TRANSLATING FLEXIBILITY INTO FEASIBILITY:

THE STRUGGLE TO IMPLEMENT POLICY TO SOLVE THE WICKED PROBLEM OF WILDFIRE

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ABSTRACT

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SCOTT FRANZ

Current wildfire policy allows for managing wildfires for multiple objectives, granting decision-makers the flexibility to balance the threat that wildfire poses with the benefits it can bring to ecosystems that expect it. Given this flexibility, how individual decision-makers interpret policy for their locale likely plays a significant role in realizing the vision set forth by federal and interagency guidance. This research aims to understand how fire professionals translate the vision, goals and objectives in policy into management planning and implementation for fires managed for objectives other than full suppression (OTFS). We first conducted a policy analysis to understand the history and current state of policy and what successes and shortcomings have been identified in existing literature. We then conducted a thematic analysis of 26 semi-structured interviews with employees in the Southwest U.S. that had experience as management officers, incident commanders, or agency administrators to better understand the complex environments they must navigate. Our findings indicate that while participants embraced flexibility in policy governing OTFS wildfire, translating flexibility into feasibility depends on a number of factors, including dynamic social, political, and ecological landscape conditions; organizational capacity and alignment to take appropriate risks; and the funding, performance metrics, and monitoring and reporting mechanisms that incentivize managing wildfire OTFS. Results show that the Southwest can serve as a model for other areas in how to drive the organizational change necessary to confront the wildfire crisis.

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Thesis Introduction

Wildfire policy has evolved rapidly over the past three decades, necessitating repeated shifts in management strategies and public communication for US land management agencies. One growing area of focus centers around the use of natural ignitions to achieve various land management goals when conditions are conducive, rather than defaulting to immediate suppression. I refer to here as fires managed for objectives other than full suppression (OTFS). The paradigm shift away past suppression towards a more nuanced relationship with wildfire is one that is mired in complexity, and as such has been an ongoing, but incomplete, mission of land management agencies since the mid-20th century (Leopold et al. 1963, DeBruin 1974). There is a need to more wholistically analyze the challenges facing wildfire management organizations and the opportunities they have to reintroduce wildfire, considering the flexibility in administration needed to bring solutions to a local context (Wilson et al. 2018). For managing wildfire OTFS, this means considering not just the policies and guidance documents, but the social and political context, operational realities, and financial and incentive structures that decision makers must balance. Additional social science is needed to understand how these factors influence management decisions, and what can be done across scales and scope to make progress towards this intended paradigm shift (Paveglio 2021, Edgeley 2023).

Current wildfire policy allows for managing wildfires for multiple objectives, granting decision-makers the flexibility to balance the threat that wildfire poses with the benefits it can bring to ecosystems that expect it. Given this flexibility, how individual decision-makers interpret policy for their locale likely plays a significant role in realizing the vision set forth by federal and interagency guidance. This research aims to understand

how fire professionals translate the policies that govern managing wildfire OTFS into planning and practice on the ground. In Chapter 1, I will first extend upon existing research documenting the history of wildfires managed OTFS through the lens of public policy. I lay out the current state of policy and identify successes and shortcomings in the framing and terminology, metrics and financial structures, and monitoring and reporting mechanisms that policy influences. Through this analysis we set the foundation for understanding the operational flexibility that wildfire management organizations have in facilitating wildfire's natural role in the ecosystem. In Chapter 2, I investigate how fire management professionals at the center of this challenge translate the necessarily ambiguous directives of policy into management planning and action, balancing the many priorities and values across social, political, and ecological landscapes. In doing so, this thesis aims to inform current and future research on how flexible options in policy become feasible operations for wildfire managed OTFS.

Chapter 1: The Evolution of Wildfire Policy Governing Management of Natural Ignitions

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Introduction

On August 2, 2021, Chief of the US Department of Agriculture (USDA), Forest Service Randy Moore, wrote a letter to the agency. Due to the severe drought conditions across the western US, with over 70 large wildfires burning and ongoing challenges of the COVID-19 pandemic, he declared "managing wildfires for resource benefit is a strategy we will not use" until the unprecedented conditions abated (Moore 2021). The strategy he refers to, managing wildfire for resource benefit, gives fire managers the ability to use a naturally ignited wildfire (i.e., via lightning strike) to accomplish management objectives on the landscape. Compared to a full-suppression strategy, whereby teams work to build effective containment around a wildfire to immediately halt its spread, managing wildfires for resource benefit can involve indirect tactics that balance ecological and social considerations. These include confining wildfire to an area by using natural barriers, roads, and other features; point or zone protection of valued resources; and monitoring its effect on natural systems and management objectives (NIFC 2020).

Wildfire is an important part of a land manager's toolbox because of its critical role in wildfire-adapted ecosystems. For example, in lodgepole pine forests, like those around

Yellowstone National Park, high-severity fire opens their serotinous cones for germination (Romme et al. 2011). For ponderosa pine forests, such as those found throughout the Intermountain and Southwest US, wildfire has long played an important role in maintaining forest health. These forests have co-evolved with wildfire, such that repeated low-severity wildfire builds resilience, as lower tree density reduces the spread of crown fires, thereby reducing the risk of high-intensity, catastrophic wildfire (Huffman et al. 2020, Stoddard et al. 2020). However, years of wildfire exclusion policies and management practices have altered the role of wildfire, especially in North American forests, and resulted in extreme fuel buildup that, combined with climate change, has resulted in uncharacteristically large and high-severity wildfires (Hagmann et al. 2021).

Reducing the risk of catastrophic wildfire and reintroducing wildfire, with tolerable risk to communities, firefighters, and ecosystems, has become a key focus of land management policies. In current policy, wildfire may be managed for multiple objectives simultaneously, and while this can give fire managers flexibility, it has also compounded the complexity of decision-making. For example, fire managers can directly suppress one flank of a wildfire, allow another flank to burn to a ridgeline or road that is safer for firefighters to control, and point-protect assets or infrastructure in between. Though enhancement in decision-making strategies and decision support systems like the Wildland Fire Decision Support System (WFDSS) and Risk Management Assistance (RMA) dashboard may help fire managers navigate that complexity (Beeton et al. 2021, Fillmore and Paveglio 2023), there is no doubt that wildfires continue to increase in intensity, severity, and duration, leading to what some land management agencies, particularly the Forest Service, have dubbed a "Wildfire Crisis" (Wasserman 2020, USDA Forest Service 2022b).

The current wildfire crisis emerged from a paradox formed over the past century that addressed short-term risk at the expense of long-term risk (Calkin et al. 2015, North et al. 2015, Ingalsbee 2017). A memo from the chief of the Forest Service in 1935 outlined what is known as the 10 a.m. policy and demanded "fast, energetic, and thorough suppression of all fires … with the aim, without reservation, of obtaining control before 10 o'clock of the next morning." Following this paradigm for decades, the rapid and total suppression of wildfires contributed to a steady buildup of fuels, so when lightning strikes or human-caused ignitions inevitably brought wildfire back to those landscapes, it came with greater and greater intensity. In his recent letter, Chief Moore stated: the 2021 restriction was "not a return to the 10 a.m. policy," but a temporary and prudent course of action. A recent resolution introduced to the US House of Representatives, however, would see that policy reinstated. House Resolution 6903 was introduced following the 2021 wildfire season and called for the Forest Service to extinguish wildfires "not later than 24 hours after such a wildfire is detected." Even temporary policies and proposed laws can have an impact on political and ecological landscapes, and it remains to be seen how these recent developments may affect wildfire management.

Between the 10 a.m. policy of 1935 and the Forest Service chief's memo of 2021 is nearly 90 years of history and resulting paradigm shifts. Before 1968, managing wildfires for resource benefit was not allowed; full suppression was the only approved management strategy. When first codified in policy in 1968, managing wildfires for resource benefit was referred to as "prescribed natural fire," as it required the same planning that goes into deliberately ignited "prescribed fires" with the only difference being their ignition source. In the early 2000s, policy shifted to classifying such fires as "wildland fire use" (WFU),

putting wildfires used to accomplished resource objectives into their own unique category separate from prescribed fires and unwanted wildfires (USDA and USDI 2003). Today, it is commonly referred to as the term in Chief Moore's letter, "managing wildfire for resource benefit," "resource objective fire," or simply "managed wildfire," though there is no consensus on which term to use due to the complexity of wildfire management in the US (Bean and Evans 2023).

Wildfire management has evolved to a complexity similar to an on-going game of chess (Paveglio 2021). To understand and contribute to a game in progress, one must know the moves played so far. Therefore, to navigate policies that govern managing wildfire, especially for objectives other than full suppression, it is helpful to know the history and context of those policies. Research done by the late Jan van Wagtendonk sets the foundation for this history, from the late 19th century to the turn of the millennium (van Wagtendonk 2007). This white paper aims to capture developments in wildfire management policy since he completed his work and show where complexities in policy have affected management (see Appendix A for methods). This paper is not intended to be a complete list of policies, but rather, it provides an overview of the major paradigm shifts that have shaped wildfire management policy in the US.

In addition, due to the oppression of indigenous nations, their knowledge and relationship with wildfire was squandered as US land management agencies emerged and took charge of the American landscape (Vineyta 2022). Only recently has land management policy evolved to recognize the value of traditional ecological knowledge (TEK) and created mechanisms to empower indigenous communities (Martin 2021, National Forest System Land and Resource Management Planning 2016; 81 Federal Register (FR) 90723–90739). For

anyone seeking to better understand how wildfire management evolved into such a nuanced and complex set of systems, this paper provides an overview of the relevant events and policies that shaped those systems from the 1870s to the present day.

Historical Policy Eras

Jan Van Wagtendonk's 2007 publication "The History and Evolution of Wildland Fire Use" in the journal *Fire Ecology* encapsulated the progression of wildland fire use since the 1870s into the following eras: Fire Protection (1872-1967), Experimentation (1968-1977), Re-Evaluation (1978-1989), and Maturation (1990-2000). We first review this chronology and then extend upon it, proposing two new eras: Fire Classification (2001-2009) and Operational Flexibility (2010-present). Figure 1 shows the eras along a rough timeline. Given the time that passed since its publication, we assessed policies from 2001 (the end of the Maturation era) onward to determine if additional eras had emerged. We grouped policies both temporally and by emergent themes, through which the Fire Classification and Operational Flexibility eras were identified. Appendix A provides an overview of our methods.

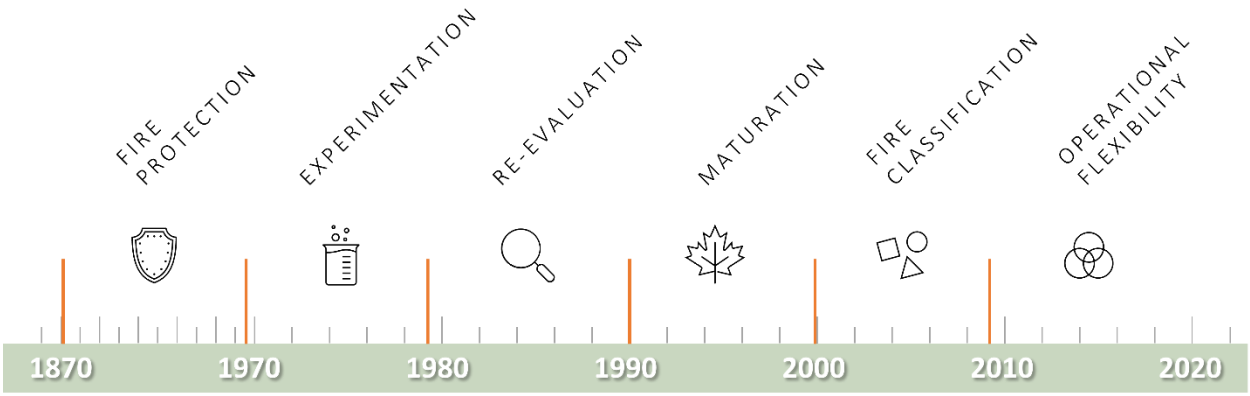

Figure 1. Eras of Wildfire Policy. *The first four eras are those originally proposed by van Wagtendonk (2007), the final two are new eras proposed by this paper.*

Fire Protection (1872 – 1967)

The historical analysis begins circa 1870, when sequestration of indigenous populations, expansion of railroads and grazing, and policies of total fire suppression started to trigger a profound shift in the wildfire patterns typical to western North America (Hagmann et al. 2021, Swetnam et al. 2016). Around the turn of the 20th century, debate ensued about the role of wildfire and associated management approaches. The nation's only two professional foresters, Gifford Pinchot and Bernhard Fernow, argued for wildfire suppression to stop the destruction from tragedies like the Peshtigo Fire in 1871 that claimed many lives (Pyne 2009). Contrasting opinions argued that regular surface fire rendered forests more resilient but were dismissed as "light burning" or "Indian fires" that stood in opposition to the prevailing academic and experiential knowledge (Pyne 2009, Smith 2017). Recent research indicates that the language the Forest Service used to pursue this suppression-first agenda was perceived as racist and derisive (Vinyeta 2022). Because collective understanding of general ecology, let alone fire ecology, was both young and hotly contested (Kormondy 2012), wildfire's role as the enemy of healthy forests was easier to understand and communicate.

Before the body of ecological research matured, large wildfires burned in the Adirondacks in the Northeast US in the early 1900s and the Big Blowup of 1910 burned millions of acres through the Intermountain West and into Canada, dominating national news (Pyne 2009, van Wagtendonk 2007). Policy following these events included the Forest Fires Emergency Act in 1908, the Weeks Act of 1911, and the Clarke-McNary Act of 1924, which sought to authorize and expand the funds and resources available for fire control (Arno 2014). New Deal programs like the Civilian Conservation Corps and the

establishment of smokejumpers brought military models to firefighting, which became further entrenched with World War II propaganda and the creation of Smokey Bear in 1944 (Pyne 2009, Waxman 2019). Though some foresters of the time realized the negative impacts of total wildfire suppression, social precedent was set; fire was a villain that must be extinguished. Federal and agency policy further solidified this framing.

Experimentation (1968 – 1977)

In the Experimentation Era, momentum began to shift away, albeit slowly, from fire suppression, especially within land management agencies. The National Park Service (NPS), using the findings and recommendations of the Leopold Committee (Box 1), led the way by becoming the first land management agency to codify the ecological importance of wildfire into policy in 1968 (van Wagtendonk 2007). Programs in national parks and monuments began using "prescribed natural fire" and paved the way for a growing body of research on fire's positive ecological effects in multiple ecosystem types (Botti and Nichols 1978). The term "prescribed natural fire" was used for natural ignitions because policy put it into the same category as a deliberately ignited prescribed fire and both required formal prescriptions. Soon after in 1974, the Forest Service initiated guidance, like Chief Moore's letter, but permanent, to move away "from fire control, a simplistic approach, easily communicated and understood, to fire management, a complex scientific approach, not so easily communicated or understood" (DeBruin 1974). Federal policy was slower to adapt. For example, the Federal Fire Prevention and Control Act was passed in 1974, and like laws in the Fire Protection Era, it focused on fire control (Public Law (PL) 93-498).

The most influential policies of this era were focused on land management, including, but not limited to, wildfire management. Two of the most prominent policies

were the 1976 Federal Land Policy and Management Act (FLMPA) and the National Forest Management Act (NFMA). FLMPA and NFMA mandated the development of regional planning documents to execute the multi-use, sustained yield missions of federal agencies (PL 94-579, PL 94-588). These plans, referred to as "land use plans," "resource management plans," "land management plans," or "forest plans," are documents assembled by a county, Forest Service district, BLM region, national park, or other management organization to establish the priorities, strategies, and tactics of the given land unit. For this paper, we refer to these documents as Land Management Plans (LMPs). LMPs are subject to the protocols established by the National Environmental Policy Act (NEPA) of 1969[1]. Jurisdictional boundaries add complexity to LMPs because ecological processes like wildfire often cross boundaries, and LMPs rarely align across boundaries, which increases the difficulty of coordinating an effective response to wildfire.

Before this era, policies governing wildfire management were contained largely to individual land management agencies. But as wildfire management grew more complex, the need for coordination across agencies to reduce redundancy and cut costs led to the creation of the National Interagency Fire Center in 1965 (NIFC 2022). NIFC is home to the fire management programs of all five major land management agencies (Bureau of Indian Affairs (BIA), Bureau of Land Management (BLM), US Fish and Wildlife Service (USFWS), NPS, and Forest Service), and along with its partners (National Association of State Foresters, US Fire Administration, and National Weather Service). NIFC provides "leadership, policy oversight, and coordination to manage the nation's wildland fire

[1] NEPA requires an Environmental Impact Assessment (EIS) for all Land Management Plans (LMPs), which land units must update every 15 years.

programs" (NIFC 2022). As LMPs and NIFC emerged, wildfire policy further fragmented, adding interagency and regional nuances and complexities to decision-making.

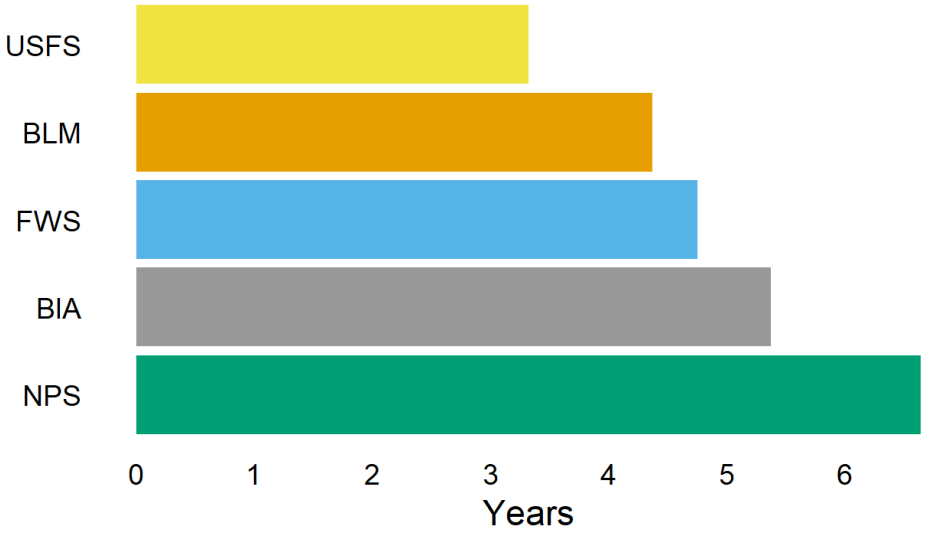

Figure 2. Average time spent to complete an Environmental Impact Statement (EIS). *An EIS is often necessary to fully revise LMPs. Individual US land management agencies spent 3 to 7 years on average to complete one, with an overall average of 4.5 years and a median of 3.5 (CEQ 2020).*

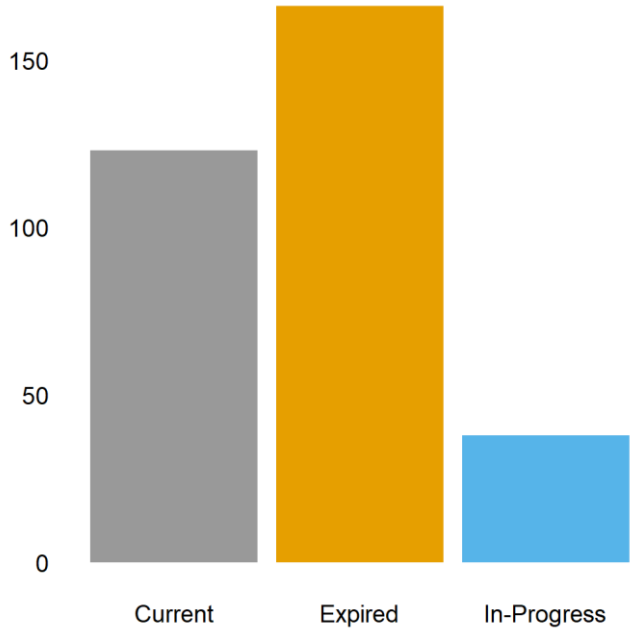

Figure 3. Status of Land Management Plans (LMPs) in the Forest Service and BLM. *Policy mandates that units revise LMPs at a minimum every 15 years, and many have missed that deadline (USDA Forest Service 2022a, BLM 2022).*

Re-evaluation (1978 – 1989)

The Re-evaluation era is marked by focusing events, such as the 1978 Ouzel Fire and 1988 Yellowstone fires, which led to revisiting existing wildfire management policies. During this era, evidence grew that while suppressing all wildfires was difficult, reintroducing fire to the landscape was even more so (Pyne 2009). In 1978 in Rocky Mountain National Park, the Ouzel Fire was managed as a prescribed natural fire for over a month without incident, until a drastic change in weather caused it to escape control and threaten surrounding communities. A report on the incident confirmed that planning gaps led to its escape (Ashley et al. 1978, NPS 2019). A decade later in 1988, multiple ignitions in Yellowstone National Park burned over a million acres (Romme et al. 2011, van Wagtendonk 2007). The Yellowstone fires resulted in subsequent ecological research that illustrated both negative and positive impacts from the fires. While some watersheds experienced short-term degradation due to increase discharge and sediment loads in streams, lodgepole pine stands, which rely on the intense heat of high-severity fire to trigger the germination process for their cones, saw healthy regeneration in the years following the fires (Romme et al. 2011, Turner et al 2003). Despite the array of nuanced impacts from these fires, the headlines in the immediate aftermath criticized management and focused on the increasing size and intensity of wildfires (Bellinghausen 1988).

During this era, planning guidelines established by FLMPA and NFMA proved confusing and cumbersome, which triggered revisions in 1982 that attempted to "clarify and simplify" the planning process (National Forest System Land and Resource Management Planning 1982; 47 Federal Register (FR) 43026). The size, intensity, and international attention drawn by the Yellowstone fires led the secretaries of Interior and

Agriculture to jointly suspend all prescribed natural fire management programs until LMPs were written (Rothman 2007, van Wagtendonk 2007). A Forest Service report found that there were many challenges in creating LMPs, including internal and external communication of strategies, financial disconnects between plans and budgets, time required to complete or amend plans, and complexity of multi-jurisdictional incident management (Larsen et al. 1990, Rothman 2007). Thus, with a revised planning policy and an order from the secretaries, federal agencies began to re-evaluate their wildfire management programs.

Maturation (1990 – 2000)

Following the era of re-evaluation, fire programs began to mature in response to a growing body of research and policy changes following catalyzing events like the Yellowstone fires. When Yellowstone National Park revised its fire program in 1990, it began to see changes as naturally ignited fires burned "in a jigsaw pattern" with reduced severity and intensity (van Wagtendonk 2007, Collins et al. 2007). Unfortunately, the Maturation Era was dominated by the tragedies of 1994, a year in which 34 firefighters died (NWCG 2017). Firefighter safety came under intense scrutiny, as the average number of wildland firefighter fatalities continued to increase into the early 2000s (NWCG 2017). Growing concerns came to a head with the most significant of these tragic fires, the 1994 South Canyon Fire in Colorado, which claimed 14 of the 34 fatalities that year (Brown 2019).

The South Canyon Fire led to the first complete revision of federal wildland fire management policy in decades. The secretaries of USDA and the DOI chartered the 1995 Federal Wildland Fire Management Policy and Program Review (hereafter, the 1995 Policy),

which reaffirmed the top priority of fire management: protect human life. Among other directives, the 1995 Policy tasked agencies with: 1) creating an organizational culture that supported employees to "implement a properly planned program to reintroduce fire," 2) considering other treatment options in areas like the Wildland-Urban Interface (WUI) where fire use was difficult, and 3) improving coordination and collaboration with partners, stakeholders, and other agencies (USDA and USDI 1995).

The 1995 Policy supported reintroduction of fire, but maintained the term "prescribed natural fire" and its related requirements (USDA and USDI 1995). However, five years later this distinction changed following the 2000 Cerro Grand Fire in New Mexico. The Cerro Grande Fire started as a prescribed fire, but it escaped control, threatened the Bandelier National Monument and the Los Alamos National Laboratory, and burned over 200 homes and structures (van Wagtendonk 2007, Rothman 2007). The Cerro Grande Fire triggered investigations that found a lack of standardization in terminology, lack of clarity in policy implementation, procedural gaps, and insufficient coordination between agencies and with communities contributed to the outcome (NPS 2001, Hill 2000). Following the investigation, the secretaries convened a new Interagency Federal Wildland Fire Policy Review Working Group to assess implementation status and provide recommendations to strengthen wildfire management programs. With their release of the 2001 Review and Update of Federal Wildland Fire Management Policy (hereafter referred to as the 2001 Update), they provided a broad philosophical and policy foundation for wildfire management in the US (USDA and USDI 2001). Though strategic direction underneath the 2001 Update has shifted over the past two decades, it remains the current federal wildland fire management policy and marks the beginning of the modern policy eras.

Modern Policy Eras

With the 2001 Update, we reach the extent of van Wagtendonk's (2007) original work, which labeled the 2000s simply as "the Years Since Cerro Grande." With over a decade since his publication, we build upon his analysis and propose two additional eras: Fire Classification (2001–2008) and Operational Flexibility (2009–Present) (Appendix A).

Fire Classification (2001 – 2008)

The 2001 Update added additional directives and modified existing ones, including statements to use best available science, develop consistent communication and education programs, and create the means to evaluate implementation progress (a full list of changes from 1995 to 2001 can be found in Appendix B). Most notably, it altered the statement on "Response to Wildland Fire" to be context-dependent and removed the formal prescription requirement. With this change, fire managers were now permitted to use natural ignitions as a management tool if the desired outcomes were in alignment with the relevant LMP and no longer needed a formal plan like a prescribed burn. The 2001 Update solidified a deferential approach to wildfire management—federal and interagency policies defer to local LMPs for how to manage wildfires. Fulfilling land management objectives using wildfire is permitted in federal and interagency policy, but LMPs dictate how, where, and why these strategies can be used and to what desired outcomes. Federal and interagency policies remain vague so they can appeal to broader contexts and garner wider support, leaving prescriptive elements to regional scopes that better understand local context (Schultz et al. 2019).

Two additional important policies were enacted in this period: the Healthy Forests Restoration Act (HFRA) of 2003 and the 2003 Interagency Strategy for the Implementation

of Federal Wildland Fire Management Policy (hereafter referred to as the 2003 Strategy). HFRA emphasized the maintenance and/or restoration of pre-fire suppression conditions to protect old-growth landscapes and improve watershed health (Schultz et al. 2019). It prioritized fuel reduction projects for communities at risk from wildfire that created Community Wildfire Protection Plans (CWPPs), which are documents that identify areas for treatment in coordination with local government, fire departments, and other interested parties (PL 108-148). HFRA and CWPPs are emblematic of the deferred administration of wildfire policy. HFRA did not define how to make a CWPP, nor what specific criteria it should meet, instead it left collaboration and prioritization up to local decision making (Jakes et al. 2011).

Though the 2001 Update set a new vision, fire managers found a lack of guidance in how to execute it (USDA and USDI 2003). The 2003 Strategy attempted to fill this need and introduced the term "wildland fire use" (WFU) as a unique category of wildfire specifically for accomplishing land management objectives, separate from prescribed fire. Fire managers were given the discretion to evaluate if WFU was appropriate based on the circumstances in which a wildfire occurred, so long as tactics and priorities were listed in the LMP (USDA and USDI 2001). Of the seven operational clarifications in the 2003 Strategy, two are especially important for WFU: 1) only one management objective can be applied to a wildland fire, either suppression or resource objectives, not both, and 2) when a fire (prescribed or not) fails to achieve resource objectives, managers will declare it a wildfire, meaning it must be suppressed and cannot return to resource objectives.

We labeled this era the Fire Classification era, because despite removing the need for formal prescriptions and creating WFU, the 2003 Strategy put wildfire decisions into

discrete, mutually exclusive states. WFU became a separate classification along with prescribed fire and wildfire, the latter of which included human ignitions and escaped prescribed or WFU events. For a naturally ignited wildfire, managers could pursue either suppression or resource objectives but not both, and could use only suppression strategies on unwanted human ignitions (USDA and USDI 2003).

Operational Flexibility (2009 – present)

Limitations to the 2003 Strategy quickly became apparent and necessitated further adjustments (USDA and USDI 2003, USDA and USDI 2009). As a result, the 2009 Guidance for Implementation of Federal Wildland Fire Management Policy (hereafter referred to as the 2009 Guidance) was created, which permitted managing wildfires for one or more objectives. This removed the 2003 Strategy's restriction, attempting to recognize the inherent complexity in wildfire management and give more operational flexibility to fire managers (see Appendix C for more details). It also removed WFU as a policy classification, instead categorizing wildland fires into prescribed fire (planned ignitions) and wildfire (unplanned ignitions) (Figure 4). Bringing WFU under the umbrella of wildfire was meant to acknowledge that wildfires can produce benefits even if the management focus is primarily on protection objectives (NWCG 2010). However, it continued to distinguish between human and natural unplanned ignitions, the former requiring suppression during initial response, the latter allowing for other strategies derived from LMPs. These changes further highlight the difficulty in making consistent terms, interagency processes, internal training, and public education (USDA and USDI 2009).

Figure 4. Fire management categories as established by current federal and interagency guidelines. *Visual adapted from Sensibaugh and Huffman (2014).*

In addition to the 2009 Guidance, two additional policies emerged in 2009: the Collaborative Forest Landscape Restoration Program (CFLRP) and the FLAME Act of 2009. The FLAME Act mandated the creation of the National Cohesive Strategy (NCS), which was completed in 2014. The CFLRP encouraged science-based, collaborative restoration to reduce wildfire management costs, including through reintroduction of wildfire (PL 111-11, Schultz et al. 2019). Meanwhile, the NCS set an interagency vision to extinguish fire when needed, use it where allowable, and in general, learn to live with fire (USDA and USDI 2014). Figure 5 shows the goals that the NCS established to pursue that vision and the challenges in doing so. The NCS used the term "managing wildfire for resource benefits" after the retirement of WFU, while research tended to use "managed wildfire" and "resource objective fire" during this time (Huffman et al. 2017, Davis et al. 2022, Iniguez et al. 2022).

The vision set by the NCS has permeated into similar strategy documents for individual agencies. For example, the Forest Service released "Toward Shared Stewardship" in 2018, which continued to emphasize collaboration and added an emphasis on

collaborating across jurisdictional boundaries to address the continued trend of increasing wildfire size, frequency, and intensity (USDA Forest Service 2018). In 2022, the Forest Service released "Confronting the Wildfire Crisis" (hereafter referred to as the 10-year Strategy) which set 10-year treatment goals for National Forest System lands and federal, state, tribal, and private lands at a rate of up to 4–5 times the pace of recent decades (USDA Forest Service 2022b). With the 2001 Update still in place as the policy under which these visions and strategies operate, land management agencies use documents such as these to show how they frame the problem, the goals to address it, and the challenges expected along the way.

In response to this fragmented array of decision support and risk assessment tools used in agencies, the Wildland Fire Decision Support System (WFDSS) was created as a standardized tool to inform and document decisions in wildfire management. WFDSS combines fire behavior simulation with assessment of critical infrastructure and natural and cultural resources at risk to assist local units in making risk-informed wildfire management strategies (Calkin et al. 2011b). WFDSS is integrated with National Incident Management System (NIMS) Incident Status Summary (ICS 209) reports, which serve as the primary means for reporting basic information on wildfires to coordination and support centers over the lifespan of the incident. The 209 informs resource allocation and helps determine incident priorities compared to other active wildfires (NIFC 2020). Because it includes the management strategy selected for the incident, researchers have used 209 reports to measure the effect of policy on how frequently fires are managed for resource benefit (Young et al. 2020, Iniguez et al. 2021).

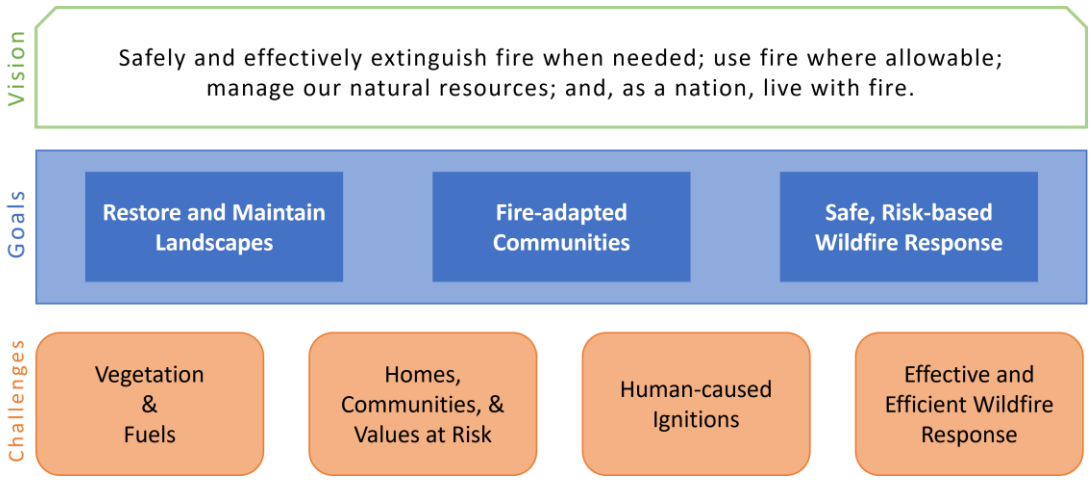

Figure 5. Vision, Goals, and Challenges adapted from the National Cohesive Wildland Fire Management Strategy of 2014 *(USDA and USDI 2014).*

To put these plans into action, it is worth noting the trends in federal funding in this era. In addition to the NCS, the FLAME Act established a fund separate from annually appropriated wildland fire suppression budgets to help pay for the costs of large (greater than 300 acres), potentially catastrophic (high threat to people and property) single fires or fire seasons that were projected to exceed annual appropriations (PL 111-88). The Consolidated Appropriations Act of 2018 created additional budget authority for fiscal year (FY) 2020–2027, allowing an additional $2.25 billion (2020) to $2.95 billion (2027) for wildfire suppression operations (PL 115-141). Colloquially referred to as the "fire funding fix," this funding provides the opportunity to use federal disaster funding to cover a portion of agency suppression costs (Clavet 2018). More recently, the Infrastructure Investment and Jobs Act (also known as the Bipartisan Infrastructure Law) of 2021 invested over $5 billion into landscapes, watersheds, and communities to help reduce the risk of catastrophic wildfire. Another $5 billion came from the Inflation Reduction Act of 2022 to improve forest conditions on national forests and grasslands and offer competitive grants to non-federal forest landowners, state programs, and private forestry (USDA Forest Service

2022, PL 117-169). The recent influx of federal funding, in conjunction with policy that allows for operational flexibility, supports actions to reduce the risk of catastrophic wildfire but does not eliminate the complexity of wildfire management, which still varies widely depending on local contexts and operational realities (Bean and Evans 2023).

The Current State of Wildfire Policy

Suggested terminology and framing

Policies around wildfire have evolved over the last century and a half, and along with policy evolution, there also has been an evolution in the terminology and framing used to talk about wildfire. Terminology and framing play an important role in how a topic is understood. Thus, it is important to use consistent terminology and framing to help facilitate understanding. To that end, we suggest, and will use for the remainder of this paper, the term "managing wildfires for objectives other than full suppression" or "managing wildfires for OTFS," which was coined by Fillmore et al. 2021. We suggest this term for the following reasons. First, "managed wildfire" is too ambiguous to capture the strategic choices available. Many have made the case that all wildfires are managed, with objectives ranging from direct attack to indirect monitoring. Second, "resource objective fire" or "managing wildfires for resource benefit" both capture the appropriate ecological considerations that come with reintroducing wildfire to fire-adapted landscapes. However, these terms do not address the rationale given for the removal of WFU from policy, which was that resource benefits can be achieved even if the management focus is primarily on protection objectives (NWCG 2010). Managing wildfires for OTFS simultaneously encapsulates tactics outside of direct-attack, full suppression operations, as well as ecological and protection-based decisions that favor indirect approaches. However, for

whatever terminology is eventually selected, the focus should be to aid communication of management strategies, not only intended outcomes (Rumelt 2011).

Variable framing of wildfire as a threat or opportunity

In wildfire management, competing definitions and priorities have persisted, without clear guidance on how to reconcile tradeoffs in utilizing wildfire (Schultz et al. 2019). Table 1 shows many of the policies discussed in the Fire Classification and Operational Flexibility eras, and whether they framed wildfire primarily as a threat, or as both a threat and an opportunity (Appendix A). At the federal and interagency level, policies like the 2001 Update framed managing wildfires for OTFS as context dependent; fire plays a natural role, and the opportunities and risks associated with the specific incident should dictate response. This competed with the 2003 Strategy's guidance, which included restrictions focused on wildfire risk, and was quickly revised (USDA and USDI 2009). The 2022 Wildfire Crisis Strategy builds upon the 2014 NCS's mission to learn to live with wildfire and build resilience into ecosystems and communities, but does not emphasize using natural ignitions to do so (USDA and USDI 2014, USDA and USDI 2022).

At the agency level, while the National Interagency Fire Center (NIFC) Red Book[2] has the same flexible language as the 2009 Guidance regarding multi-objective approaches and deference to LMPs, it defines initial attack as "an aggressive action to put out a wildfire by the time the first resources arrive, consistent with firefighter and public safety and values to be protected" (NIFC 2022). Budget justifications for the Forest Service emphasize

[2] the "Red Book," is the living document that "states, references, or supplements policy and provides direction" for the five land management agencies (BIA, NPS, Forest Service, BLM, and USFWS). It provides organizational roles and responsibilities for the agencies; the principles of planning, preparedness, and response for fire operations; further enforces WFDSS as the standard planning and support tool for all fire management agencies; and points to LMPs as the authority on fire's role in an ecosystem.

metrics like initial attack success, defined as suppressing a wildfire before it reaches 300 acres in size (USDA Forest Service 2022c). These metrics perpetuate the short-term risk bias that pushes fire managers toward suppression, which only begets larger wildfires in the long run, further intensifying agency response (North et al. 2015, Ingalsbee 2017). At the regional/local level LMPs can be bound to older, suppression-focused paradigms, making it difficult for managers to incorporate updated vision (Figure 2, Figure 3) (Steelman and McCaffrey 2011). The combination of complicated diagnoses and guiding policies, and the metrics used to measure progress toward addressing them prevent the culture shift that researchers argue is necessary to normalize the use of wildfire individually and organizationally (Fillmore et al. 2021). Without intervention, bias toward short-term risk analysis tends to dominate wildfire events, limiting opportunities for managing wildfires for OTFS (Schultz et al. 2019).

Policy level	**Frames wildfire primarily as a threat**	**Frames wildfire primarily as both a threat and an opportunity**
federal	2003 HFRA 2009 FLAME Act	2009 CFLRP 2001 Update 2012 NFMA planning rule
interagency	2003 Strategy	2009 Guidance 2014 Cohesive Strategy 2022 Red Book
Agency	2022 Confronting the Wildfire Crisis 2023 USFS Budget Justification	2018 Toward Shared Stewardship 2022 FSM
Regional/local	LMPs, depending on completion date, could be either	

Table 1. Wildfire management problem definition and framing across levels of policy since 2001. *Textual analysis grouped wildfire management policies into two categories. Policies that more often mentioned wildfire management in the context of "risk," "danger," "safety," or "crisis" were grouped in the "threat" category. This group tended to focus on fuel reduction treatments to protect people and property threatened by wildfires. Policies that also included terms like "living with fire," "resource benefits," fire as a tool to "improve forest health/conditions," or fire's "natural role," were grouped into the "threat and opportunity" category. See Appendix A for methods.*

Operational structures and social incentives

Operational structures and social incentives that guide our approach to wildfire management create further complexity. Financial barriers exist, both in the quantity of funds available and the systems that determine their allocation. Analysis of the 1995 Policy found that a lack of funds was among the causes of inconsistent implementation of its directives (USDA and USDI 2001). Despite the establishment of national accounts to help fund firefighting efforts (like the FLAME fund from the 2009 FLAME Act), agencies like the Forest Service have exhausted these funds multiple times over the past 20 years, forcing them to divert money from other departments to cover the cost, cannibalizing other priorities of the agency (Tidwell 2013). Though the Consolidated Appropriations Act of 2018 added to national suppression accounts, research suggests that the structure of such accounts can incentivize suppression bias in fire management by disconnecting local fire managers from the costs of suppression strategies, encouraging overuse of these resources (Thompson et al. 2013, Calkin et al. 2011a, Calkin et al. 2015). Thompson et al. (2013) proposed leveraging these accounts by taking end-of-year surpluses and rewarding fire management programs that successfully implement managing wildfire for OTFS strategies. Future work could investigate frameworks or processes that create positive incentives and support the managers tasked with putting them into practice.

Social barriers exist, as well, in the form of a double standard for fire managers. If they start with suppression strategies and the fire escapes control, public perception remains on their side. But if they choose other objectives and it escapes, then public perception will lay blame on them for choosing an action other than full suppression (Schultz et al. 2021, Chan and Moon 2021). It becomes an all-risk-no-reward trade-off in a

space already fraught with risk aversion. Key barriers to managing fires for OTFS are the potential political fallout and lack of public support, both relating to the "social license" a fire manager needs to manage wildfire for OTFS (Fillmore et al. 2021). If managers do not feel confident in both their ability to execute these strategies and the public's understanding of them, risk aversion will continue to push fire managers to avoid these strategies (Rapp et al. 2020). To address the disconnect between practitioners and the public, more work is needed to identify how successful coordination and collaboration manifests when managing wildfires for OTFS, how such strategies can be supported and repeated, and what the outcomes of such strategies are in terms of long-term community protection and ecological restoration.

Decision support systems like WFDSS and more recently Risk Management Assistance (RMA) can bridge gaps in planning, analysis, and communication, both internally and externally. WFDSS users found the system valuable when fires were expected to burn for longer periods of time and when strategies included both protection and resource objectives, as are often the case with wildfires managed for OTFS (Fillmore and Paveglio 2023). RMA helps evaluate available management strategies, estimate the likelihood that those strategies will be successful, and consider trade-offs multiple strategies or objectives (Calkin et al. 2021). In addition to supporting operations and incident objectives, its emphasis on pre-fire and pre-season planning allows it to validate and communicate decision rationale to partners (Beeton et al. 2022). Given that collaborative relationships and the communication they require are crucial facilitators to managing a wildfire for OTFS (Fillmore et al. 2021), these systems provide vital links between the updated wildfire management vision and its execution.

Evaluating coherent actions to carry out policy

To determine the quality of any strategy, it is important to first have some means to evaluate its progress (Rumelt 2011). A key finding of the 2001 Update was that the 1995 Policy was sound, but incomplete implementation hindered its progress. It added an explicit directive to build systematic means to evaluate the effectiveness of projects and improve accountability (USDA and USDI 2001). Recent research has attempted to evaluate policy's impact on decision-making, with 2009 marked as an inflection point (Iniguez et al. 2021, Young et al. 2020). When the 2009 Guidance replaced the 2003 Strategy, it was a clear paradigm shift, allowing for multiple management strategies on a wildfire, instead of only one (see Appendix C for more details). However, the 2009 Guidance continued to defer authority to LMPs to define wildfire's role across a given land management unit (PL 94-588, PL 94-579, USDA and USDI 2001, USDA and USDI 2009, NIFC 2022). Because many LMPs have expired (Figure 3), this can create misalignment across management levels and units, making it difficult to assess the impact of the 2009 Guidance across the western US given the variability in LMP status. The most recent planning rule for NFMA aims to support more frequent LMP amendments between full plan revisions, and some research has shown a greater ability to make planning documents more flexible and adaptable (Abrams et al. 2021, National Forest System Land Management Planning 2016; 81 FR 90723). Researchers and policymakers should instead look to regional units to evaluate the impact of changes to both the NFMA planning rule and interagency guidance on planning and operations.

Even with improved regional planning, the current use of 209s as the primary means of documenting wildfires lacks the clarity necessary to evaluate policy's impact. The 209 offers four options for management applied to a wildfire: monitoring, confine, point or

zone protection, and full suppression. Each of them fails to clearly define a coherent strategy, from providing unnecessary specificity, to lacking defined guiding policies, to using goals or outcomes in place of processes (Pietruszka 2022). The impact of this is two-fold: first, researchers use these data to evaluate impacts, and second, interagency coordination centers use them to provide incident management reports that inform the public. A lack of clarity in defined strategies and how they are reported can create inconsistencies that degrade public support for wildfire management (Pietruszka 2022). Without clear documentation, we cannot accurately evaluate results to determine if shifts in strategy are successful.

Conclusion

Wildfire policy has evolved over the past 150 years into a multi-layered system mired in complexity. What began as a militarized model steeped in Smokey Bear's singular mission to prevent wildfires, morphed into a collection of laws, agencies, coordinating groups, and regional units that have a wide array of priorities and capacities. Our policy analysis shows that progress has been made to recognize the duality of wildfire as both a destructive and beneficial force of nature. However, building a sound strategy to confront this duality still meets resistance. Though operational models of the past have changed, redirecting the cultural and institutional inertia of historical wildfire suppression has proven challenging. Performance metrics and financial appropriations for wildfire management still foster a suppression bias. Regional and jurisdictional complexities create a lagging effect of bringing policy vision to management action. Complicated terms, framing, and priorities make communicating strategies difficult. Each of these gaps must be addressed if we are to confront the wildfire crisis, as well as learn to live with fire and

reintroduce it safely to fire-adapted systems to benefit both ecosystems and communities. Managing wildfires for OTFS must be part of the approach moving forward.

Decision support systems can bridge the gaps between policy, practitioners, and the public, so long as those systems have the right data and people at the table to inform decisions. Our hope is that this paper provides a set of starting points to guide future work on the intersection of people and policy. Given the difficulty in normalizing culture to managing wildfire for OTFS, the first steps should include rebuilding broken relationships with the indigenous nations that were disparaged and marginalized, to learn lessons on living with wildfire. Future work should also investigate interpretations of policy to learn how definitions and metrics of success affect decision-making and how educational and financial structures can be better built to support fire management organizations, so the right knowledge and the right resources can help facilitate the right kind of wildfire.

Chapter 2: The Challenge of Turning Flexible Options into Feasible Operations

Introduction

In 2022, the United States Department of Agriculture Forest Service released the Wildfire Crisis Strategy (hereafter "WCS"). In the face of increasing fuel loads in forested areas subjected to historical suppression of wildfire for the last century, climatological changes like more frequent extreme droughts, and the increased severity and destruction of wildfires, it called for "a paradigm shift" in wildfire management to build resilience across landscapes (Forest Service 2022). The scale of treatments needed to address this crisis represent an order of magnitude increase from current efforts, and the WCS accordingly set targets to treat tens of millions of acres over the next ten years (North et al. 2012, North et al. 2015, Forest Service 2022). Tools used to meet these targets are mechanical, like mastication or thinning, and fire-based, including both deliberately ignited prescribed fire and naturally occurring wildfire. The latter of these has gone by many names, from "prescribed natural fire" to "wildland fire use" to simply "managed fire" (Bean and Evans 2023). We will refer to this idea as managing wildfire for objectives 'other than full suppression' (OTFS) (Fillmore et al. 2021). Managing wildfire OTFS is of particular importance to the problems identified by the WCS because it has the potential to operate at a larger scale that is infeasible for prescribed fire or mechanical treatments, and as such is likely a crucial tool for meeting restoration targets and reduce future risk to people and ecosystems (Ryan et al. 2013, Thompson et al. 2018, Kolden 2019).

Prior to European settlement, indigenous peoples shaped ecosystems in which wildfire was an important ecological process (Kimmerer and Lake 2001). Beginning in the

early 20th century, land management agencies in the United States moved to extinguish naturally-ignited wildfires as quickly as possible, a paradigm that continued for multiple decades (Pyne 1982). In the 1960s and 70s, land management agencies codified the ecological importance of fire to many ecosystems in the United States, aiming to shift away from a policy of total suppression that sought to extinguish wildfires as quickly and effectively as possible, toward a more complex and nuanced philosophy of fire management (DeBruin 1974, Leopold et al. 1963). The option to manage wildfire OTFS began conservatively, originally subjected to the same protocol and scrutiny as prescribed fire (USDA and USDI 2001, van Wagtendonk 2007). Even when that prescription requirement was lifted, such incidents were restricted to using full suppression or OTFS strategies, but not both (USDA and USDI 2003). The most recent iteration, marked by the 2009 Guidance for Implementation of Federal Wildland Fire Management Policy (hereafter "2009 Guidance") recognized that ecological benefits can occur even with suppression as the primary management strategy and allowed wildfires to be managed for multiple objectives simultaneously (USDA and USDI 2008, USDA and USDI 2009). In doing so, policy sought to bring operational flexibility to managers (Franz et al. 2023). This intended flexibility enters a decision space that is incredibly complex, with vertical and horizontal components akin to a game of three-dimensional chess (Paveglio 2021). In this paper, we examine the effect of current policy governing OTFS strategies and how individuals tasked with implementing and executing wildfire management policy interpret the increased flexibility.

Policy has moved through a number of terms through the eras of this paradigm shift (Bean and Evans 2023). Despite federal and interagency policy remaining largely unchanged since 2009, researchers, policymakers, and agency leadership have been unable

to settle on a satisfactory label of what this and other papers have referred to as managing wildfires OTFS (Fillmore et al. 2021, Franz et al. 2023). The search for a single term that adequately and accurately encapsulates the philosophy and strategy of facilitating wildfire's natural role in an ecosystem is likely futile; in wicked problems, disagreement on the nature of the problem means there likely is no one definition of the problem, nor one context in which the problem manifests. Therefore, with wildfires managed OTFS, we likely cannot craft a single label for it that would prove satisfactory to the diverse array of ecosystems and communities across the United States.

Given this varied terminology and framing, the vertical distribution of wildfire policies and organizations (Paveglio 2021, Franz et al. 2023), and the historical challenge of communication, both internal and external, for wildfire management (DeBruin 1974, USDA and USDI 2001), it stands to reason that translating policy to the decision makers tasked with executing it will not be trivial for land management agencies. A recent review (Fillmore et al. 2021) of existing literature investigated the decision factors that influence the choice to manage a wildfire OTFS. This review generated a decision framework broken out into key themes to provide a means of understanding current decision processes. Fillmore (2023) tested this framework with decision makers on active wildfires to verify the decision factors and themes and do so in a management and policy context post-release of the 2009 Guidance.

The purpose of this paper is to extend upon existing research by interviewing similar decision makers regarding their experience with managing wildfire OTFS and relevant policies. Furthermore, we address a gap in research by considering the translation of policy governing OTFS strategies into, out of, and throughout agencies. To do this we

interviewed wildfire management professionals to see how policy is interpreted, implemented, and evaluated; and how well responses fit into Fillmore's decision framework. In doing so, we hope this study provides insight for how land management agencies might turn flexible options into feasible operations.

Literature Review

Definitions of policy in academic and government institutions can vary, from simply a course of action to tackle a problem, to more explicitly defined as "a law, regulation, procedure, administrative action, incentive, or voluntary practice of governments and other institutions" (Harvard University 2023, CDC 2023). In relevant research, policy is commonly considered to be not only the laws and standards that establish problems and objectives for organizations, but the strategies, guidance, plans, funding, and metrics that land management organizations develop and use to address problems and objectives (Calkin et al. 2011, Thompson et al. 2013, Schultz et al 2019, Essen et al 2022). Table 2 provides a subset of current, relevant policies (and corresponding abbreviations, if needed) across various scales or levels of government to highlight the vertical, horizontal, and temporal layers that influence managing wildfire OTFS. Policy chains together across the vertical hierarchy of government, going from federal laws and standards, like the FLAME Act and the 2001 Update, down to LMPs written for every unit in a land management agency's jurisdiction. Policy distributes horizontally through the handbooks of interagency groups and individual agencies, as the RM, FSM, and Red Book balance interagency standards. Finally, policy distributes temporally; LMPs span multiple decades in their date of origin, with some written well before recent and significant policy shifts, and many long overdue for their mandatory revision every 15 years (BLM 2022, Forest Service 2022).

Level	Policy example	Abbreviation	Relation to managing wildfire OTFS
Federal	National Environmental Policy Act of 1969	NEPA	▪ Establishes requirements for analysis, public involvement, and considering alternatives to proposed actions for documents like LMPs (see regional/local level)
	National Forest Management Act of 1976	NFMA	▪ Mandated the development of LMPs (see regional/local level) to execute the multi-use, sustained yield missions of federal agencies
	2001 Review and Update of Federal Wildland Fire Management Policy	2001 Update	▪ Establishes a policy directive that wildland fire will be allowed to function in its ecological role ▪ Use of fire will be based on approved LMP (see regional/local)
	FLAME Act of 2009	FLAME Act	▪ Mandates the creation of a national cohesive wildland fire management strategy to align all land management agencies and their partners on vision, goals, and objectives (see 2014 NCS) ▪ Establishes the FLAME fund to support the cost of suppressing large wildfires
	2022 Infrastructure Investment and Jobs Act	2022 IIJA	▪ Appropriated $5.5 billion to reduce wildfire risk and restore healthy forests, a portion of which has been used to increase firefighter pay
Interagency	2009 Guidance for the Implementation of Federal Wildland Fire Management Policy	2009 Guidance	▪ Declares that managers may apply multiple strategies to a wildfire, allowing suppression and resource objectives to be pursued simultaneously ▪ Declares that initial action on human ignitions will be suppression
	2014 National Cohesive Strategy	2014 NCS	▪ Sets three primary national goals restore and maintain landscapes, fire-adapted communities, and safe and effective wildfire response ▪ Names managing wildfire OTFS as a tool to help restore and maintain landscapes
	National Interagency Fire Center Standards for Fire and Aviation Operations	Red Book	▪ Provides wildfire management organizational roles and responsibilities for the agencies as well as the principles of planning, preparedness, and response for fire operations
Agency	2022 Wildfire Crisis Strategy and 10-year Implementation Plan (Forest Service)	2022 WCS	▪ Refers to hazardous fuel reduction and wildfire resilience, but does not explicitly mention managing wildfire OTFS ▪ Sets a goal to treat an additional 20 million and 30 million additional acres on national forest system lands and other federal, state, Tribal, and private lands, respectively

Regional/ local	Land Management Plans	LMP	▪ Required by 2001 Update and 2009 Guidance to establish wildfire's role for locale ▪ Managing wildfire OTFS cannot happen without justification in LMP

Table 2. Examples of policies across various scales and their relationship to managing wildfire OTFS. *This subset of policies is not meant to be a comprehensive list of policies that govern wildfire managed OTFS, but rather, an informative subset to highlight the interconnectedness of policy across different scales and scopes of governance.*

With such a complex distribution of wildfire policy, the question becomes how individuals navigate it in order to implement this intended paradigm shift. Implementation of policies, more so than fundamental flaws in their philosophy, often causes policies to fail to meet their intended objectives (Pahlka 2023). Current federal policies have noted that while the foundational principles are sound, gaps exist in fully implementing them (USDA and USDI 2001). The wildfire crisis fits the "wicked problem" trope, meaning people see it as the symptom of a higher-order problem but disagree on the nature of that problem; the definition is in the mind of the beholder (Allen and Gould 1986, Carroll et al. 2007). The ongoing debate on the nature of the problem and how to address it has yielded multiple attempts to frame and reframe problems in land and wildfire management (DeBruin 1974, Vaughn and Cortner 2005). Differing priorities within or between agencies due to varied mission statements or operational purview, combined with cultural inertia of a status-quo bias towards suppression rather than OTFS strategies, makes change elusive (Calkin et al. 2015, Schultz et al 2019). As Allen and Gould (1986) argue, to address wicked problems, an adaptive, rather than one-size-fits-all approach, is necessary.

For policy to remain adaptive to the context in which it operates, it must be necessarily vague. Federal wildfire management policy encompasses ecosystems and communities across the U.S., and like any endeavor with broad contexts and constituencies, requires "goal ambiguity," whereby higher levels of policy stay broad to remain both

politically salient and locally applicable (Rainey and Jung 2015). The challenge comes from the need to keep stability and consistency in standards at higher levels of government while not becoming so rigid as to deprive local contexts of the flexibility to apply those standards appropriately, especially given the dynamic nature of ecosystems and wildfire (Craig et al. 2017). Goal ambiguity cannot (nor should not) be eliminated entirely, but if it is not translated into clear and verifiable performance metrics, it becomes difficult to both measure and report progress (Rainy and Jung 2015).

In practice, this means that wildfire management organizations must have adequate metrics and the monitoring and reporting necessary to realize policy goals. Performance measures are one means by which priorities are identified and incentivized within agencies, but remain challenging as scale and timeframe change in dynamic environments (Radin, 2006; Schultz et al., 2018). Simple metrics like acres treated and initial attack success provide utility for policymakers, but fail to capture whether risk has been reduced and progress has been made (Thompson et al. 2018, Schultz et al. 2019, Schultz et al. 2022). To adequately determine progress towards a goal or metric, robust monitoring strategies must be developed to assess landscape conditions (Wurtzebach and Schultz 2016). Because monitoring is neither standardized nor easily scalable and risk management is scale-dependent, it is difficult to connect local, place-based outcomes into broad, long-term, national-level performance measurements (Thompson et al. 2016, Schultz et al. 2019, Schultz et al. 2022). Research further suggests that restricted terminology in reporting fire management strategies may contribute to a “let it burn” narrative that erroneously blames wildfires managed OTFS as the primary source of structure loss (Pietruzska et al 2023).

The combination of goal ambiguity in wildfire management policy, the layers of policy and bureaucracy separating vision from implementation, and the challenge of measuring, monitoring, and reporting progress from local to national scales implies a significant amount of interpretation from the individual decision-maker before, during, and after an incident. Fillmore (2023) focuses on Agency Administrators (AAs), the delegated authority for wildfire preparation and response, during active wildfires being managed for multiple objectives. This leaves a gap in understanding of how wildfire professionals live in this vagueness both in the preparation that comes before and evaluation that comes after an incident. As such there is a research need for practitioner perspective on the "long-term outcomes of policies, plans, and regulations and the extent to which they achieved their goals" (Edgeley 2023). This study seeks to address these gaps via the following research questions:

1. How do managers translate policies and guidance into implementation for the planning and management of OTFS fires?
2. What barriers exist for individuals and districts to take the risk necessary to manage wildfire OTFS?

Methods

We conducted semi-structured interviews with fire management professionals across the Southwest United States in order to examine manager interactions with, and interpretations of, policy governing OTFS strategies. Semi-structured interviews combine an initial protocol of questions asked to all participants with the flexibility to ask follow-up questions to allow novel information and ideas to emerge (Patton 2002, Bryman 2016). This method elicited individual perspectives on wildfire management policies, strategies,

and metrics and enabled the research team to probe deeper into topics based on the expertise and responses of the participants.

The sample frame for interview recruitment was based on three factors. First, participants must have held a position within a federal land management agency (Forest Service, Bureau of Land Management, National Park Service, US Fish and Wildlife, Bureau of Indian Affairs), a state department of land management or forestry, or a local wildland firefighting department. These levels align with the variety of scopes at which public policy is interpreted and implemented, from federal laws (i.e., NFMA, NEPA, the FLAME act), interagency guidance (i.e., 2009 Guidance), agency-specific guidance or handbooks (i.e., Wildfire Crisis Strategy, RM), planning documents for regional land units (i.e., 4FRI, L/RMPs, FMPs), and state or local jurisdictions (i.e., CWPPs and other community-level interaction). Second, they must have one or more of the following titles or qualifications: Fire Management Officer (FMO), fire / fuels specialist, fire ecologist, agency administrator (AA), incident commander (IC), or fire staff. Multiple fire operations experts were consulted in the initial design of our study to shortlist these positions for study inclusion, which cover the managerial, operational, and ecological components of managing wildfire in roles that are likely to interface with the policies that govern it. Third, they must be primarily located in the geographic area bounded by the Southwest Region of the Forest Service, which consists of Arizona, New Mexico, and two grasslands in Oklahoma and Texas. We focused this study on Arizona and New Mexico only to simplify the alignment of federal, state, regional, and local policy. This area has both frequent fire regimes and a history of managing wildfires to achieve a resource objective with greater frequency than other

regions, making it an ideal geographic area to study the effects and interpretations of wildfire management policy (Huffman et al 2020, Young et al. 2020, Iniguez et al. 2021).

Initial purposive sampling was conducted to identify potential participants and their contact information. Individuals with AA and IC qualifications at the regional, forest or national park, and district level of federal land management agencies were found on agency websites via publicly available employee directories and on the National Interagency Fire Center (NIFC) Southwest Coordination Center website. FMOs and fuels specialists were identified via a publicly available Forest Service outreach letter that listed the permanent or acting personnel for each district within the Southwest Region. Candidates were contacted via personalized email with instructions to schedule a time for an interview via private online scheduling software. If candidates did not respond after one week, a follow-up invitation was sent. If candidates did not respond for two weeks after the follow-up, a final invitation was sent and the research team ceased attempts to contact the individual. Additional participants that met our inclusion criteria above were discovered via snowball sampling; at the end of each interview, the participant was asked to suggest other individuals they believed could bring valuable perspective to the study.

A total of 26 individuals participated in the study. Participants represented 5 organizations spanning federal, regional, state, and local levels, and held positions spanning FMO, Fuels Specialist, Fire Ecologist, District Ranger, Forest Supervisor, and Regional Fire Staff. Interviews were conducted over a five-month period from March to July 2023. Due to (1) the geographic scope of our sampling process and (2) the limited availability of fire management professionals, particularly during a time of year typically associated with the beginning of the wildfire season, a majority of interviews were done virtually via video-

conferencing software to maximize availability of both the research team and interviewees. Two interviews were conducted in person. Interviews ranged in length from 27 to 67 minutes, with an average of 48 minutes, and were recorded with the interviewee's permission. Recordings were transcribed verbatim for analysis.

Data were analyzed using Dedoose, a software platform for qualitative and mixed methods research that provides data management, excerpting, coding, and analysis tools for research teams. We used an inductive, three-stage coding process, with discussion between researchers throughout the analysis process to ensure coding alignment and inter-coder reliability. The first stage used in vivo coding, in which codes are derived from the verbatim snippets of responses to capture meanings inherent in respondents' experience (Strauss 1987, Stringer 2004, Saldaña 2013). In vivo coding was well-suited to begin our process of determining individual interpretation of wildfire policy and its interaction with the wildfire management landscape. The second stage involved consolidating the 249 unique codes generated in stage one into descriptive codes that encapsulated a more generalized topic. For example, in vivo codes such as "talking to resource specialists," "regional dialogue," and "struggle to communicate" were grouped into the descriptive code "communication," while codes like "acres treated," "fire effects," and "historic structure of forests" were grouped into "monitoring and metrics." In the second stage, researchers took the developed descriptive codes and separately coded transcripts for inter-coder reliability. Coded transcripts were compared and discussed until the research team reached alignment on how codes were used to describe participant perspectives and shared consistent interpretation of data meaning. Through this process, codes were identified to categorize topics respondents covered during interviews. The third and final stage used thematic

coding to identify consistent, higher-level themes that occurred across participants. These codes showed relationships among the descriptive codes, and how they aligned or differed between respondents (Saldaña 2016). Finally, researchers selected quotes representative of the various themes to assist in demonstrating the results of the study.

Results

Managers recognize policy emphasis on operational flexibility

Regardless of experience level, there was no consensus among participants about terminology used to describe managing natural ignitions. What they consistently acknowledged, however, was the appropriate "vagueness" or flexibility of current policy at the federal and interagency level. Many interpreted the shift brought by the 2009 Guidance – allowing managers to declare multiple objectives on an incident – as a removal of previous policy restrictions and an attempt to encapsulate the variability of fire management scenarios nationally, while maintaining dynamic local decision-making authority on incidents. One respondent described this interpretation as such:

> *You have planned ignitions and you have unplanned ignitions; prescribed fire and wildfires, that's it. The reason we did that is to try to encompass all of these different, widely variable situations across the country, and then allow [practitioners] the ability to dynamically manage their incident… you might be full suppression on the left flank and you might be allowing that fire to move on the right [flank].*

In addition to aiding the decision space of a single incident, interviewees noted that this flexibility is crucial when considering the broader landscapes where incidents occur. They frequently cited the landscape conditions, including, but not limited to: topography, accessibility (i.e., road networks through forested areas), proximity to the WUI, and wildlife habitat as factors unique to districts within the National Forest System or National Park

System that require unique management approaches. One respondent summarized the need for local flexibility on local landscapes:

> *What works here in Flagstaff is different than what will work on our neighboring district on the Mogollon Rim. It's the exact same topography, the exact same terrain. They just don't have the [San Francisco] Peaks or a city of 100,000 people built right in it. So they can probably burn more acres with less impacts to humans than we can … a one-size-fits-all policy wouldn't even work here on the Coconino.*

Many participants considered this operational flexibility in policy as allowing managers to use a diverse array of tools to meet treatment targets. Mechanical thinning, prescribed fire, and wildfire were all recognized as valuable tools, each with a different scope, precision, and cost. One manager summarized this array as such:

> *We're taking [fire], a blunt tool to work out there that's not exact. However, it's one of the fastest and cheapest ways for us to treat the landscape… The scalpel is our timber shop going out there and extracting the trees… but they can only work on so much ground every year.*

Precise tools like thinning could cater to values such as preparing timber sales or minimizing disturbance to protected wildlife habitats, while fire (both prescribed and wildfire) could more broadly reduce fuel loads and serve ecological functions for ecosystems common to the Southwest like Ponderosa Pine. Participants expressed a mixture of optimism and concern at the scale of work expected of them in current policy. Targets established by the 2022 Wildfire Crisis Strategy (and individual LMPs that have been updated since its release) were seen as an order-of-magnitude increase in expectations, attempting to reverse the suppression paradigm that previously dominated wildfire management. Participants agreed that they need the full array of tools at their disposal, but highlighted wildfire as the tool that will allow agencies to meet the challenge of scale. One participant described it in this way:

> *We'll never get to where we need to be with prescribed burning and mechanical thinning alone, the heavy lifting is going to need to be with wildfire, and that's a message that I feel like the agency is kind of unwilling to admit at this point.*

Success depends on translating flexibility into feasibility

The challenge of implementation for managing wildfires OTFS is the translation of flexibility in policy, into feasibility in practice. Responses across participants coalesced into six distinct needs to manifest this paradigm shift toward OTFS strategies: (1) clear agency leadership to build trust and buy-in, (2) Adequate planning documents and assessments to justify strategies, (3) organizational capacity to execute strategies, (4) local opportunities clashing with national priorities, (5) metrics used to incentivize taking appropriate risks and measure progress, and (6) means and mechanism of reporting for internal and external audiences.

Participants saw the current flexibility in policy as important, but acknowledged that to leverage it, they needed alignment and support throughout their organization. Regardless of position, respondents felt that explicit direction to manage wildfire OTFS was important for their (or their subordinates') own motivation to do so. Clear and explicit direction gave them the feeling that leaders "had their back" when taking appropriate risks with OTFS strategies. Forest Service employees lauded regional leadership in particular for taking the time to build dialogue from district fire staff down to district rangers and managers and give clear support in risk management associated with OTFS wildfires. On the other hand, they felt that further up the chain of command, national leadership has not helped build this sense of alignment and trust. A forest supervisor explained it in this way:

> *That alignment up to the Washington Office is very important about the level of risk we're willing to take, why we're doing what we're doing and what success looks like … I don't feel real comfortable about that alignment with the Washington Office. I feel really good about the alignment we have with*

> *Regional Office, yeah. I talked to the regional office, [and] they talked to the Washington Office, but it really does make that difference to hear them say it. [It] doesn't have to be the Director, it doesn't have to be the Chief, just to hear that leadership in the Washington office, say "this is our expectations that you will take these risks."*

Explicit direction from leadership is only the first part of the organizational alignment needed to build successful fire management programs capable of managing wildfire OTFS. Participants added that part of translating policy flexibility into operational feasibility involves disseminating guidance through the many links of policy and bureaucracy that chain together high-level vision, goals, and targets and the boots on the ground that work to achieve them. According to most participants, one of the most important links in this chain is the LMP. It establishes how the unit will be managed to achieve the goals and vision set by federal and interagency policy. More importantly, without an approved, existing LMP that calls for the use of wildfire on the landscape, OTFS strategies are not allowed. While many interviewees echoed policy, saying that positive ecological benefits can result even from wildfire that is managed for full suppression, they cannot claim such benefits as progress toward acreage metrics (more on this below). One interviewee summarized the importance of updated LMPs like this:

> *[My FMO] told me, "I can't wait till you get that [LMP] signed" and I'm like why? He says… it's the intent the plan brings and the and the discussion about natural fire being necessary to the objectives that we're going to try to achieve. We'll never get there [with] prescribed burning and the mechanical treatment alone, the acres are too much. [The LMP] talks about the amount of acres you want to treat, [it's] about 6 times what we're treating now. And so it's those numbers that. Give him the license to take those risks a little more than before*

Participants noted the wide array of values that must be considered in wildfire management as established by the LMP, from human values like grazing allotments, infrastructure, and cultural or archeological resources, to ecosystem values like watersheds

and protected habitats. As such, the LMP retains some of the goal ambiguity seen in higher levels of policy, with interdisciplinary management teams setting more concrete objectives on a per-incident basis. One participant described this process as such:

> *It starts with the forest plan… then we refine that using local resource specialists. So we have our range managers, hydrologists, biologists, archaeologists… the full suite at the table early in the incident… [to] help shape what success would look like, whether we're going full suppression on all our parts of the fire or we're looking to manage that fire as part of its role in the ecosystem. So the forest plan sets the foundation and then our local input really helps dial that into the site and the landscape.*

With justification from leadership and LMPs, the next requirement to manage wildfires OTFS is capacity. This includes both the quantity of personnel and the experience level of that personnel. Participants noted that because OTFS strategies often result in incidents that last longer and affect more acres than a full suppression effort, they require more resources. These resources also need to have the appropriate knowledge and skillset to execute these strategies; multiple participants stated that a background in fire ecology is an important component of that skillset, but is not formally incorporated into firefighter training and education. Even if it was, simply finding and hiring the personnel needed to manage wildfire OTFS is an obstacle. One interviewee explained:

> *It's lack of staff. It's not having enough people. And now and that's a real crisis for us right now. It's really getting hard to fill these basic engine positions where we need to be growing our own to come up through the organization… in general that is the hardest thing: having the people and the resources available to do it often and at a time when there's not a lot else going on in the country.*

Even if capacity exists, managers may not be able to utilize it. Participants consistently noted that, in wildfire management, capacity is a zero-sum game. As the

national Preparedness Level (PL) rose[3], participants felt less likely to manage a wildfire OTFS, because the risks associated with an incident escaping increase as there are fewer extra resources available. Furthermore, nearly all respondents stated that the biggest obstacle to capacity came when the Chief of the Forest Service released a memo that temporarily removed OTFS strategies altogether (Moore 2021). One participant summarized the most recent instance of such a memo:

> *Further escalation, like what happened in 2021, where you get to [PL] 5, and then the Chief comes out and says nobody gets to manage fires because it's just spread too thin. We have been there a handful of times and that's really frustrating for us, knowing that we could manage some fires fairly small… and keep them 1,000 acres, 1,500 acres. It wouldn't take that many resources to do that… [but] we won't even bring that opportunity to the table because we've already been told no from a much higher level.*

The local landscape conditions like weather and topography determine if OTFS strategies are even possible, and respondents noted the limited windows they have with natural ignitions, both seasonally and day-to-day. Though opportunities arise locally, resource prioritization or strategy approval can be dictated nationally, and alignment between the two is required to give the capacity to manage wildfire OTFS.

Participants stated that while strategic flexibility and operational capacity are vital to manage wildfire OTFS, the decision still comes down to the individual manager's willingness to do so. Interviewees felt the need to balance the many values that exist in the area of a potential incident, both human-centric (cultural or archeological sites, timber sales, infrastructure, WUI, etc.) and ecosystem-centric (watersheds, protected wildlife

[3] The National Multi-Agency Coordinating Group (NMAC) oversees allocation of equipment and resources, establishing priorities for active incidents (NIFC 2020). It sets the national Preparedness Level (PL), a scale from 1 to 5 (5 being the highest) that indicates the quantity and severity of wildfire incidents across the country, and the percentage of resources committed to active incidents

habitats, historical range of variability, etc.). In deferring authority to local documents like LMPs and the managers that implement them, they are entrusted to analyze the risks and rewards at play. Most participants either implied or explicitly stated that giving the "green light" to manage a wildfire OTFS comes down to the personal motivation and risk tolerance of the individual decision-maker. One described in this way:

> *we've got enough flexibility as a decision maker to manage fire in ways that you think are appropriate… the policy's giving that flexibility. So really, what's driving [OTFS] then? It's your local line officers and the fire managers. What's their personal views and opinions on the importance of fire, their willingness to accept the risk associated with having a fire get larger on the landscape? The easy button is to say I've done all I can to put this fire out.*

One challenge in appealing to individual motivation is having metrics and rewards for the risks taken by decision-makers. Participants noted both qualitative metrics and quantitative metrics used to measure success, with a mixture of the two brought into WFDSS to set the objectives for a particular incident. Qualitative metrics varied in type and clarity across participants; some talked about getting "good fire effects" or moving towards "desired future conditions" with low to medium severity wildfires, while some considered simply "getting any fire on the landscape" to be a success, given the suppression-bias of past policy and practice. Still others described a mosaic pattern on the landscape, where a wildfire "punched holes" in the landscape, replacing dog-hair thickets with lower-density canopies. Quantitative metrics sometimes included measurements of severity and fuels reduction, most often for teams that had a fire ecologist or fire effects monitor available. They also included the structures, habitats, cultural resources, infrastructure, and people (both firefighters and the public) that the wildfire threatens, and how many were successfully protected. In addition to incident-specific metrics, there are also landscape targets set at regional and national levels that track at a larger scale, geographically and

temporally. Most often, participants referred to acres treated as the common measurement used, but one that lacked means of prioritization between broad and specific goals. One explained it like this:

> *I want big acre targets… I want you to go [to the backcountry] and crank out 4000-acre prescribed burns, but at the same time, I need you to come in and do 300 acres right next to my house. So having the landscape-based targets and then having the more nuanced, what we call "value at risk"-based targets and figuring out how to increase both without sacrificing the other… how do we value those needs appropriately?*

Interviewees stated they feel recognition from their superiors when they hit treatment targets, but expressed concern in whether those targets adequately captured local priorities. Furthermore, while mechanical treatments and prescribed burns have a relatively straightforward connection into acres treated targets set at a regional or national level, it is more difficult to count the acres burned by a natural ignition. Without a prior updated LMP that explicitly calls for fire on the affected area, they may not count towards these metrics. One interviewee summarized the challenge with these incentives:

> *the [WCS] and our [LMPs] called for fire on the landscape, and the only acres that you ever claimed were areas that NEPA had been done, a burn plan had been written, and you went out and you implemented [it] So that counts, right? That's the incentive column… our managers get a pat on the back for hitting a target. Meanwhile, we have all these acres [from natural ignitions] that are meeting the same criteria that are being identified, but not really identified. That's a huge barrier, right? It's just as simple as being able to put the right acres with the right outcomes into the achievement pile and being able to claim it as an accomplishment. When we can finally do that right, that's the incentive for a large amount of fire managers to consider*

Beyond driving incentives, measurements of progress and success drive reporting to both internal and external audiences. Reports were grouped into two categories, those that are generated during an incident, and those generated after. The most referenced example of reporting during an incident is the ICS-209, which gives daily or weekly snapshots

(depending on the incident) of incident information including cost, resource needs, fire behavior and size, and management strategy. Though it is used by coordination centers to determine resource allocation, multiple participants agreed it was limited in how it communicates management strategies. One respondent put it this way:

> *You need to describe what's happening on a fire, [and] it pigeonholes you into [confine], point protection, suppression, [and] monitoring. And for good or bad, folks use that 209 as a way to determine [management strategy]. So folks have learned to turn to it… I think as long as we've got simple one-word descriptors in the 209 folks are going to continually go to that and try to classify what we've done based on that one-word descriptor.*

After an incident, one report that aims to address this is a "fire outcome report," but because they are both optional and not standardized across the region, the quantity, quality, and frequency of such reports after incidents varied. One participant tied reporting to capacity and policy (or lack thereof), saying:

> *they're not required for every incident… we're blessed here to have somebody that's really engaged and enthusiastic in that work, so we do get a lot of outcome reports generated. But, to my knowledge… I don't believe that's anywhere in policy*

As to the content and delivery of a report, many emphasized the importance of having people "seeing it with their own eyes," such as showing the state of the landscape before and after the incident. All participants described the difficulty they have in communicating the fire management paradigm shift, how it relates to management decisions, and progress made, to the general public. Most respondents believed that some form of visual information was crucial to help external audiences connect strategies to outcomes in complex incident management.

Problem solving must be multi-faceted, across scales and systems in order to have an impact

The many scales and systems involved in and affected by managing wildfires OTFS necessitates an equally multi-faceted approach to problem-solving. Interviewees offered an array of options that either could, or actively do, help translate flexibility into feasibility. These answers fell into three main pipelines: (1) data, (2) personnel, and (3) funding.

To successfully implement their programs, participants consistently mentioned being in "the right place at the right time" to take advantage of opportunities to utilize OTFS strategies. Determining the right place given the dynamic nature of landscapes where they operate, that meant having accurate and up-to-date data. Preparation, especially prior to the fire season, was necessary to take priorities and objectives in LMPs, known values and assets in the area, input from resource specialists, and populate WFDSS with information necessary to decide where wildfire can play its role, and where it should not. As one respondent put it:

> *If you wanted to throw a wrench into the whole thing, you would not have prepopulated [management objectives] … Fire doesn't care you didn't do your homework; it's going to keep burning. And that is no time to crack a [LMP] and start pulling out objectives. If you don't have your pre-planning taken care of, you're hosed.*

Participants credited the recent development and proliferation of risk management tools like WFDSS and the Risk Management Assistance (RMA) dashboard, with improving the structure and substance of pre-season and pre-incident planning. In particular, a component of the RMA called potential operational delineations (PODs) were often cited as helpful in facilitating conversations and delegating responsibility. PODs are polygons drawn onto maps of a landscape to both identify the boundaries that give the highest probability of successfully containing an incident within them and assign the strategic responses to a

potential incident agreed upon by involved stakeholders (ranging from "exclude" to "restore" depending on the ecosystem and human values). Participants pointed out benefits to both operations and communication for management, such as the alignment generated with ranchers on decisions related to range infrastructure. One unknown with PODs, as one interviewee mentioned, is who contributes to the POD-development process, as both too many inputs and too few could reduce its effectiveness.

The task of maintaining these data, especially areas designated for facilitating wildfire's natural role in the ecosystem, typically falls to the Fire Ecologist(s) or Fire Effects Monitor. Multiple participants identified these positions as responsible for planning, plotting, measuring, and reporting for their wildfire management programs. But as one was keen to mention, this work and the positions that tend to do it often are not the priority:

> *Making sure that when the plots are installed or read that that they're done right … It's easy to get bad data if you're not doing it right, and so at that point … you could question the value. So it [hasn't always been] a priority… when we talk about hiring, you know, the fire ecologist and the fire effects is generally not the first thing on our priority list … it takes a backseat to other hiring*

Hiring in general has proven difficult for land management agencies in the Southwest Region and as such many participants cited the personnel and necessary funds to support them as a major problem to solve. Part of the problem comes from the competition for labor; as one manager put it, their labor-intensive work is a tough sell in a competitive job market:

> *if you can go work the kiosk and make [15-20 bucks] an hour and not sleep in the dirt and work your *** off … That's way more attractive*

Within the organization, participants also emphasized the importance of building both capacity and parity in these skillsets across the organization. Academic and experiential knowledge were both cited as important elements of a core competency in

"fire ecology 101". Because these subjects were not a part of taskbooks and other formalized education or training for the workforce, competency is dependent on the staffing, culture, and motivation of individual units. As one FMO said:

> *I would have [our fire ecologist come out] anywhere from 2 to 6 times a year with the [my employees] and just teach … I think that there needs [something], if you want to call it a "fire ecology" academy … We have an engine academy and we have a prescribed fire academy … [but] it's a fraction of a percentage of folks that pursue [fire ecology] degrees or certificates or the like … there needs to be a real uptick in effort and money spent [to change] an internal culture.*

Experiential knowledge was often spoken of as a more geographic facet. The landscape conditions, primary ecosystem, and fire regime in the Southwest Region were considered to increase the opportunities available to teams to use manage a wildfire OTFS. As such, a few participants found their confidence and familiarity with the practice to be significantly higher than crews they met from other Forest Service regions. They also noted that areas with different fire regimes will have different parameters when considering OTFS, and thus will have different frequency and quantity of opportunities. Over all participants highlighted the need to build this organizational capacity while balancing the unique traits of land units.

The third pipeline is necessary funding to support the shifting paradigm about wildfire and OTFS strategies. Several participants mentioned the recent influxes of cash via federal policy like the 2022 IIJA. While generally appreciated, we did not observe consensus among participants as to which work these laws prioritized. Some felt that it would involve wildfire managed OTFS, while others were concerned it would be deprioritized for prescribed burns or mechanical treatments. Furthermore, the one-time nature of each is seen as a part of the cycle of feast and famine with funding land management agencies. Budgets constrict over time as funding either slows or stops, such that when funds are

rapidly appropriated, the agency is inundated and less prepared to utilize those funds effectively. As one manager articulated:

> *We're so used to being such a poor agency that [when] you just flood us with money, it doesn't help because we don't have people to even accept the money.*

Discussion

There has been a growing need to understand how wildfire professionals translate policy directives for managing wildfires OTFS into decisions and outcomes on the landscape. The ability to manage a wildfire for multiple objectives simultaneously reflects the operational complexity of wildfire, and OTFS strategies are perceived as a vital tool in meeting the increased treatment expectations placed on them by agencies and the federal government. This research found that managers embrace the shift brought by policies like the 2009 Guidance and believe they bring more flexibility for managing wildfire OTFS. Findings from this research inform and extend three key areas of wildfire social science research for the Southwest. The discussion below provides insight into the role planning plays in motivating managing wildfire OTFS, identifies current and future workforce needs related to wildfire response (Edgeley 2023), and investigates the challenge in translating flexible options into feasible operations when managing natural ignitions.

To achieve feasibility, our results indicate it is critical to focus on the scope of work that must be done before an ignition occurs to prepare to manage wildfire OTFS and afterwards to validate the decision to do so. Participants found that this preparation starts with the collaborative relationships within and between fire management organizations, non-fire agency specialists, and public stakeholders to build social and organizational support for OTFS strategies. Updated LMPs gave participants the ecological and legal

foundation to use OTFS strategies when opportunities arise and a connection to the performance measures that could incentivize their use. Consistent monitoring and subsequent reporting of wildfire's effects on reducing hazardous fuels and restoring wildfire's role in ecosystems helped participants measure and communicate progress internally and externally. The factors that influence their ability to manage a wildfire OTFS include organizational and individual capacity, clear support from leadership, and clear incentive structures to take appropriate risks. These factors corroborate multiple decision factors and overarching themes identified Fillmore and other's (2021) research, including: institutional considerations, operational considerations, and perceived risk.

Participants pointed out that their capacity to manage a wildfire OTFS relies upon significant preparation. Naturally ignited wildfire is a stochastic event, as such they stressed the importance of assessing landscape conditions and priorities well before an incident occurs. Existing research emphasizes that enabling social and institutional preparation may help facilitate OTFS strategies, given the variability of local actors and conditions (Davis et al. 2022). In policy, this preparation often comes through LMPs that lay the foundation of identifying areas where wildfire should or should not occur. Participants noted that an updated LMP with explicit justification to use OTFS strategies helps give the license to manifest this wildfire management paradigm shift and reorient practices to promote resilience (Abrams et al. 2021). Existing research has pointed out the restrictions that managers can face if their respective LMPs are not updated to reflect current best practices (Steelman and McCaffrey 2011). Given the significant number of expired LMPs written over 15 years ago (Franz et al. 2023), policymakers should focus on providing the funding and personnel necessary to update these plans.

Another means for interviewees to adequately prepare their organizations, partners, and landscapes for OTFS wildfire were decision support systems like WFDSS and RMA. Participants mentioned that prior to an incident, the use of PODs in particular was identified as a beneficial new tool to facilitate conversations with specialists and stakeholders to identify assets that require protection. Specifically, conversations with ranchers concerned with grazing lands and range infrastructure were facilitated, identifying both larger priorities for these groups and the specific assets they wished to protect. This aligns with existing research that posits the communication improvements such tools bring and the trust it can build between agencies and external audiences (Greiner et al. 2021, Calkin et al 2021). An important consideration in this outreach and preparation, however, is the population brought together for input. PODs development and value identification in WFDSS does not have the same rigor as public input for environmental analysis under NEPA, so leaders must take care in soliciting input that is representative of the locale, socially and ecologically. During an incident, this preparation was seen as an improvement for fire management operations, which DSS adoption literature supports given the complexity of longer-duration OTFS wildfires and the balance of both protection and resource objectives (Fillmore and Paveglio 2023). An important caveat that DSS literature points out, however, is that these tools tend to serve as a means of documenting decisions rather than informing them, which could limit their ability to aid the preparation necessary to manage wildfire OTFS (Noble and Paveglio 2020, Fillmore and Paveglio 2023).

Our results identify both a lack of staff and the proper training and education for those staff as obstacles to an effective wildfire response using OTFS strategies. Participants

expressed frustration at both the difficulty in finding candidates and retaining them in their organizations. Retention and turnover are two sides of the same coin, one that the Forest Service has struggled with in recent decades, leading to disruptions in the collaboration and community development necessary to affect change in wildfire planning management (Davenport et al. 2007, Brown and Nie 2019, Paveglio 2021). When new hires are brought into land management agencies, they do not receive formalized training in fire ecology the same way they receive training in suppression operations, as jobs in those fields and their skillsets were perceived as less of a priority for the organization. This is emblematic of a larger trend in land management personnel; the proportion of people in fire suppression increased significantly while all other departments decreased in recent decades, due in part to increasing suppression costs forcing wildfire management to siphon other budgets (Tidwell 2013, Calkin et al. 2015). To handle the scope of work before, during, and after OTFS wildfires, land management agencies need a larger, more balanced workforce.

To attract the talent required to balance suppression and OTFS priorities in the workforce, participants expressed the need to address the money pipeline (i.e., appropriations to fund wildfire operations, firefighter pay, etc.). The 2022 IIJA provided $5.5 billion to improve forest conditions and invest in the workforce, including an increase to firefighter pay, but participants expressed doubt about the rapid, one-time nature of this injection. The IIJA does not provide ongoing funding into the future, as such it is unclear if it will have a long-term impact on compensation and retention. Congress passed the FLAME Act of 2009 and the Consolidated Appropriations Act of 2018 with provisions that allocate funds specifically to support suppression costs in an attempt to limit the impact on non-fire expenditures. However, additional funds alone will not address the bias towards short-term

results (Steelman and Burke 2007, Collins et al. 2013), as such any effort to expand capacity must also focus on balancing long-term results in incentive structures. Our findings extend existing literature on workforce needs in wildfire response in the Southwest (Edgeley 2023), showing that the future workforce will not only require a stable increase in compensation in competitive job markets, but also formalized education in fire ecology to build a more balanced capacity for both suppression and OTFS operations. Programs such as the GS-401 Natural Resource Management and Biological Sciences series, which establish standards of coursework and fieldwork that individuals can pursue at accredited universities, already provide opportunities to develop fire, forest, and natural science professionals. Additional development, funding, and recruitment for certificates around fire ecology within those programs could help add capacity and fix the talent pipeline into fire management organizations.

Our findings indicate that individuals need both the capacity to take appropriate risks and the incentive to do so, otherwise the flexibility afforded to them by policy will be rendered infeasible. Goal ambiguity in policy must be clarified, which starts with clear leadership (Schultz et al. 2016). Guidance documents give managers the authority to facilitate wildfire's role in ecosystems while also balancing the protection of human life and values, but there are no performance measures indicating OTFS strategies are an agency priority (Schultz et al. 2022). Existing research has pointed out the lack of balance between restoration and protection objectives in wildfire management, and the lack of quality monitoring needed to evaluate those objectives (Abrams et al. 2021). Research has also argued that with the increasing complexity of land management planning rules, the capacity to understand and comprehensively update plans has been trending downwards

(Brown and Nie 2019). This research uniquely shows that competent fire ecologists can help develop the metrics, monitoring techniques, and quality reporting needed to accurately demonstrate wildfire's effectiveness in treating the landscape. Furthermore, it highlights the gap in planning capacity at the local level to reflect the modern paradigm of wildfire management. Fire ecologists and planners can translate general principles established in management planning rules to the local context, but it is unclear if they are the ideal candidates to focus efforts on planning capacity, or if that would be better suited for an independent task force that could bring planning capacity temporarily to forests that need it.

Participants expressed a desire for explicit public statements of support for OTFS strategies and direct dialogue for planning and prioritization purposes, but saw varying consistency at different levels of governance. Participants felt less confident in the Washington Office of the Forest Service, leaving some unsure about the agency's support for managing wildfire OTFS. The restrictions placed on them at times via letters from the Chief of the Forest Service (Moore 2021), were interpreted as inconsistent support of these strategies from national leadership, which research has identified as a barrier to promote paradigm shifts in land management (Abrams et al. 2021). On the other hand, the proactive involvement of regional leadership was considered instrumental in building alignment throughout the organization on their expectations to managed wildfire OTFS. In the Forest Service, interviewees that interacted with regional or national leadership found that they were able to connect larger priorities and objectives, like the expectation to take appropriate risks to reintroduce wildfire, from regional Fire Staff down through their FMO and to the hand crews that execute tactics to meet those objectives. Existing literature

suggests that this interaction is at a level in land management agencies where leadership is perceived to be effective and can generate the alignment necessary to execute a paradigm shift (Schultz et al. 2016). The Southwest Region's proactive approach to direct dialogue with forest and district personnel can serve as a model for other Regions to show how communicate and execute organizational alignment and change. Though other regions will have their own unique set of actors and landscapes, participants believe the communication and preparation has helped build trust and experience in collective decision making, which may help facilitate OTFS strategies while balancing considerations of risk (Canton-Thompson et al 2008, Calkin et al 2011, Fillmore and Paveglio 2023).

Participants made it clear that even with operational capacity and leadership support behind them, there needs to be an incentive for the individual decision maker to take on the risk of managing wildfire OTFS. While acres treated was regarded as an important quantitative measure, without clarification in the local context it loses meaning. Promoting wildfire's natural role in landscapes varies based on dynamic and site-specific social, ecological, and political conditions (Craig et al. 2017, Wilson et al. 2018, Paveglio 2021) Our results found that practitioners wanted some means of establishing priority acres based on how much treating those acres would effectively mitigate wildfire risk in the future. Furthermore, the difficulty of counting acres affected by OTFS wildfires and connecting them to agency-level performance measures presents a barrier to decision makers. The historical lack of emphasis on monitoring has left participants unable to consistently evaluate progress towards these performance measures. Recent research suggests that co-creating performance measures and monitoring capacities with collaborators and partners, along with building consistent methodologies to evaluate

positive and negative effects of wildfire, can supplement needed capacity for land management agencies (Schultz et al. 2022). A policy of performance measures without capacity to measure progress toward those measures represents a policy error, the same way aggressive suppression without means to address fuel accumulation resulting from suppression represents a policy error (Calkin et al. 2015). Future research could investigate how to connect local metrics with national goals, how to better incentivize individuals and agencies to consider managing wildfire OTFS. We recommend agencies develop performance measures closer to land unit levels (i.e., National Forests for the Forest Service or National Parks for NPS), as it is important to tailor plans, metrics, and incentives to the unique local circumstances, socially and ecologically, and those levels seem to be where transformative leadership is most effective (Schultz et al. 2016, Craig et al. 2017, Paveglio 2021).

Conclusion

Researchers and land managers alike consider OTFS strategies to be vital tools to reverse the inertia of historical suppression of wildfire, reduce hazardous fuel loads that beget catastrophic wildfire, restore the natural role wildfire plays in many ecosystems, and return frequent-fire landscapes to a more resilient state. Previous research had either used quantitative reports to measure policy impact on the use of OTFS strategies or analyzed decision factors and support systems that help facilitate their use. This research provides an examination of how wildfire management professionals in the Southwest United States translate necessarily ambiguous policy that governs managing wildfire for objectives other than full suppression (OTFS).

Ultimately, though professionals embrace the flexibility policy gives them on paper, numerous variables both in and out of their control determine whether flexible options become feasible operations. Results presented here highlight the fundamental importance of capacity, both individually and organizationally, to manage wildfire OTFS. Decision makers and practitioners must have the requisite knowledge of the landscape, planning and decision documents to support them, and incentives to take appropriate risks on the landscape. The lack of personnel with the knowledge and capability to execute OTFS strategies necessitates deliberate, long-term investment in the hiring, training, retention, and compensation of the people and organizations tasked with doing so. Due to the importance of management plans, we suggest that support for implementing policy focus on updating these resources for land units. This could take the form of either increasing capacity within local units to own their planning processes, or as a mobile and independent task force that brings such capacity to the units that need updated management plans. Doing so could lay the social and operational foundation of priorities and conditions to consider when wildfire occurs. To shift away from full suppression bias, managing wildfire OTFS needs clearer connections to the incentives structures that motivate individuals to take appropriate risks. Given the nuance of ecosystems and communities across the U.S., performance measures should be developed collaboratively for a given locale. Given the lack of consistent methods determine progress and measure success, reprioritizing monitoring and evaluation in management should remain a goal in pursuit of the wildfire paradigm shift.

Thesis Conclusion & Policy Recommendations

We offer the following recommendations for policymakers going forward to better support the management of wildfires for objectives other than full suppression:

- Remove remaining rigidity within policy categorizing wildfire that allows inconsistencies to persist in agency communication on OTFS strategies (i.e., remove stipulation that initial response to a human ignited wildfire is suppression, focus categorization on strategies used to manage wildfire rather than desired outcomes like resource benefit)
- Build cross-jurisdictional, agency-spanning dialogue similar to the Forest Service Southwest Region to foster alignment and trust in risk management support from federal leadership down to individual firefighters
- Investigate more long-term funding options in policy to create the financial incentive necessary to attract the quantity and quality of talent needed to confront the wildfire crisis over the long-term
- Increase the funds and personnel devoted to management planning and NEPA processes to begin the needed updating of hundreds of out-of-date LMPs
- Reprioritize monitoring and evaluation in wildfire management to be more balanced with suppression efforts while aligning with training in fire ecology to more clearly and wholistically tell the story of wildfire's impact on ecosystems, good, bad, and everything in between

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Appendices

Appendix A: Policy Review Methods

To conduct our review of wildfire policies governing management of natural ignitions, we began our search in two places: 1) the Department of the Interior's (DOI) Wildland Fire Policy page (https://www.doi.gov/wildlandfire/policy) and 2) Van Wagtendonk's (2007) original publication. We collected the available and cited policy documents from each source and purposively sampled those that contained material relevant to wildfire management, especially pertaining to natural ignitions. We consulted expert witnesses with fire management experience in federal agencies to determine when we had reached saturation on the critical policies.

At the time of Van Wagtendonk's (2007) work, the years following the turn of the millennium were simply labeled "Years Since Cerro Grande." Given the time that passed since its publication, we assessed policies from 2001 (the end of the Maturation era) onward to determine if additional eras had emerged. Using inductive coding, we grouped policies both temporally and by emergent themes, through which the Fire Classification and Operational Flexibility eras were identified.

Similar coding was used to group policies by how they framed wildfire, as either primarily a risk, or both a risk and an opportunity, as seen in Table 1 (Findings/Discussion). Policies that more often mentioned wildfire management in the context of "risk," "danger," "safety," or "crisis" were grouped in the "threat" category. Policies in this group tended to focus on fuel reduction treatments to protect people and property threatened by wildfires. Policies that also included terms like "living with fire," "resource benefits," fire as a tool to

“improve forest health/conditions,” or fire’s “natural role,” were grouped into the latter category "threat and opportunity” category.

Appendix B: Updates to Federal Wildland Fire Management Policy from 1995 to 2001

Below is the table provided in Appendix D of the 2001 Review and Update of Federal Wildland Fire Management Policy showing the additions, subtractions, and updates to the 1995 policy. Blank entries in the 1995 Policy column indicate an element that did not exist in 1995 that was added in 2001, while blank entries in the 2001 Policy column indicate an element that existed in 1995 and was removed in 2001.

POLICY ELEMENT	1995 POLICY	2001 POLICY
Safety	Firefighter and public safety is the first priority. All Fire Management Plans and activities must reflect this commitment.	Firefighter and public safety is the first priority. All Fire Management Plans and activities must reflect this commitment.
Ecosystem Sustainability	---	The full range of fire management activities will be used to achieve ecosystem sustainability including its interrelated ecological, economic, and social components.
Response to Wildland Fire	Fire, as a critical natural process, will be integrated into land and resource management plans and activities on a landscape scale, across agency boundaries, and will be based upon best available science. All use of fire for resource management requires a formal prescription. Management actions taken on wildland fires will be consistent with approved Fire Management Plans.	Fire, as a critical natural process, will be integrated into land and resource management plans and activities on a landscape scale, and across agency boundaries. Response to wildland fires is based on ecological, social and legal consequences of the fire. The circumstances under which a fire occurs, and the likely consequences on firefighter and public safety and welfare, natural and cultural resources, and values to be protected dictate the appropriate response to the fire.
Use of Wildland Fire	Wildland fire will be used to protect, maintain, and enhance resources and, as nearly as possible, be allowed to function in its natural ecological role.	Wildland fire will be used to protect, maintain, and enhance resources and, as nearly as possible, be allowed to function in its natural ecological role. Use of fire will be based on approved Fire Management Plans and will follow specific prescriptions contained in operational plans
Rehabilitation and Restoration	---	Rehabilitation and restoration efforts will be undertaken to protect and sustain ecosystems, public health, safety, and to help communities protect infrastructure.

Protection Policies	Protection priorities are (1) human life and (2) property and natural and cultural resources. If it becomes necessary to prioritize between property and natural and cultural resources, this is done based on relative values to be protected, commensurate with fire management costs. Once people have been committed to an incident, these resources become the highest value to be protected.	The protection of human life is the single, overriding suppression priority. Setting priorities among protecting human communities and community infrastructure, other property and improvements, and natural and cultural resources will be done based on the values to be protected, human health and safety, and the costs of protection. Once people have been committed to an incident, these human resources become the highest value to be protected.
Wildland Urban Interface	The operational role of federal agencies as a partner in the Wildland Urban Interface is wildland firefighting, hazard fuel reduction, cooperative prevention and education, and technical assistance. Structural fire protection is the responsibility of tribal, State, and local governments. Federal agencies may assist with exterior structural suppression activities under formal Fire Protection Agreements that specify the mutual responsibilities of the partners, including funding. (Some federal agencies have full structural protection authority for their facilities on lands they administer and may also enter into formal agreements to assist State and local governments with full structural protection.).	The operational role of federal and State agencies as partners in the Wildland Urban Interface are wildland firefighting, hazard fuels reduction, cooperative prevention and education, and technical assistance. Structural fire suppression is the responsibility of tribal., State, or local governments. Federal agencies may assist with exterior structural protection activities under formal Fire Protection Agreements that specify the mutual responsibilities of the partners, including funding. (Some federal agencies have full structural protection authority for their facilities on lands they administer and may also enter into formal agreements to assist State and local governments with full structural protection.)
Planning	Every area with burnable vegetation must have an approved Fire Management Plan. Fire Management Plans must be consistent with firefighter and public safety, values to be protected, and land and resource management plans and must address public health issues. Fire Management Plans must also address all potential wildland fire occurrences and include the full range of fire management actions.	Every area with burnable vegetation must have an approved Fire Management Plan. Fire Management Plans are strategic plans that define a program to manage wildland and prescribed fires based on the area's approved land management plan. Fire management plans must provide for firefighter and public safety, include fire management strategies, tactics, and alternatives; address values to be protected and public health issues; and be consistent with resource management objectives, activities of the area, and environmental laws and regulations.
Science	---	Fire management plans and programs will be based on a foundation of sound science. Research will support ongoing efforts to increase our scientific knowledge of biological, physical, and

		sociological factors. Information needed to support fire management will be developed through an integrated interagency fire science program. Scientific results must be made available to managers in a timely manner and must be used in the development of land management plans, fire management plans, and implementation plans.
Preparedness	Agencies will ensure their capability to provide safe, cost-effective fire management programs in support of land and resource management plans through appropriate planning, staffing, training, and equipment.	Agencies will ensure their capability to provide safe, cost-effective fire management programs in support of land and resource management plans through appropriate planning, staffing, training, equipment, and management oversight.
Suppression	Fires are suppressed at minimum cost, considering firefighter and public safety, benefits, and values to be protected, consistent with resource objectives.	Fires are suppressed at minimum cost, considering firefighter and public safety, benefits, and values to be protected, consistent with resource objectives.
Prevention	Agencies will work together and with other affected groups and individuals to prevent unauthorized ignition of wildland fires.	Agencies will work together and with their partners and other affected groups and individuals to prevent unauthorized ignition of wildland fires.
Standardization	Agencies will use compatible planning processes, funding mechanisms, training and qualification requirements, operational procedures, values-to-be protected methodologies, and public education programs for all fire management activities.	Agencies will use compatible planning processes, funding mechanisms, training and qualification requirements, operational procedures, values-to-be protected methodologies, and public education programs for all fire management activities
Interagency Cooperation	Fire management planning, preparedness, suppression, fire use, monitoring, and research will be conducted on an interagency basis with the involvement of all parties.	Fire management planning, preparedness, prevention, suppression, fire use, restoration and rehabilitation, monitoring, research, and education will be conducted on an interagency basis with the involvement of cooperators and partners.
Communication and Education	---	Agencies will enhance knowledge and understanding of wildland fire management policies and practices through internal and external communication and education programs. These programs will be continuously improved through the timely and effective exchange of information among all affected agencies and organizations
Agency Administrator	Employees who are trained and certified will participate in the wildland fire program as the situation demands;	Agency administrators will ensure that their employees are trained, certified and made available to participate in the

and Employee Roles	employees with operational, administrative, or other skills will support the wildland fire program as needed. Administrators are responsible and will be accountable for making employees available.	wildland fire program locally, regionally, and nationally as the situation demands. Employees with operational, administrative, or other skills will support the wildland fire program as necessary. Agency administrators are responsible and will be held accountable for making employees available.
Evaluation	---	Agencies will develop and implement a systematic method of evaluation to determine effectiveness of projects through implementation of the 2001 Federal Wildland Fire Management Policy. The evaluation will assure accountability, facilitate resolution of areas of conflict, and identify resource shortages and agency priorities.
Economic Efficiency	Fire management programs and activities will be based on economic analyses that incorporated commodity, non-commodity, and social values.	---

Appendix C: Updates in Interagency Guidance from 2003 to 2009

Below are the changes adapted from Appendix C of the 2009 Guidance for Implementation of Federal Wildland Fire Management Policy (2009 Guidance), showing the adjustments made to operational statements in the 2003 Interagency Strategy for the Implementation of Federal Wildland Fire Management Policy (2003 Strategy).

2003 STRATEGY	2009 GUIDANCE
Only one management objective will be applied to a wildland fire. Wildland fires will either be managed for resource benefits or suppressed. A wildland fire cannot be managed for both objectives concurrently. If two wildland fires converge, they will be managed as a single wildland fire.	A wildland fire may be concurrently managed for one or more objectives and objectives can change as the fire spreads across the landscape. Objectives are affected by changes in fuels, weather, topography; varying social understanding and tolerance; and involvement of other governmental jurisdictions having different missions and objectives.
Human caused wildland fires will be suppressed in every instance and will not be managed for resource benefits	Initial action on human-caused wildfire will be to suppress the fire at the lowest cost with the fewest negative consequences with respect to firefighter and public safety.
Once a wildland fire has been managed for suppression objectives, it may never be managed for resource benefit objectives.	A wildland fire may be concurrently managed for one or more objectives and objectives can change as the fire spreads across the landscape. Objectives are affected by changes in fuels, weather, topography; varying social understanding and tolerance; and involvement of other governmental jurisdictions having different missions and objectives
The Appropriate Management Response (AMR) is any specific action suitable to meet Fire Management Unit (FMU) objectives. Typically, the AMR ranges across a spectrum of tactical options (from monitoring to intensive management actions). The AMR is developed by using FMU strategies and objectives identified in the Fire Management Plan	The term Appropriate Management Response is removed from implementation guidance with "Response to Wildland Fire" as the policy area defining the actions for managing a wildland fire
The Wildland Fire Situation Analysis process is used to determine and document the suppression strategy from the full range of responses available for suppression operations. Suppression strategies are designed to meet the policy objectives of suppression.	Managers will use a decision support process to guide and document wildfire management decisions. The process will provide situational assessment, analyze hazards and risk, define implementation actions, and document decisions and rationale for those decisions.

Wildland fire use is the result of a natural event. The Land/Resource Management Plan, or the Fire Management Plan, will identify areas where the strategy of wildland fire use is suitable. The Wildland Fire Implementation Plan (WFIP) is the tool that examines the available response strategies to determine if a fire is being considered for wildland fire use.	Managers will use a decision support process to guide and document wildfire management decisions. The process will provide situational assessment, analyze hazards and risk, define implementation actions, and document decisions and rationale for those decisions.
When a prescribed fire or a fire designated for wildland fire use is no longer achieving the intended resource management objectives and contingency or mitigation actions have failed, the fire will be declared a wildfire. Once a wildfire, it cannot be returned to a prescribed fire or wildland fire use status	Managers will use a decision support process to guide and document wildfire management decisions. The process will provide situational assessment, analyze hazards and risk, define implementation actions, and document decisions and rationale for those decisions.