INVESTING IN WILDFIRE PREVENTION

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EXECUTIVE SUMMARY

With increased frequency and severity of wildfire, forest and fire managers are re-examining strategies for reducing human and ecological loss (Calkin et al. 2015, NCWFMS 2018). Reducing human caused ignitions through wildfire prevention awareness is an important component of a successful strategy. Although investments in fire prevention have demonstrated effectiveness at reducing preventable human caused ignitions, tracking and evaluating federal investment in fire prevention is a challenge. Prevention is tied to the overall preparedness budget at the national, regional, and forest levels – making investment toward prevention work only identifiable at the ranger district level.

To better understand prevention programs at the ranger district level, we interviewed eight fire prevention technicians and fire management officers about their investments toward fire prevention work on The Santa Fe and The Coconino National Forests. In this report, we place our findings from local-level interviews within the context of larger national programs and funding allocations.

KEY FINDINGS

Our key findings about wildfire prevention awareness programs include:

- In 2018, 89% of wildfires in the U.S. were human caused.
- As a nation, we are not investing enough in prevention given how effective it can be in reducing wildfires.
- Increased clarity about the USFS investments in prevention would help identify what is working and where increased resources are necessary.
- Efforts to educate urban forest users about forest restrictions and closures poses a substantial challenge to ranger district staff, and these efforts are not prioritized for funding.
- Statistics on fire prevention programs can be difficult for outside organizations to obtain at the national forest level, making it hard to evaluate the success of prevention efforts and to identify areas where capacity may be improved through partnerships with outside organizations.
- Ranger districts generally lack a process for evaluating the success of public awareness efforts.
- There is no budget line item tracking investment in fire prevention work at the Washington Office, regional, or National Forest level.
- Most of the ranger districts we interviewed lacked capacity to accomplish both suppression and prevention tasks at least some points during fire season.
- There are only 400 wildfire prevention technicians listed in the entire US Forest Service budget (about 4% of total number of employees devoted to fire related activities).
- Creating and sharing actionable prevention plans based on priority areas is a sensible starting point for advancing wildfire prevention.
- Greater information sharing and transparency about the challenges that fire prevention programs face with human-caused ignitions is needed.

BACKGROUND

Large, high-severity wildfires are an increasingly common occurrence across the United States (Dennison et al. 2014, Parks and Abatzolglou 2020). These fires overwhelm suppression capabilities and burn large areas of land, placing people, infrastructure, and important ecological values at risk of destruction. Both human and biophysical conditions contribute to this increase in wildfire severity; climate change is extending the length of fire season and creating higher incidence of wildfire (Abatzoglou et al. 2016), a legacy of past land management is influencing forest structure and species composition, and human settlement within and adjacent to forested landscapes is creating increased probability of ignition (Radeloff et al. 2018; Nagy et al. 2018; Theobald and Romme 2007).

As suppression resources continually struggle to cope with the increased frequency and severity of wildfire, wildfire prevention awareness has been recognized as an important component of any successful strategy to reduce human and ecological loss (Calkin et al. 2015, NCWFMS 2018). Investments in fire prevention awareness have demonstrated effectiveness at reducing preventable human-caused ignitions (NCWFMS 2018, Abt et al. 2015; Prestemon et al. 2010). The United States Forest Service (USFS) asserts that for every one dollar increase in preparedness funding there is a decrease of $1.70 in suppression costs (USFS 2018). Had investments been made to prevent the escaped campfire that caused the Wallow Fire in Arizona, over $100 million in suppression and immediate post-fire rehabilitation could have been avoided (Evans 2018).

KEY TERMS

Prevention: Prevention appropriations are a part of the broader preparedness appropriation and focus on reducing human-caused wildfire ignitions through actions like updating and enforcing fire restrictions and forest closures, and public education.

Preparedness: Appropriations for preparedness are used to support efforts that assist with fire prevention and detection, equipment, training, and baseline personnel.

Suppression: Suppression appropriations are primarily used for wildfire response (i.e., putting fires out).

In fire seasons like 2018, where 89% of wildfires in the U.S. were human caused, the potential reductions in human-caused ignitions associated with prevention programs are substantial.

People start wildfires with their vehicles, cigarette butts, campfires, fireworks, debris burning, powerlines, arson, and other activities. Since there are many ways humans start wildfires and prevention takes numerous forms, reducing human wildfire ignitions is a complex problem that spans geographical and jurisdictional boundaries.

With regard to human-caused ignitions, The National Cohesive Wildland Fire Management Strategy specifically recommends (NCWFMS 2018):

"emphasize programs and activities that prevent human-caused ignitions, whether accidental or incendiary, where these ignitions, combined with high levels of area burned, suggest the greatest need. Programs should be tailored to meet identified local needs."

Programs and activities that build public awareness of the risk of wildfire are essential to reducing human caused ignitions.

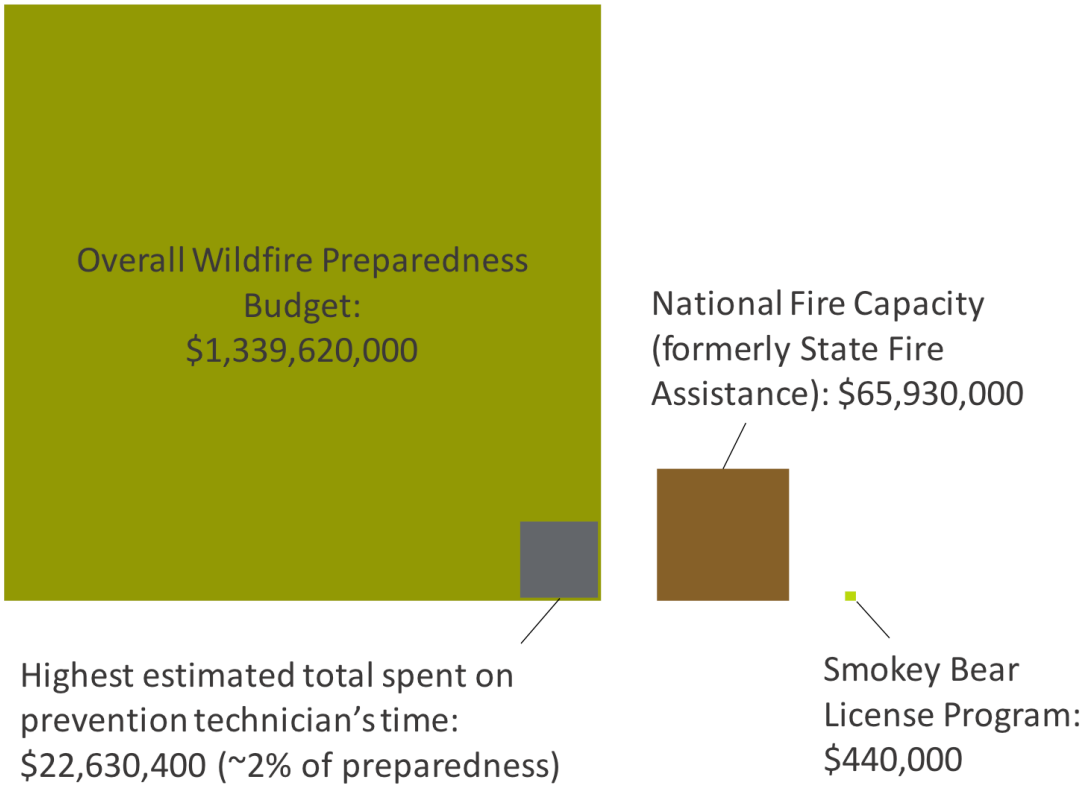

Figure 1: Forest Service budget allocations associated with wildfire prevention (USFS 2019)

These programs motivate forest users to take action by providing information about the risk of wildfire and techniques for reducing that risk (Collins 2005). The US Forest Service (USFS) has been a leader in wildfire prevention since Smokey Bear was born. Our previous report, Increasing wildfire awareness and reducing human-caused ignitions in Northern New Mexico (Evans 2018), highlighted that federal agency budgets for prevention programs do not reflect the importance and potential payback of these programs. To better understand the USFS's contribution to public awareness of wildfire risk, this report explores the fire prevention efforts at the national level and within local ranger districts.

US FOREST SERVICE PREVENTION BUDGET ALLOCATIONS

Of the 346 million acres of forest land in the Western US, 120 million acres (34%) are managed by the USFS as National Forestland. Since its creation over 100 years ago, the USFS has led the federal effort to raise awareness on how to avoid wildfire ignitions. The USFS is responsible for national wildfire prevention programs, like the Smokey Bear campaign, as well as local level prevention programs within each ranger district of a National Forest. A central component of raising national awareness about wildfire risk, The Smokey Bear License Program, has an annual budget of $440,000 and one full-time licensee contractor to-support national initiatives, programs, and products that help increase public awareness of wildfire prevention (USFS 2019). The license program generates some funding which is used to support the National Smokey Bear Award program and the national wildfire prevention public service campaign

Other USFS investments such as the National Fire Capacity program (formerly State Fire Assistance) focus on providing financial assistance through partnership agreements with State Foresters for the prevention, mitigation, control, and suppression of wildfires on non-federal lands.

Both the Smokey Bear program and National Fire Capacity Program are dwarfed by wildfire preparedness and suppression spending. The national wildfire preparedness budget was over $1.3 billion in fiscal year 2020 (USFS 2019). Although fire prevention is part of this broader wildfire preparedness budget for both the USFS and Department of Interior (DOI) agencies like the Bureau of Land Management (BLM), only a small fraction of this national preparedness budget will eventually be allocated to fire prevention (Figure 1). There are 400 wildfire prevention technicians listed in the USFS budget (or about 4% of the total number of full-time equivalent employees in the preparedness budget line item). Prevention technicians are responsible for connecting with the public and local partners to spread awareness on how to prevent human-caused wildfire, including providing information on fire restrictions and forest closures.

The 2020 justification states that preparedness funding supports "wildfire prevention, mitigation, education, and response operations, including initial and extended attack (p. 105 USFS 2019)." Despite this statement, there is no budget line item that tracks investment in fire prevention work at the Washington Office, regional, or National Forest level (pg. 110 USFS 2019).

The fire prevention programs on National Forest ranger districts cover almost 20% of the total forested land in the US and play a critical role in increasing public awareness of the risk of human-caused wildfires. Despite the importance of these locally-specific programs, there is no clear budget or line item to track investment in fire prevention awareness at the district level. Instead, personnel and material costs for prevention are taken from the larger preparedness budget within each ranger district of a National Forest. Each year, district fire management officers decide how much money the prevention program will receive for staff time and materials. This allows the fire management officer flexibility to grow and shrink prevention programs based on their evaluation of local fire prevention needs, but makes tracking and evaluation of prevention programs a challenge.

To explore how fire prevention programs vary between ranger districts, we conducted interviews with eight fire management officers and prevention technicians on ranger districts within the Santa Fe and Coconino National Forests. Although the ranger districts in this report are not representative of the entire range of prevention programs that exist within the country, they may serve as an example of the variation that exists between ranger districts within a single national forest as well as the variation between ranger districts in different national forests. Table 1 provides some facts about the two National Forests.

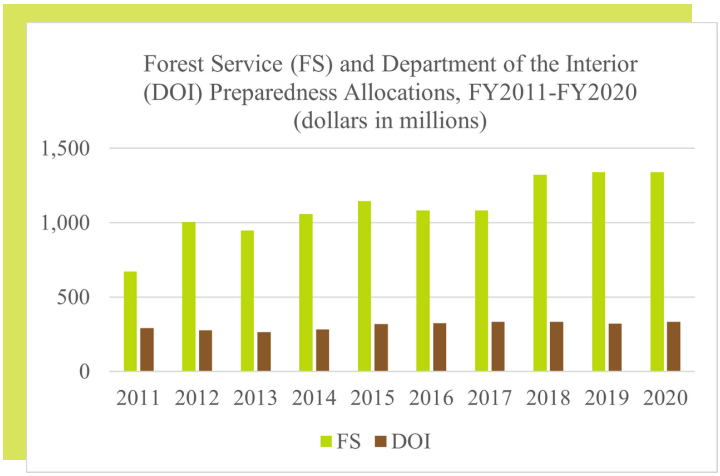

Figure 2: Overall preparedness allocations for FS and DOI (Hoover 2020)

Investment in Fire Prevention Awareness in Ranger Districts of the Santa Fe and Coconino

The level of investment in fire prevention awareness varies each year and within each ranger district of the Santa Fe and Coconino National Forests. All prevention programs in this report received funding from district preparedness budgets. This funding covers the staff time of prevention personnel as well as materials needed to complete signage, public education, training, and fire suppression duties. Table 2 provides a snapshot of district fire prevention staffing reported by fire management officers and fire prevention technicians of the Santa Fe and Coconino National Forests.

Table 1: Facts about the Santa Fe and Coconino National Forests.

	Santa Fe National Forest	Coconino National Forest
Geography	Santa Fe - (North-Central New Mexico) 1.6 million acres. Elevations from 5,300 to 13,103 feet.	Coconino - (Northern Arizona) 1.8 million acres. Elevations 2,600 feet to 12,643 feet.
Key Values at Risk	The Santa Fe National Forest provides a large percentage of the drinking water for the city of Santa Fe, and other surrounding areas.	The Coconino National Forest contributes over 50% of the drinking water to the city of Flagstaff and surrounding communities
Visitation Estimate	708,000 annually in 2019	5,057,000 annually in 2015
Abandoned Campfires[1]	Year Total - - - 2017 62 2018 48 2019 195	Year Total 2015 548 2016 466 2017 699 2018 167 -

Table 2: Prevention personnel on ranger districts of the Santa Fe and Coconino National Forests.

Prevention Personnel by Salary Grade in 2018			
National Forest	Ranger District	Number of Seasonal Patrols and Lookout Staff (Salary Range: $31,404 - $45,679)	Number of Prevention Technicians (Salary Range: $43,523 - $56,576)
Santa Fe National Forest	Coyote	?	1
	Cuba	1	1
	Jemez	1	1
	Española	1	1
	Pecos	?	1
Coconino National Forest	Mogollon	6	1
	Red Rock (Prescott and Coconino zoned)	1 - 4	1
	Flagstaff	6	2

The staff time of fire prevention technicians is the largest investment that any of the eight ranger districts made toward fire prevention awareness. In most cases, the fire prevention technician is the only staff officer dedicated to the prevention program. On the eight ranger districts, a prevention technician received between $43,523 and $56,576 annually. Only the Flagstaff Ranger District on the Coconino National Forest allocated funding to hire more than one prevention technician.

In addition to funding staff time, fire management officers provide funding to prevention programs for supplies and training. This funding varies from year-to-year. Figure 2 shows a snapshot of the materials budget at each ranger district based on estimates by fire management officers and fire prevention technicians.

WHICH PREVENTION ACTIVITIES ARE FUNDED (AND WHICH ARE NOT)?

FUNDED

Training for the fire prevention technician is funded through the prevention awareness materials and supplies funding. Most, if not all, fire prevention technicians receive forest protection officer (FPO) training so that they can write citations for abandoned campfires or any other violations of forest regulations. Enforcement is an important part of the fire prevention technician's job and helps to bring legitimacy to restrictions and closures.

Classroom visits are charged to the fire prevention technician's time. These visits are mainly completed during the off season, when fire suppression duties and fire restrictions are not a key concern. Educational visits target children in forest proximate schools, often early in elementary school (around second grade) to introduce the Forest Service, and then later (around seventh grade) to provide more in-depth education about ecosystem management. Many fire prevention technicians emphasized that by educating children they can educate entire families because students bring a conversation about fire prevention awareness into their households.

Signs describing restrictions, closures, and general forest information are purchased and posted through the fire prevention awareness funding. Fire prevention technicians coordinate with fire suppression crews to post and maintain signage throughout their ranger district. One fire prevention technician used a mobile mapping program to facilitate sharing information with visiting personnel that may not be familiar with the ranger district. This coordinating role is key to the fire prevention technician's job.

OPPORTUNITIES TO INCREASE FUNDING

Efforts to educate urban forest users about forest restrictions and closures poses a substantial challenge to district staff, and these efforts are not prioritized for funding. During the summer months, many of the forest users on the Santa Fe National Forest come from the Albuquerque and Santa Fe metropolitan areas. It is a challenge to get these forest users an adequate amount of education about the importance of campfire safety, strategies for reducing human-caused ignitions, or the status of fire restrictions and closures.

WHICH PREVENTION ACTIVITIES ARE FUNDED (AND WHICH ARE NOT)?

OPPORTUNITIES TO INCREASE FUNDING

Education and outreach to non-forest users is not prioritized during fire season due to a lack of available time. During fire season, the fire prevention technician's priorities shift. Classroom visits, public presentations, and other strictly educational activities off of the national forest land become second priority to procedural updating of signs and coordinating messages within USFS jurisdiction. The timing of this shift is due to the limited staff capacity of the fire prevention awareness program. In some ranger districts, a seasonal helper joins the staff to assist the fire prevention technician with outreach and education to the general public while suppression responsibilities might otherwise make these activities difficult to schedule and complete.

Transferring knowledge from one fire prevention technician to the next by overlapping personnel and tracking district-level accomplishments is a challenge. The job of fire prevention technician involves strategic outreach to students, agency partners, local businesses, and many others. It can take years to develop communication channels and effective outreach strategies, and when someone leaves a ranger district, these channels and strategies may be lost, requiring more investment to rebuild them.

Altogether, the combined investment in fire prevention staff time and materials ranged from a highest estimate of $200,000 annually on the Flagstaff Ranger District to a lowest estimate of $50,000 on the Pecos Ranger District. These differences reflect allocation of funding at the forest and district level as well as other factors such as number of forest visitors. Figure 3 places fire prevention materials budgets within the context of forest visitation.

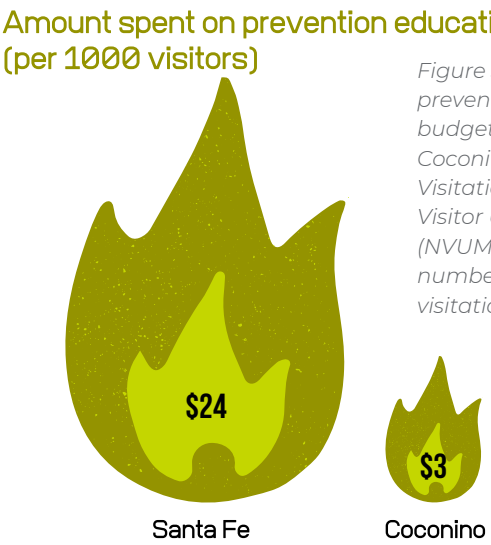

Figure 3: Reported prevention materials budgets of the Santa Fe and Coconino per 1000 visitors. Visitation based on National Visitor Use Monitoring (NVUM) data. Coconino numbers are low due to high visitation.

Fire Prevention Roles and Responsibilities

Across the ranger districts, fire prevention technicians described similar roles and responsibilities. These technicians combine firefighting with public awareness job duties. Their public awareness activities include:

- Communicating and enforcing fire restrictions and closures during fire season;
- Presenting the role of fire in ecosystem management educational programs;
- Helping present fire prevention programs in local schools and community events;
- Conducting routine inspections of areas such as electrical/electronic sites, power lines, resorts, camps, and developed facilities; and
- Identifying, collecting, and preserving evidence in the probable cause of wildland fires.

Balancing suppression duties with public education duties is a widespread challenge for prevention technicians, particularly during the summer months. One prevention technician described this seasonal shift in priorities by stating that, "suppression season is unpredictable and it is a challenge to schedule visits during this time." In the position descriptions of prevention technicians on the Santa Fe National Forest, technicians are expected to perform "rigorous suppression duties." Most often, prevention technicians are pulled into initial attack, which is the first attempt to suppress a wildfire ignition, while patrolling on their ranger district. Most ranger districts, except Flagstaff, expressed that they sometimes lacked capacity to accomplish suppression and prevention tasks during fire season.

The fire prevention technician must remain flexible to accommodate the combined duties of fire suppression and fire prevention awareness, making it difficult to account for their time. Though some districts had an internal log of fire prevention activities, most districts lacked a process for evaluating the success of public awareness efforts. Some districts described a broad fire prevention plan, but these were invariably kept flexible enough to accommodate for the unpredictable nature of the prevention technician's fire suppression duties. One district ranger illustrated how the fire prevention technicians time allocation is contingent on weather conditions during fire season when they stated, "the prevention technician has a plan laid out and every year he/she is required to do A, B, C, and D. If it's a hot year, maybe he/she robs from B and does a little more of C." The fire prevention technicians time is not only split between fire prevention awareness and fire suppression, but also between the various priorities that fall within the fire prevention technician's job description responsibility. As fire season approaches, the priorities of the fire prevention technician may shift from a focus on education and outreach to forest users and the general public, to communicating messages about fire

restrictions and closures to the forest users alone. The difficulty of accounting for the fire prevention technician's time highlights an important tradeoff associated with the prevention technician's combined duty of firefighting and public awareness. Public education and awareness have to be put on hold when wildfire suppression is required. Some example of the capacity trade-offs between fire suppression and prevention include:

- Enforcing campfire restrictions at night conflicts with initial attack duties due to work/rest restrictions on the fire prevention technician's time;
- Posting and maintaining the necessary signage of fire restrictions and forest information often requires borrowing staff capacity of fire suppression crews; and
- Scheduling and completing classroom visits, presentations, and events conflicts with the unpredictable nature of suppression duties, leading to cancellations during summer months.

TRACKING AND EVALUATING PREVENTION PROGRAMS

Forest level prevention plans are an important tool that that the USFS uses for tracking and evaluating prevention programs. These plans use data collected at the forest-level to evaluate wildfire causes and prevention issues across the national forest. Data is collected from forest dispatch, which is responsible for sending firefighting resources to the scene of new wildfire ignitions across the forest. The 2019 Wildfire Prevention Handbook written by the Forest Service recommends that these prevention plans cover: 1) Interagency roles and responsibilities, 2) Training, 3) General wildfire prevention actions, 4) Specific Wildfire Prevention Actions, 5) Public education, 8) Patrol operations, 9) Wildfire investigations, and 10) Inspections.

These plans vary in detail and time since revision. The 2019 Coconino National Forest prevention plan is a model of how these plans can be used to guide prevention efforts between ranger districts. The Coconino plan is an actionable document with recent and thorough analysis of the priority areas across the forest. Maps showing where historical density of abandoned campfires overlaps with risk, hazard, and values are useful for helping prevention patrols find abandoned campfires before they start a wildfire.

These plans are not available to the public. Agency practice of restricting access to these plans limits their effectiveness at identifying areas where National Forest capacity may be supplemented through partnership with outside organizations, such as a watershed council or a group of trailwork volunteers.

Ranger district fire prevention technicians contribute to prevention planning by identifying, collecting, and preserving evidence in the probable cause of wildland fires on their district. District-level data is called into dispatch and aggregated at the national forest level. This data is essential to prevention programs and includes the annual number of abandoned campfires and human-caused wildfires.

Prevention statistics can be difficult for outside organizations to obtain at the forest level, making it hard to evaluate the success of prevention programs and identify areas where capacity may be improved through partnership with outside agencies and organizations. In light of recent initiatives like Cohesive Strategy (2009), Good Neighbor Authority (2014), and the recent Shared Stewardship Strategy (USDA Forest Service 2018), we recommend greater information sharing and transparency about the challenges that fire prevention programs face with human-caused ignitions.

Prevention statistics, such as the annual number of abandoned campfires, can help improve the timing and location of prevention awareness efforts. For example, data of abandoned campfires on both the Santa Fe and Coconino show that the number of abandoned campfires spikes around national holidays like Memorial Day, The Fourth of July, and Labor Day. As the number of forest visitors increase during the holidays, there is a high probability that a large number of users will be from outside areas. At present, USFS fire prevention programs struggle to reach these forest users from areas outside ranger districts. This gap in USFS prevention education is an example of where partnerships with outside organizations with effective communication to urban audiences could lead to greater awareness of wildfire risk. Of course, Smokey Bear is one way to reach occasional forest visitors, but the number of abandoned campfires after 75 years of Smokey Bear suggests that additional approaches are needed.

IN SUMMARY

Large, high severity fires are becoming more common, and the warming, drying climate is making conditions ideal for these devastating fires. Human caused wildfires are a big part of the wildfire threat, and research shows we can reduce with prevention. In fact, it is likely that **we are not investing enough as a nation in wildfire prevention given how effective it can be in reducing wildfires.**

In our effort to better track prevention investments, we interviewed staff on eight ranger districts. Though some districts had an internal log of fire prevention activities, most often districts lacked a process for evaluating the success of public awareness efforts. Furthermore, prevention technicians must remain flexible to accommodate the combined duties of fire suppression and fire prevention awareness, making it difficult to account for their time. **Increased clarity about the USFS investments in prevention would help identify what is working and where increased resources are necessary** (either to augment to compliment the USFS resources).

Most of the ranger districts we interviewed lacked capacity to accomplish both suppression and prevention tasks at least some points during fire season. In other words, balancing suppression duties with public education duties is a widespread challenge for prevention technicians, particularly during the summer months. Prevention staff are not able to prioritize efforts to educate urban forest users or outreach to the general public during fire season. This limited capacity has important implications for the amount of outreach and public engagement needed to accomplish the cross-boundary goals of national initiatives like the Cohesive Strategy.

Forest level prevention plans are an important tool that that the USFS uses for tracking and evaluating prevention programs, but these plans vary in detail and time since they have been updated. Some districts described a broad fire prevention plan, but across the eight ranger districts in this research, these plans were written to be flexible and accommodate the unpredictable nature of the prevention technician's fire suppression duties. The 2019 Coconino National Forest prevention plan is a model of how these plans can be used to guide prevention efforts between ranger districts. The Coconino plan is actionable document with recent and thorough analysis of the priority areas across the forest. **Creating and sharing actionable prevention plans based on priority areas is a sensible starting point for advancing wildfire prevention**.

Ranger district fire prevention technicians contribute to the completion of actionable fire prevention plans by identifying, collecting, and preserving evidence in the probable cause of wildland fires on their district. District-level data is called into dispatch and aggregated at the national forest level. This data is essential to prevention programs and includes the annual number of abandoned campfires and human-caused wildfires. These statistics can be difficult for outside organizations to obtain at the forest level, making it hard to evaluate the success of prevention programs and identify areas where capacity may be improved through partnership with outside agencies and organizations. In light of recent initiatives like National Cohesive Fire Management Strategy (NCWFMS) (2014), Good Neighbor Authority (2014), and the recent Shared Stewardship Strategy (USDA Forest Service 2018), **we recommend greater information sharing and transparency about the challenges that fire prevention programs face with human-caused ignitions.**

This report attempts to identify the current conditions of the USFS's contribution to public awareness of wildfire risk by exploring fire prevention efforts at the national level and within local ranger districts. We document some of the barriers and opportunities these programs face as a first step toward reducing human-caused ignitions across boundaries. In the spirit of shared stewardship, we hope to continue this work with local, state, and federal agencies, Tribal governments, and private landowners—to achieve cross-boundary reduction of human ignitions and greater public awareness of the risk of wildfires. Complex problems like this require multiple perspectives and approaches. We hope that this report can help inform a dialogue about increasing investment in fire prevention awareness at the national level while finding creative ways to fill existing capacity gaps through partnerships at local and regional levels.

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