges of 2021 unfolded, the Interior Department needed to execute two transfers from the Wildfire Suppression Operations Reserve Fund, including one in July 2021, and expended a total of more than $648 million on suppression response.

In December 2020 and January 2021, large fires were generally absent from the West, but scattered fire activity continued in the Southern Area.

Fire activity increased across the United States in March 2021, especially in the Southern, Eastern, Rocky Mountain, Northern Rockies, and Southwest geographic areas. Dry and windy conditions led to short-duration, wind-driven, large fires across these areas periodically throughout the month.

Large fire events occurred in April 2021, particularly in the Southwest. Critical drought conditions set in across large swaths of the Southwest, Great Basin, and California in May. However, fire activity remained below the 10-year average.

Fire activity increased significantly across the West in June 2021. Most significant activity was in the Southwest, Colorado, Utah, Montana, and California. The United States increased to National

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[1] National wildfire data gathered from Incident Management Situation Report from the National Interagency Coordination Center.

[2] National wildfire data gathered from Incident Management Situation Report from the National Interagency Coordination Center.

Preparedness Level (PL) 4 in late June and remained at PL 4 or PL 5 for 99 consecutive days: the longest duration on record. Fire activity continued to increase significantly during July 2021 across the Northwest, northern California, Idaho, and Montana geographic areas, although it moderated in the Southwest, Utah, and Colorado.

Fire activity began to moderate in September 2021 across much of the West, but significant fires continued in several of the western geographic areas, especially in California.

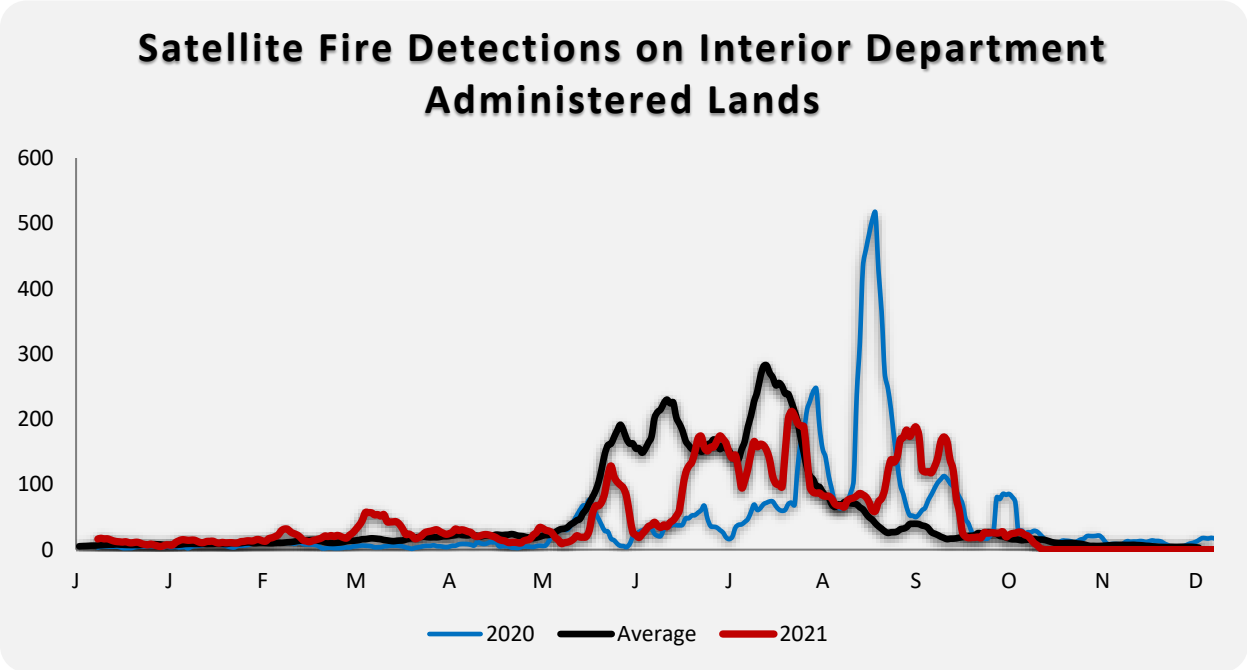

Figure 1. Graph depicting the seven-day running average for satellite heat detection on Interior Department lands for January through December 2021, illustrating the fire year. Data from Moderate Resolution Imaging Spectroradiometer (MODIS).

Figure 1 shows the seven-day running average of the total number of heat points or fire locations detected by satellite on Interior Department lands for the past 20 years. The black line represents the 20-year average, the blue line represents 2020, and the red line represents 2021. The Interior Department experienced several points above-average during the first part of the fire season. September 2020 and September 2021 both proved to be exceptional times for fire impact on Interior Department lands. This impact, and the high level of activity supporting partners, contributed to the need to use the suppression reserve fund. Additionally, several large fires from FY 2020 continued into FY 2021, resulting in the use of suppression funds early in the fiscal year and the need to execute the first Reserve Fund transfer relatively early in the year (i.e., July 2021). Of note, many areas that experienced significant fire activity were also classified as extreme or exceptional drought areas.

COVID-19

At the start of 2021, national incident rates of COVID-19 were declining. However, by late June, the rates had rapidly increased because of the Delta variant. These infection trends impacted the wildland fire community, which responded with protocols consistent with Centers for Disease Control and Prevention guidelines and recommendations. However, because of delay in consistent implementation of measures

and increased disease transmission, even among the vaccinated, COVID-19 had a more significant impact on response resources in 2021 than 2020. Confirmed COVID-19 cases on incidents and close contact exposures resulted in some personnel being removed from service temporarily.

The National Multi-Agency Coordinating Group (NMAC) closely monitored these resource impacts and adjusted the national response as needed. In close coordination with Tribal, State, and local partners, Federal wildland fire agencies developed and maintained geographic area wildland fire response plans to help maintain continuity of fire operations and protect firefighters and the public during the COVID-19 pandemic. Additionally, the Medical and Public Health Advisory Team provided information to the wildland fire community on the Food and Drug Administration-authorized COVID-19 vaccines, prioritization of the vaccines for wildland fire personnel, and transmission prevention measures after vaccination.

Collectively, all efforts to address COVID-19 helped to promote firefighters' health, maintain wildland fire response continuity, and sustain the highest degree of fire response capability possible. This effort will continue into 2022.

National Guard and Military Assistance

National Guard assistance with wildfires is provided by individual States. Participation varies depending on the needs. The National Guard often provides aviation, ground forces and hand crews, security and road guards, and other requested resources. The 2021 fire year set records for National Guard involvement in Montana, Washington, Oregon, and California.

Since 1975, the Department of Defense (DOD) has provided temporary support to fill capacity gaps when resource demands are high in numerous geographic areas and Federal, State, and National Guard capabilities are stretched thin. During the 2021 fire year, DOD provided support through:

- Modular Airborne Fire Fighting System (MAFFS), which provided a surge capability to boost wildfire suppression efforts when commercial airtankers were fully committed or not readily available. All eight available MAFFS were ordered and utilized in several States.
- Distributed Real Time Infrared (DRTI), which provided critical surge and gap capability in fire detection, creating real-time perimeter maps and providing real-time infrared video to frontline operations. Two DRTI units were ordered and used for a total of 169 days.
- Approximately 200 active-duty personnel created ten firefighting crews. This was the fortieth time since 1987 that active-duty personnel were mobilized to serve as wildland firefighters.

International Support

For over 35 years, the United States has maintained reciprocal cooperative agreements with both Canada and Mexico for resource sharing during peak fire activity. NMAC requested assistance after determining that the United States needed additional support for numerous large fires. Canada experienced an above-average fire year with burned area nearly doubling their ten-year average[3].

[3] CIFFC situation reporting. (n.d.). Retrieved November 2, 2021, from https://ciffc.net/en/public-sitrep-archive?date=2021-10.

Canada was at national PL 4 or 5 during much of the same time as the United States. Even with these challenges, Canada provided aid to the United States. The National Interagency Coordination Center (NICC) mobilized three Canadian wildland firefighting hand crews. More than 60 total personnel assisted with suppression efforts. Additionally, in collaboration with U.S. Customs and Border Protection, the National Forestry Commission of Mexico (CONAFOR) and others supplied additional firefighters to support efforts along the southern border.

National Multi-Agency Coordination

NMAC is composed of wildland fire representatives from each Federal wildland fire agency, State agencies, and the U.S. Fire Administration, which is an entity of the Department of Homeland Security's Federal Emergency Management Agency. NMAC makes decisions and takes necessary actions to:

- Manage resources among and between geographic areas to meet national priorities.
- Identify trends and issues concerning critical fire response capacity and business practices.
- Analyze existing data and information on current and predicted fire response needs.
- Provide oversight and management of national incident management team mobilization.
- Establish national wildfire preparedness levels and priorities.

After the busy 2020 fire year and a focused effort to support the President's COVID-19 Vaccination Campaign, the 2021 fire year brought new and unique challenges. Some of the most prominent challenges included, but were not limited, to:

- Ongoing wildfire response and firefighter vaccination efforts that began during the 2020 fire year and continued into 2021 impacted resource availability and led to challenges filling resource requests.
- Supply chain limitations and shortages of food and firefighting supplies, including transportation of supplies to the fire line, were experienced, and procurement costs increased.
- A shortage of batteries for required fire line communications equipment occurred.
- Shortages in Federal contracting officials and limited contracted resources, including caterers and shower units, caused gaps in incident support. Several emergency equipment rental agreements were required this year, resulting in increased costs for suppression.
- Shortages of staff to work in regional and national fire caches, along with a lack of transportation availability, significantly slowed the movement of firefighting supplies and equipment refurbishment efforts.
- Numerous large fires in multiple geographic areas at the same time caused resource shortages and increased demand, requiring earlier oversight and management by NMAC.
- There was a significant increase in the use of and need to support National Guard and Active Military personnel with Federal or State overhead.
- Overseeing COVID-19 mitigation efforts and reporting information on firefighters among various States and local health districts with different rules and guidelines during the pandemic was challenging.

Difficulties in obtaining goods and services, additional coordination, and staffing challenges were contributing factors to some increased costs in 2021. These challenges affected the Interior Department and other organizations at all levels. Through complementary action, the Interior Department and its partners successfully addressed the challenges in 2021. However, wildland fire response entails

partnerships and collaboration among different entities, and the complexity of interagency coordination continues to increase at incident, State, regional, and national levels.

Methodology

As required by Public Law 115-141, the Interior Department analyzed a sample of large fires. The fires were selected by evaluating the largest fires over which the Interior Department has jurisdiction responsibility to represent a range of geographic areas, cost, and suppression strategies. This approach was designed to concisely survey this broad variation across Interior Department circumstances and landscapes to adequately capture, summarize, and report relevant information.

Additional information is provided from general program data analysis. Looking at individual events and general program information helps identify common approaches, best practices, and lessons learned that can be used to enhance programs.

Using sampling to draw broad conclusions related to large wildfires can be challenging because each wildfire entails a unique combination of environmental conditions; risks; management objectives; resource availability and application; and incident management options, strategies, and decisions.

Table 1 (below) shows the FY 2021 Interior Department fires selected for analysis.

Agency	Fire Name	FY 2021 Interior Department Cost[4]	Size (Acres)	State	Geographic Area
BIA	Chuweah Creek	$2,809,936	36,752	WA	Northwest
BIA	Whitmore	$871,224	58,234	WA	Northwest
BLM	Devils Creek	$1,221,731	18,707	MT	Northern Rockies
BLM	Mescal	$4,227,834	72,250	AZ	Southwest
FWS	Oxcart	$188,812	12,540	MN	Eastern Area
NPS	KNP Complex	$786,028	88,307	CA	Southern California

Table 1. The Interior Department fires selected for analysis.

Risk Management

The foundational wildland fire management documents—the Review and Update of the 1995 Federal Wildland Fire Management Policy (2001) and the Guidance for Implementation of Federal Wildland Fire Management Policy (2009)—highlight the concepts of risk and fire consequences by noting that risk management underlies all fire management activities, those risks must be thoroughly understood, and the consequences of a wildland fire dictate the approach to fire response.

All wildfire presents inherent risks. The Wildland Fire Decision Support System (WFDSS) assists fire managers and agency administrators in making strategic, tactical, risk-based decisions for wildfire incidents using a deliberative risk analysis process. Three risk components are analyzed:

- **Values** are the things of concern (e.g., social, cultural, economic, or ecological resources) that could be lost or damaged because of a fire.
- **Hazard** is measured by the intensity, severity, and spatial extent of the fire and is influenced by the physical conditions of the fire environment.

Probability refers to the likelihood of the fire affecting values.

The wildfires analyzed for this report demonstrate several common risk factors that influenced management decisions. Those factors are firefighter and public safety, including COVID-19 mitigation; the presence of Federal and private infrastructure; stakeholder involvement at Federal, Tribal, private,

[4] Costs include the Interior Department obligation for FY 2021 and are therefore not the same as total estimated costs cited in "Sampled Fire Summaries" section which described current estimates of total known cost to date.

local, county, and State levels; socio-political and economic considerations in relation to neighboring communities; and the presence of natural resources.

In addition to the common risk factors, the analysis showed several incident-specific factors that also influenced risk management decisions, such as geographic location and access (wilderness versus urban interface); time of year (early season or late season); availability of firefighting resources; condition of fuels; land ownership; the presence of threatened and endangered species; smoke emissions and impacts to local communities and public health; and the presence of cultural sites.

Type	Threatened	Lost	Protection Rate
Residences	4,534	12	99.7%
Other Structures	3,527	17	99.5%
Total	**8,061**	**29**	**99.6%**

Table 2. Residences and other structures threatened and lost in 2021 Interior Department wildfires selected for review.

Firefighter and public safety are the foremost concerns in strategic and tactical decision-making. The suppression strategy of each incident aligned with Federal fire policy principles to maximize firefighter and public safety and protect values at risk. Suppression strategies minimized firefighter exposure to risk through the strategic placement of firefighters, decisions related to the number of resources and daily work assignments, and by using indirect and point protection tactics, natural and man-made barriers, monitoring the fire perimeter where there was no threat to values, and working to ensure the appropriate resources were being used in the right place at the right time to ensure the highest probability of success.

Fire Name[5]	Reported Injuries	Maximum Reported Personnel
Chuweah Creek	4	436
Devils Creek	8	189
KNP Complex	19	2,118
Mescal	8	672
Oxcart	2	74
Whitmore	3	396
Total	**44**	**3,885**

[5] Table information derived from Integrated Reporting of Wildland-Fire Information (IRWIN) incident histories.

Table 3. Reported injuries and maximum number of incident personnel in 2021 Interior Department wildfires selected for review. This demonstrates a relatively low reportable injury rate. The Interior Department recognizes the inherent risks of wildland fire but is always striving to reduce injuries.

The 2021 fire season brought many challenges. Some were familiar (e.g., prioritizing limited resources), while others presented a new set of risk management challenges both before and during the fire season (e.g., COVID-19 impacts). Regardless of the challenges, the interagency wildland fire management community has worked hard over the years developing and refining processes and tools, based on lessons learned, to help guide and inform risk management decisions.

Suppression Management

The six fires analyzed in this report burned more than 286,000 acres with 44 reportable injuries. More than 8,000 structures were threatened, with only 29 structures lost. As noted in the Executive Summary, costs associated with a wildfire incident may take multiple fiscal years to resolve as items like cost-share agreements, cost-recovery efforts, and invoice submissions are reconciled. As of September 30, 2021 (the end of FY 2021), the Interior Department's response costs for these six fires totaled $10.1 million. By December 31, 2021 (the end of the first quarter of FY 2022), the costs had grown to a total of $41.3 million (i.e., the costs for October through December were $31.2 million).

Extreme fire behavior was exhibited in some of these fires. In certain areas, the fire damaged natural and cultural resources or community infrastructure. In other areas, the fire assumed a natural disturbance role and produced landscape benefits.

The Interior Department relies on analytical techniques (e.g., fire weather forecasting, fire danger and fuels analysis, and intelligence and resource status information) to help predict what areas might have conditions that support an above-normal occurrence of wildfires or fire behavior. Each geographic area experiences significant variations in the number of acres burned from year to year without a consistent pattern. The Preparedness program provides the resources to manage the complexity and uncertainty of wildfire occurrence by ensuring that a flexible, capable, qualified, and mobile workforce is available to respond quickly whenever and wherever wildfires occur.

In an average year, significant fire activity occurs in only a couple of geographic areas and typically not at the same time. This normally enables the shifting of resources based on fire response needs. As drought conditions persist across the country and fire seasons become longer and include extreme fire behavior, there is increasing strain on resource availability nationally. This was particularly true in 2021 and is becoming an alarming trend as we are seeing demands for human and other resources that significantly outpace supply year after year. In 2021, the Nation was at PL 4 to PL 5 for 99 consecutive days.

These extended periods of significant fire activity affect operational resources, but they also strain support personnel, particularly dispatchers, along with administrative and procurement staff. Additionally, these scenarios often produce increased costs for suppression response as more personnel and equipment (vehicles, aircraft, etc.) are utilized for longer periods of time and the need for goods and services to support these efforts increases.

The last ten years have demonstrated unprecedented levels of fire activity, including longer fire seasons, increased complexity, and more mega-fires[6]. An extremely busy fire season only compounds other challenges, including the scarcity of personnel and resources.

The Interior Department responded to more than 12,000 fires this year. Multiple factors collided in 2021, further constraining our ability to logistically support fire operations. Due to the collaborative interagency nature of fire response, significant effort was placed on coordination to address the increased competition for resources, goods, and services.

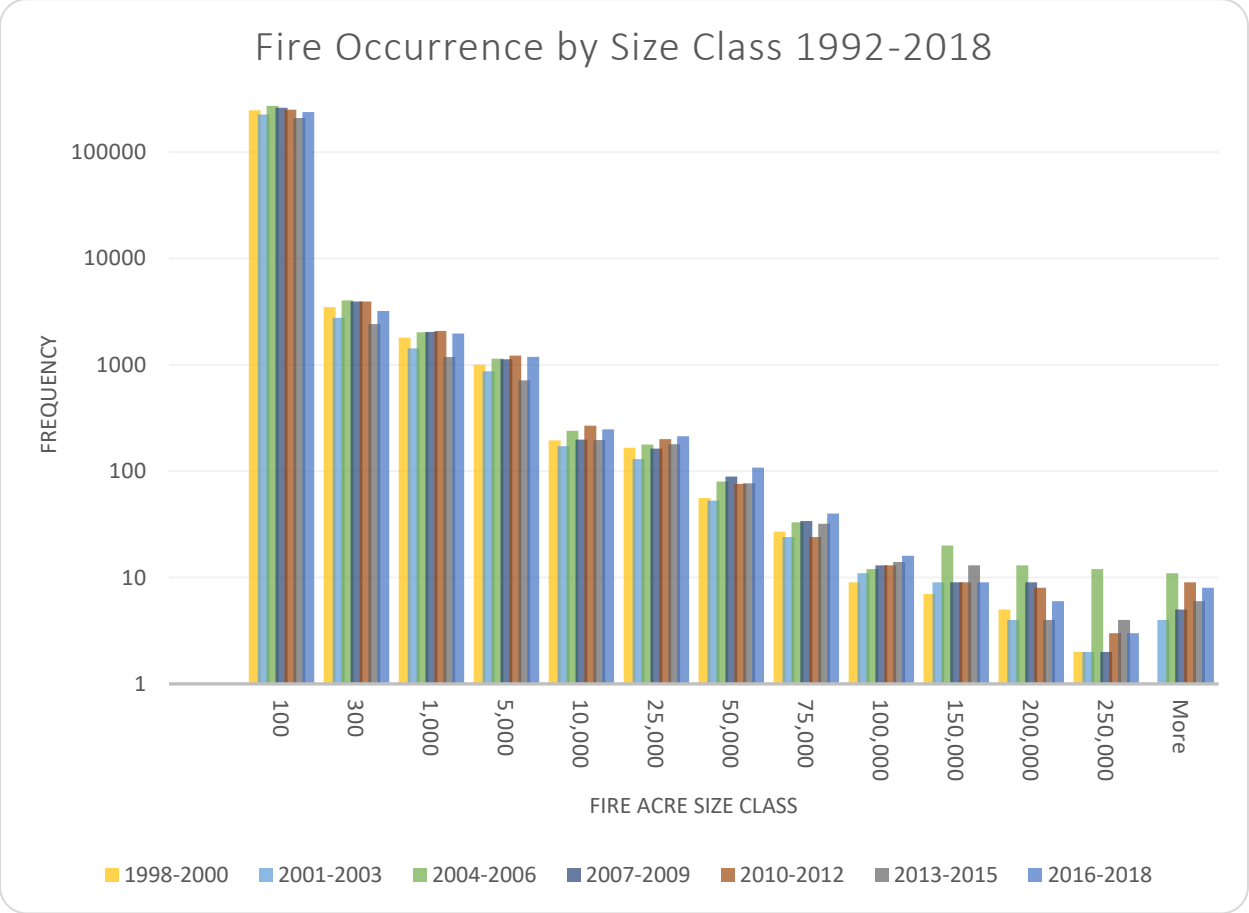

Figure 2. Fire occurrence by fire size class category from spatial database of wildfires across multiple ownerships.[7] Of importance is the increasing occurrence of larger size class fires, particularly in the last 20 years.

Overall, while roughly 98 percent of initial response strategies for wildfires succeed on Interior-managed landscapes, reduced capacity coupled with an increasing, prolonged wildfire workload is likely to erode

[6] The term "mega-fire" is used for extraordinary wildfire characterized by intensity, size, duration, and exceptional difficulty of control. There is no precise universal definition. Used here, it notes wildfires great than 100,000 acres.

[7] Data derived from Spatial wildfire occurrence data for the United States, 1992-2018 [FPA_FOD_20210617] (5th Edition).

mission performance over time and have significant impacts on response capabilities. Increasing and maintaining an adequate workforce would provide improved capability at critical moments throughout the year, disperse workload-reducing burnout, and help improve programmatic stability for the Interior Department and the interagency wildland fire community.

The Interior Department continues to implement the WFM workforce transformation strategy. Initial steps, such as a pilot Interior fire hiring event and converting to a more permanent year-round workforce, have demonstrated improvements. However, further investment is needed and planned in FY 2022.

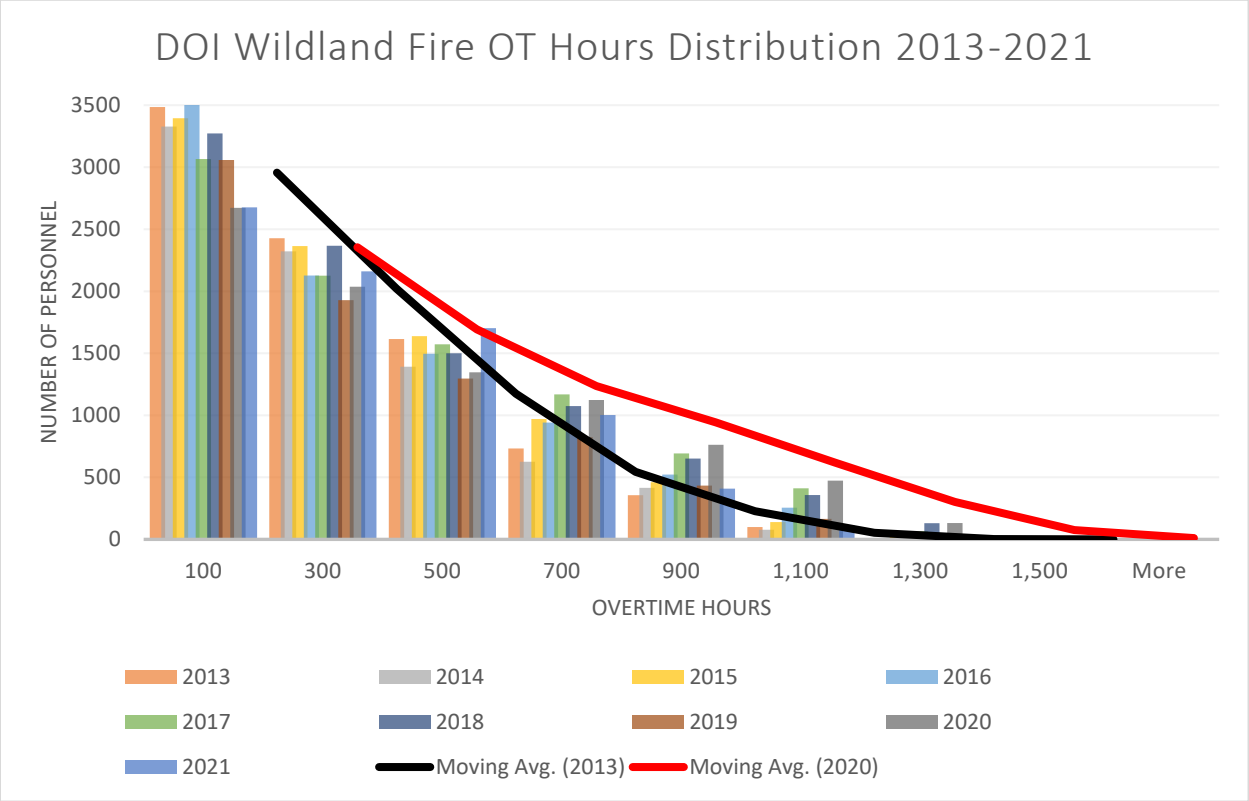

Figure 3. The distribution change of overtime hours categories from 2013-2021.[8]

As shown in Figures 2, 3 (above), and 4 (below), fires at the extreme end of the size spectrum occurred regularly over the last 20 years (Figure 2) and perhaps increased in frequency. Even a small increase in the number of fires in the largest size categories has a disparate effect with thousands of personnel committed for more than a month as compared to smaller size categories (e.g., KNP Complex, as shown in Figure 4). Also, depending on where these fires occur, the presence of natural and cultural values, structures, infrastructure, and socio-political concerns can drastically increase complexity and workload.

[8] The Interior Department employee over-time hours charged to wildland fire specific accounts, data from Financial Business Management System (FBMS). Only partial FY 2021 data were available, as auditing of fire financials had been not completed at the time of report.

As these factors combine, Interior's firefighting personnel work more hours, as the occurrence of higher overtime categories suggests in Figure 3. An extremely high workload can contribute to higher attrition rates, increased mental health issues, and other impacts. Extreme workloads occurred in FY 2020 and continued to be a significant factor in 2021, with multiple very-large fires occurring for long durations. The financial costs associated with very-large fires further increased overall suppression expenditures.

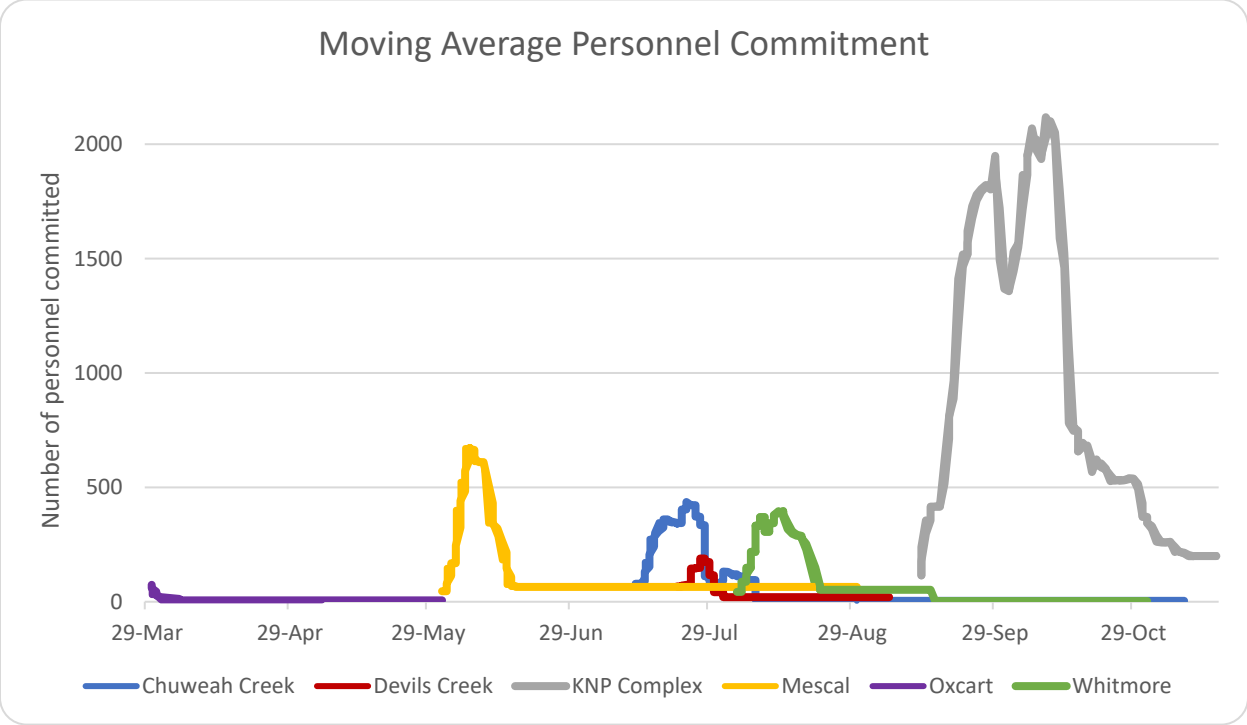

Figure 4. The two-day moving average for total number of personnel committed to the six analyzed 2021 incidents. This not only displays the significant volume of people responding to a fire but also the significant duration of the commitment of personnel.[9]

Landscape Considerations

Fire behavior is determined by three primary factors: weather, vegetation (fuels), and topography. However, numerous variables influence a wildfire's effects at broader landscape scales. Vegetation treatment history and frequency play a vital role in a fire's broad-scale impact. Fire is a natural process that occurs on the landscape and provides numerous benefits. But with climate change, accumulated fuels resulting from decades of fire suppression, and population growth, fire risks are of much greater concern.

When implemented strategically, fuels treatments reduce fire impacts to values at risk. Along with treatment design, the strategic placement of treatments further helps protect values at risk at the landscape scale. However, when historic drought and weather combine with cured fuels, the best designed and located treatments may not be fully effective to protect values.

[9] Data derived from IRWIN incident histories.

During the 2021 fire season, most of the western United States experienced severe to extreme drought conditions, according to the National Integrated Drought Information System. While some areas of the parched West received much-needed moisture starting in September, episodic moisture has not been enough to eradicate drought conditions and most of the West remains under significant drought impacts. For example, areas in southern California did not receive any moisture in the month of November 2020 (the last time this happened was in 1992). The intensity of drought conditions carried over from 2020 created dangerously dry fuels that contributed to extremely active and uncontrollable wildfires. Unless there is a change, the current drought impacts will lead to a very active 2022 fire year.

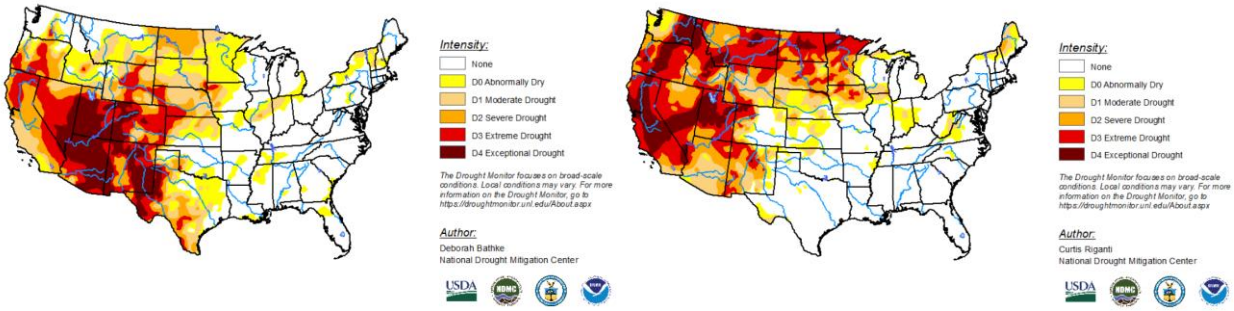

Figure 5. January 5 and August 24, 2021, maps showing continued expansive, extreme, and exceptional drought.

From 2015 to 2021, the Interior Department's fuels management budget increased by $56 million, from $164 million to $220 million, a 34 percent increase in funding. Fuels treatment increased from approximately 939,000 acres in 2015 to more than 1.67 million acres in 2021.

The Interior Department has made substantial investments in the Fuel Treatment Effectiveness Monitoring System, which assesses the effectiveness of fuels treatment with wildfire interaction. Thorough analysis of interaction takes time to complete, especially during a busy or prolonged fire year, such as 2021. Monitoring assessments are on-going for 2021 fires, with 462 assessments completed out of the 1,068 identified possible interactions between wildfires and fuels treatments. Completed assessments indicate that when wildfire interacted with fuels treatments, it changed the fire behavior 89 percent of the time, and treatments helped with control and/or management of wildfires 90 percent of the time. Nearly 90 percent of fuels treatments were identified as strategically located to facilitate control of the fires.

Often, the ecological outcomes are dependent upon complex interactions, response factors, and subsequent conditions that may not be readily apparent for some time. In FY 2021, the Interior Department managed approximately 112,000 acres of wildfire that achieved land management objectives.

Sampled Fire Summaries

The Interior Department experienced more than 6,000 jurisdictional fires in 2021 that burned more than 1.3 million acres. Six large wildfires were selected representing a wide range of geographic areas with varying incident objectives, strategic courses of actions, and differing costs. As noted previously, each wildfire is a unique event. Suppression response and costs are influenced by a multitude of factors,

including location, vegetation, values at risk, socio-political setting, hazards, and the availability of resources.

The **Chuweah Creek Fire** started within the Colville Reservation in Washington State on July 12, 2021, from an undetermined cause. The wildfire was managed under a full suppression strategy to reduce potential impacts to life and property. It was contained at 36,752 acres at a cost of more than $3.1 million as of October 31, 2021. Unfortunately, 14 primary and secondary structures were lost, in addition to impacts to high-value timber on the eastern side of the wildfire. Cultural and historic sites within and adjacent to the wildfire were also impacted. The community of Nespelem, private residences, the Tribal police station, a convalescent center, and a government center were all threatened as well. The highly valued timber on the western flank of the fire was protected through a combination of light to heavy suppression control line tactics. Since 2013, 12,707 acres had been treated for fuels reduction to lower wildfire impacts and risk.

The **Devils Creek Fire** occurred primarily within BLM jurisdictional lands outside of Miles City, Montana, within the Billings District. It started on July 22, 2021. It was contained at 18,707 acres at a cost of more than $1.2 million as of October 31, 2021. Due to the fire burning on FWS, State, county, and private lands, it was managed under a unified command structure. A full suppression strategy was applied to protect values of concern that included private lands and structures, as well as Federal and private rangeland resources, including Devils Creek lands with wilderness characteristics, a Devils Creek recreation site, and grazing areas. Periods of exceptionally low fuel moisture levels occurred due to drought. A total of eight injuries were reported, with several firefighters injured during the initial response. No structures were reported lost during the fire. Since 2016, 19,827 acres in the area have been managed with mechanical treatments and prescribed fire to reduce hazardous fuels.

The **KNP Complex** was formed when the Colony and Paradise fires eventually grew together. Both fires were started by lightning on September 9, 2021, in Sequoia and Kings Canyon National Parks in California. The fire was eventually contained at 88,307 acres, and costs had grown to more than $28.0 million by December 31, 2021. The KNP Complex was primarily driven by fuels and topography and was managed utilizing indirect, direct (where possible), and point protection tactics. These tactics minimized risk to firefighters arising from steep, inaccessible terrain; predicted fire behavior; heavy snag or dead and dying fuel loads; prolonged drought; lack of available resources; and the high potential for a long-duration incident and resistance to control. The Giant Forest area around the visitor center has a long history of fuels treatments to reduce wildfire risk. Since 2007, 5,164 acres have been treated in the park to reduce wildfire impacts. The treatments assisted in protecting many of the treasured sequoia trees. Numerous cultural and natural resources, park infrastructure, and neighboring communities were at risk, including giant sequoias, historic lodges, visitor centers, campgrounds, employee and concession housing, and NPS telecommunication sites. Other critical infrastructure at risk included hydropower and transmission assets and the neighboring communities of Oak Grove, Silver City, Mineral King, Pinehurst, and Heartland. Nineteen injuries were reported, and one residence was lost after more than 2,300 structures were threatened at the height of the incident.

The **Mescal Fire** started on BLM Gila District lands in Arizona on June 1, 2021, and predominately burned on San Carlos Reservation lands. The fire was contained at 72,250 acres and costs had grown to more than $4.2 million as of October 31, 2021. The fire initially spread through drought-stressed fuels. Numerous natural and cultural resources and infrastructure were threatened. Fortunately, there

were natural barriers to the fire's spread and access points for response personnel from road systems. However, because of the rugged terrain, a combination of ground and aerial resources was needed to contain the fire. Combinations of tactics were employed, including monitoring, direct perimeter control, and point protection of values at risk. The fire exhibited extreme behavior and large growth during the first few operational periods, resulting in several community evacuations and closures of major travel routes. Six injuries were reported, with no structures reported lost despite more than a thousand threatened at the height of the incident. Fuels treatments on 40,847 acres within the Gila District have been implemented since 2005 to increase opportunities to use confinement and point protection as strategies near values at risk, as well as to promote landscape resiliency.

The **Oxcart Fire** occurred on the Glacial Ridge National Wildlife Refuge in Minnesota on March 29, 2021. This human-caused fire was contained at 12,540 acres and cost more than $192,000 as of October 31, 2021. Various values were at risk, including the town of Mentor, Minnesota, which was in the direct path of the fire. Hazardous fuel reduction projects, including mechanical removal and prescribed fire, implemented prior to this wildfire protected two refuge housing units. The fuel treatments on 4,284 acres reduced fire activity in the area, allowing time for residents to evacuate and firefighters to contain the fire. No damage occurred to infrastructure within the treatment area; however, damage did occur outside the treatment area, including the loss of power poles, range fencing, and one structure. Previously installed, strategically placed control lines allowed firefighters to safely perform burnout operations to support fire containment.

The **Whitmore Fire** started on August 3, 2021, on the Colville Indian Reservation in Washington State and grew to 58,234 acres before it was contained, costing more than $3.3 million as of October 31, 2021. There were few barriers to the fire's spread, and several primary and secondary structures were lost. The limited roads, steep terrain, and older fuels treatment fire breaks made firefighting difficult. Along with infrastructure, natural and cultural heritage values within and adjacent to the fire were at risk. These included threatened and endangered species, sensitive riparian and meadow areas, and historic and prehistoric sites. Significant effort went into protecting the Tribe's highly-valued commercial timber assets. Efforts included the use of past fuels treatments and appropriate wildfire suppression tactics. Ten structures were reported lost after more than 4,600 were threatened during the incident.

Fire Name[10]	Residences Lost	Residences Threatened	Other Structures Lost	Other Structures Threatened	Protection Rate
Chuweah Creek	5	350	9	25	96.4%
Devils Creek	0	20	0	10	100.0%
KNP Complex	1	2,376	3	1	99.8%
Mescal	0	1,133	0	1,095	100.0%
Oxcart	0	155	1	60	99.5%

[10] Table information derived from IRWIN incident histories.

Whitmore	6	500	4	2,336	99.6%
Total	**12**	**4,534**	**17**	**3,527**	**99.6%**

Table 4. Primary residences and other structures lost and threatened for the fires sampled. In all cases, responders were highly successful at protecting these values.

Fires	Cost Drivers					
Fire Name	Labor, Benefits, Travel	Contract Services	Aviation Contract	Supplies, Materials, Goods	Rent, Communication, Utilities, Equipment Rental	Other, Grants, and Cooperative Agreements
Chuweah Creek	11.9%	5.5%	4.6%	0.9%	76.9%	0.1%
Devils Creek	42.5%	15.7%	15.3%	26.2%	0.1%	0.2%
KNP Complex	86.4%	1.0%	0.0%	11.1%	0.0%	1.6%
Mescal	27.8%	67.6%	2.7%	0.7%	1.1%	0.2%
Oxcart	75.8%	0.4%	0.0%	9.1%	0.0%	14.7%
Whitmore	47.5%	20.6%	1.9%	14.5%	14.6%	0.9%

Table 5. Suppression costs for incidents by cost driver as a percentage. These costs only reflect the Interior Department obligations in FY 2021, and not all costs are available yet. These do not include contributions from interagency partners for total incident cost.

Financial Reporting

The complex, dynamic nature of wildland fire management is reflected in the structure of the Interior Department's WFM Program. The DOI Wildland Fire Management account comprises budget line items for Fuels Management, Preparedness, Suppression Operations, Burned Area Rehabilitation, Facilities Construction and Maintenance, and Joint Fire Science. The Interior Department's total wildland fire management program costs (direct obligations) in FY 2021 were $1.3 billion.

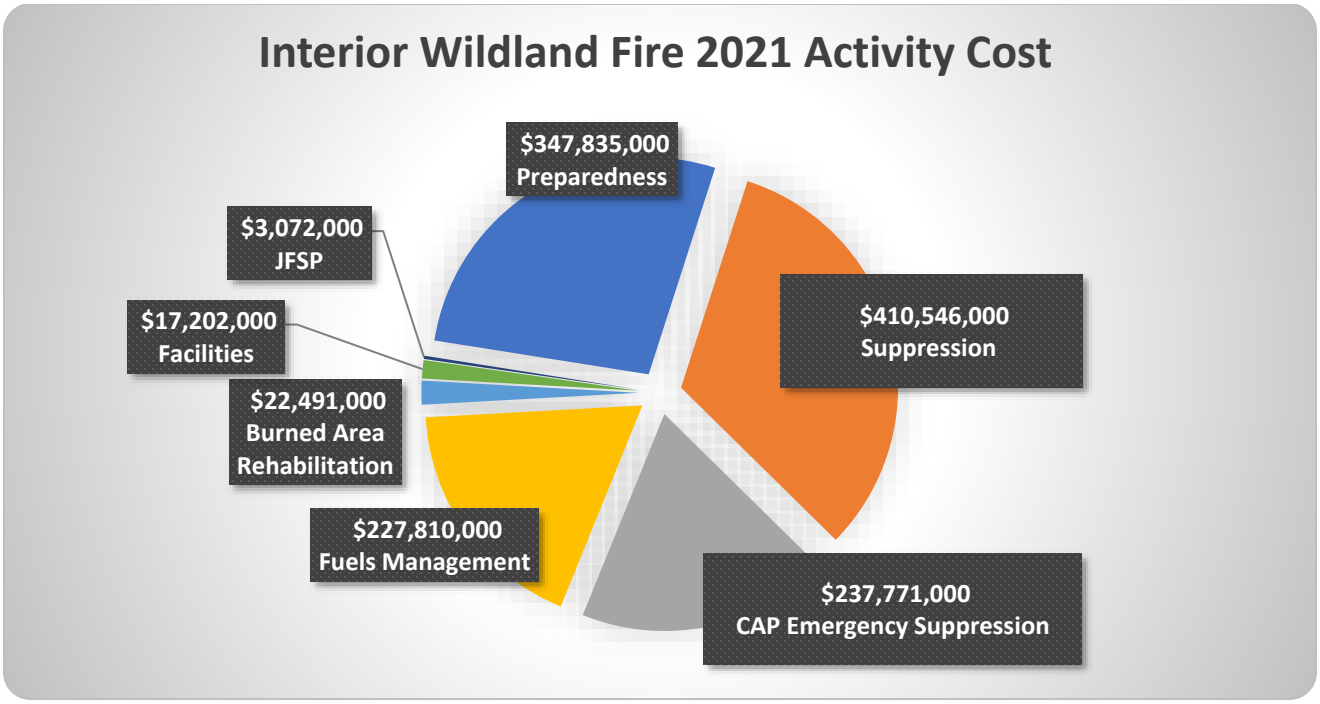

Figure 6. The Interior Department costs by wildland fire activity for 2021.

The Interior Department's total suppression activity costs for FY 2021 were $648.3 million, which includes $410.5 million funded from the Wildland Fire Management account and an additional $237.8 million transferred from the Wildfire Suppression Operations Reserve Fund to the WFM account for emergency wildfire suppression operations.

Wildfire outlays included direct wildfire incident accounts, as well as non-incident-specific wildfire support accounts (e.g., aviation contracts servicing multiple fires). Fires may span fiscal years, and costs associated with a wildfire incident may take multiple fiscal years to resolve as items like cost-share agreements, cost-recovery efforts, and invoice submissions are reconciled. Continuing costs from FY 2020 wildfires are also reflected in the Interior Department's total costs in FY 2021. Similarly, some of the costs of fires that started in FY 2021 carried forward into FY 2022.

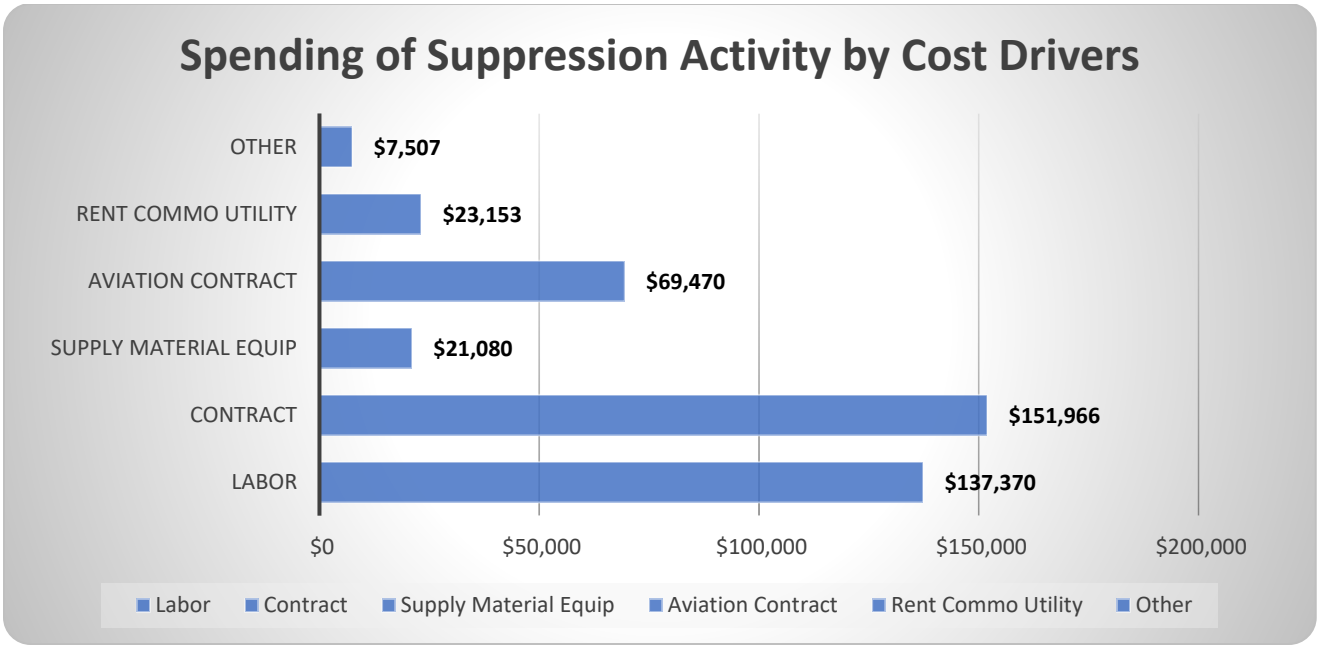

Figure 7. National-level suppression activity costs by cost driver for FY 2021. Labor expenses include personnel compensation, benefits, and transportation of people.[11] (Values in $1,000s)

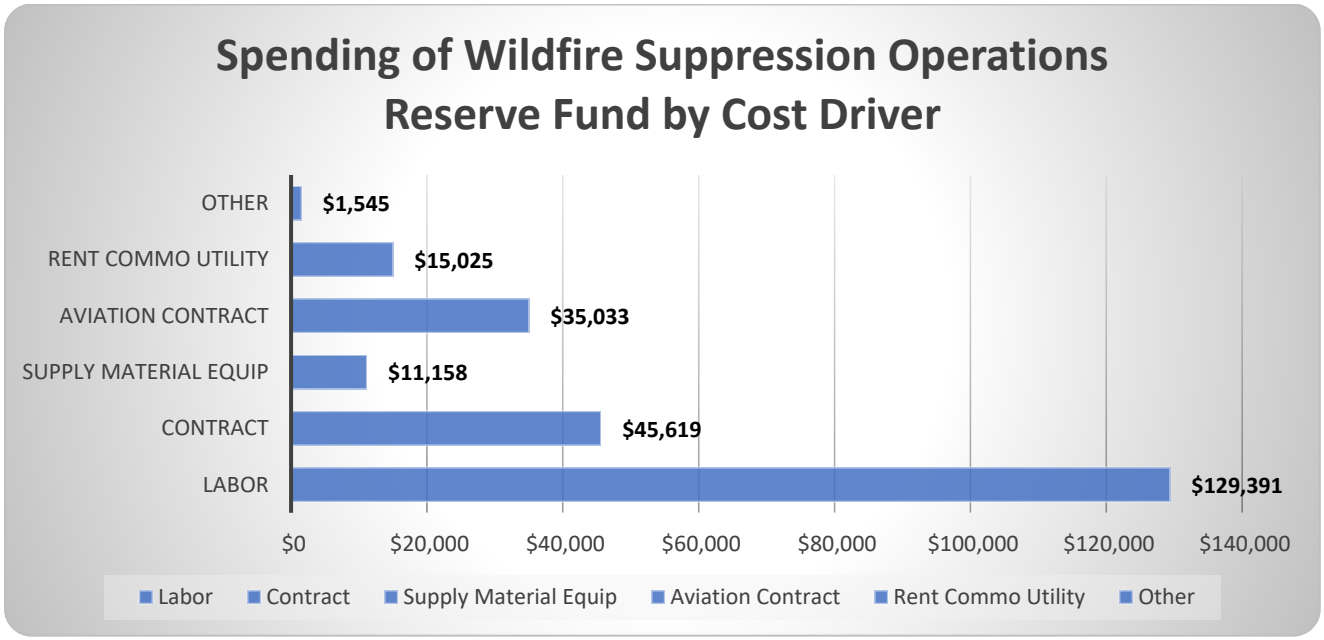

Figure 8. Interior Department 2021 Spending of Wildfire Suppression Operations Reserve Fund resources shown by Cost Driver shows labor by far as the most significant factor.[12] (Values in $1,000s)

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[11] Costs are budget obligations. Categories are derived from budget object code (BOC).

[12] Costs are budget obligations. Categories are derived from budget object code (BOC).

The Interior Department received approval for two funding transfers totaling $260.0 million from the Wildfire Suppression Operations Reserve Fund to the WFM account during FY 2021. The first took place on July 22, 2021 ($150.0 million), and the second on August 30, 2021 ($110.0 million), as suppression funds available for obligation in the WFM account were exhausted. DOI used the transferred funding primarily for labor costs and vendor payments, providing necessary resources for wildfire response on lands administered by the Interior Department and to assist wildland fire partners in their response. The Interior Department provides significant support to our Federal, Tribal, State, and local partners for wildfires that occur outside Interior Department-administered lands, and the Interior Department receives reciprocal support for Interior Department jurisdictional fires. As demonstrated in the graph below, funding transferred from the Wildfire Suppression Operations Reserve Fund supported wildfire response activity on lands of various jurisdictions. Although 84 percent of the funding supported suppression response on Federal lands, the funding also supported Tribal, State, and local cooperators.

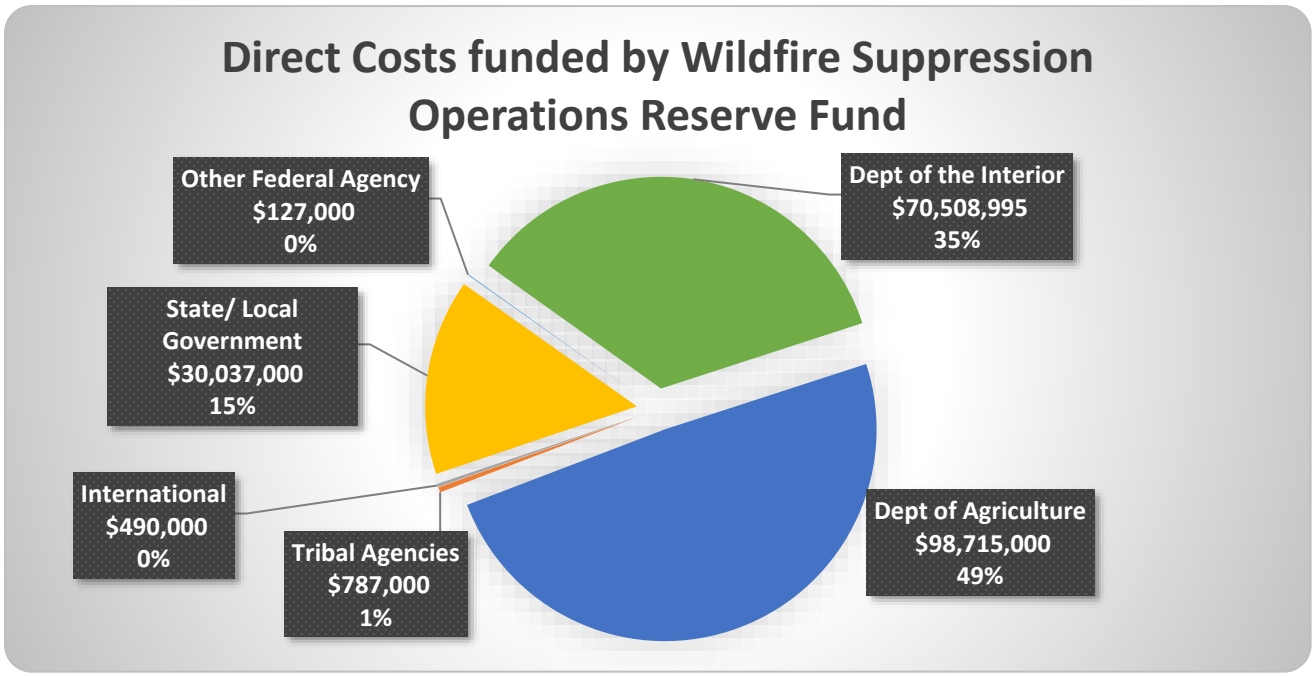

Figure 9. The Interior Department 2021 direct costs funded by Wildfire Suppression Operations Reserve Fund resources, shown by the partner receiving support. The Interior Department contributed significantly to its partners' wildland fire suppression operations in 2021.

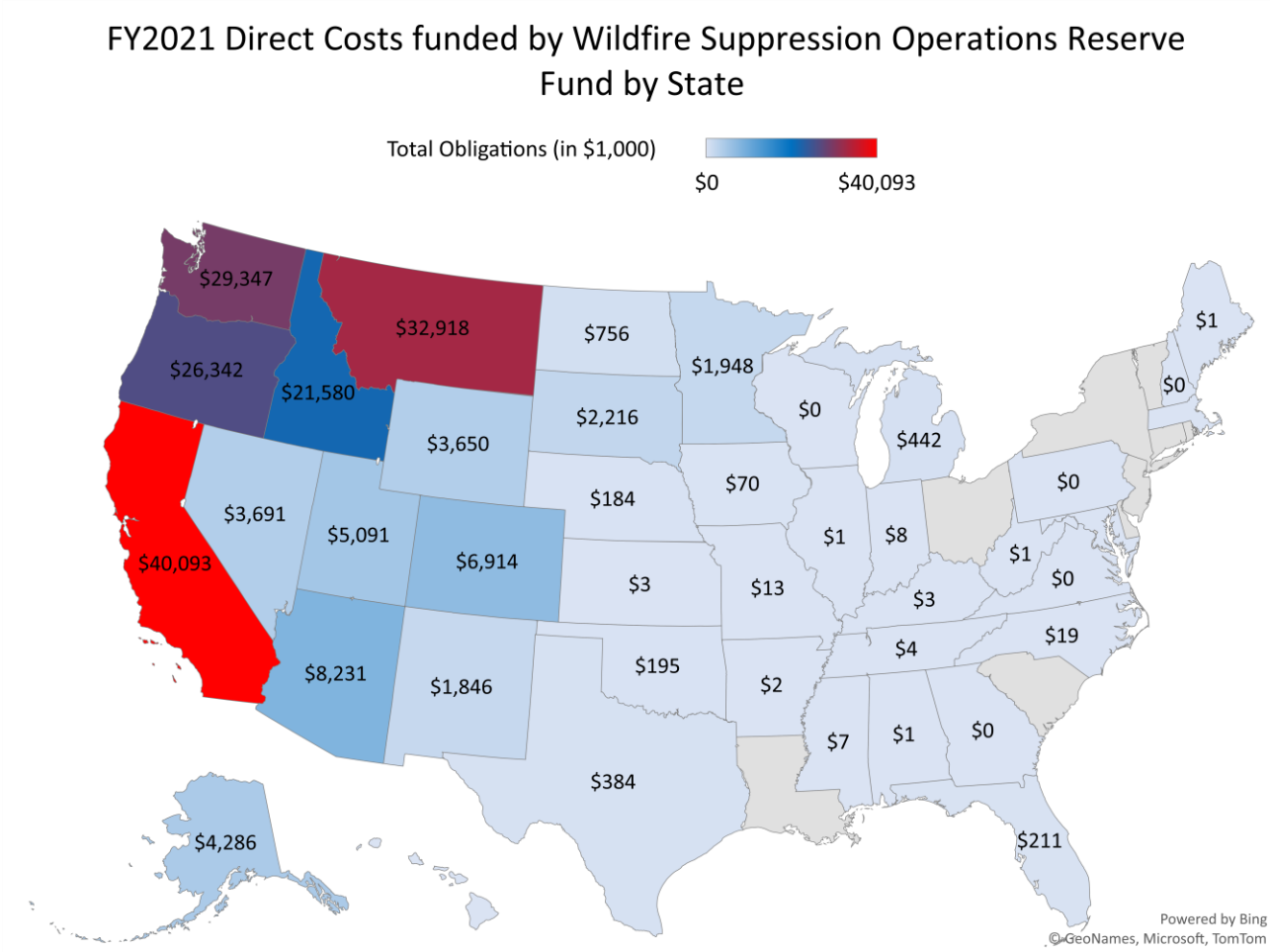

Figure 10. The Interior Department 2021 direct costs paid from Suppression Operations and Wildfire Suppression Operations Reserve Fund resources, shown by State on a U.S. map. Approximately $10.2 million was obligated at the national level to support suppression operations. The funding by State correlates well with incident activity and the location of Interior Department lands.

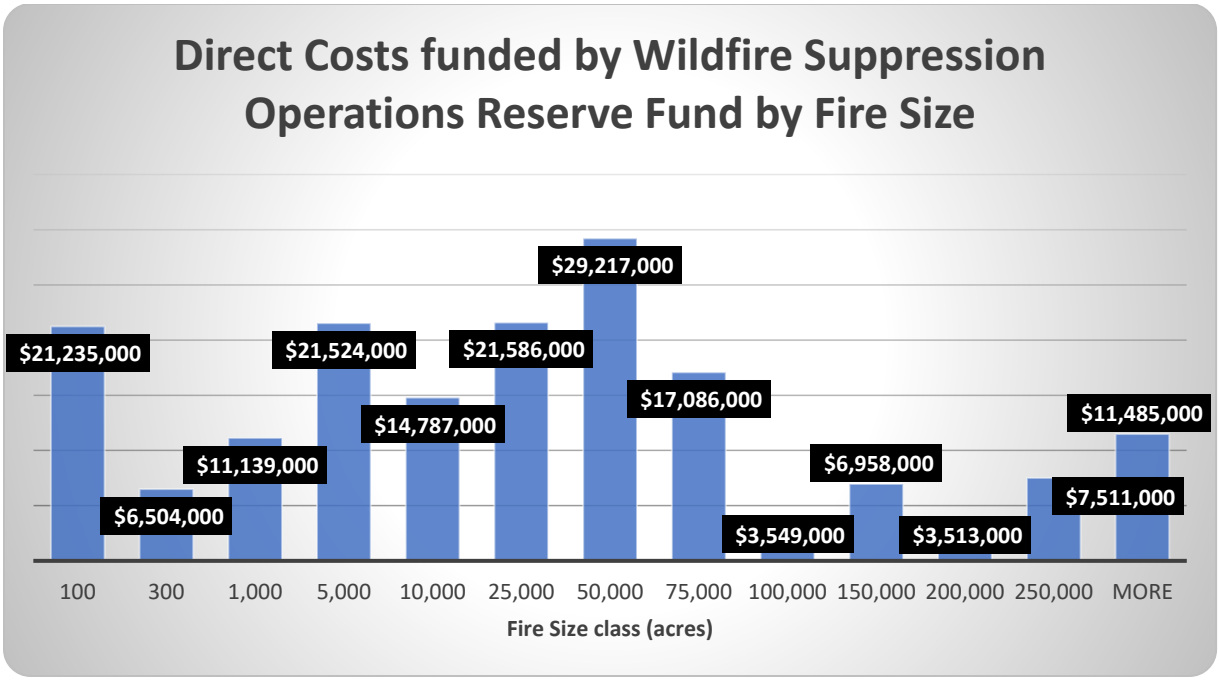

Figure 11. The Interior Department 2021 direct costs funded from Wildfire Suppression Operations Reserve Fund resources, demonstrated by fire size. Dollar figures are rounded to $1,000.

Lessons Learned

Throughout this analysis, several themes emerged:

- The Interior Department's WFM Program can adapt quickly to challenging situations. 2021 brought about new challenges, particularly with support services and goods during the COVID-19 pandemic.
- As climate change continues, weather patterns continue to shift and pose challenges for wildland fire. The exceptional drought experienced in 2021, along with other challenging weather events, heavily influenced the dynamic adverse fuels and fire behavior conditions.
- The complexity of interagency and intergovernmental coordination among Federal, State, local, Tribal and other partners has a compounding effect. It was particularly pronounced during 2021. There is entanglement of complexities ranging from mobilizing resources to logistical supply to pandemic response. These conditions are also interacting at multiple levels at incidents, local areas, geographic areas, and national scales. As this occurs, coordination must increase to address resource competition and these compounding issues.

Recommended Enhancements

Additional investment and strategic organization of the Interior Department's wildland fire workforce is needed to provide greater, more sustainable capability to perform critical mission functions and continue to effectively serve the Interior Department, partners, stakeholders, and the public. Although the Interior Department has made improvements, more work is needed. The demands on the current workforce are immense and will require better adaptation to meet the increasing amount, complexity, and annual duration of the wildfire workload.

Monitoring of fuels treatments continues to show their effectiveness in reducing fire behavior and contributing to the management of wildfires. Furthermore, monitoring enables the program to identify and distinguish between beneficial and detrimental fire impacts to highly valuable resources and assets. Based on wildfire trends, expanded post-fire mitigation investment would improve recovery and reduce the risk of secondary impacts.