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REPORT

Using Focus Groups for Knowledge Sharing: Tracking Emerging Pandemic Impacts on USFS Wildland Fire Operations

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ABSTRACT

In early 2020 the US Forest Service (USFS) recognized the need to gather real-time information from its wildland fire management personnel about their challenges and adaptations during the unfolding COVID-19 pandemic. The USFS conducted 194 virtual focus groups to address these concerns, over 32 weeks from March 2020 to October 2020. This management effort provided an opportunity for an innovative practice-based research study. Here, we outline a novel methodological approach (weekly, iterative focus groups, with two-way communication between USFS staff and leadership), which culminated in a model for focus group coordination during extended crises. We also document the substantive challenges USFS wildfire employees discussed, including: conflicting policies and procedures; poor communication; ill-defined decision space; barriers to multi-jurisdictional resources; negative impacts on work-life balance; and disruption of pre-season training. USFS focus groups were effective for knowledge sharing among employees and elevating issues to top levels of the USFS management structure.

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Practice-Based Research Methods Implications

Enterprise-level and strategic-level managers may find that qualitative focus groups serve as tools for convening field employees to engage in knowledge sharing and for gathering from them valuable information about how changing policies and procedures impact employees. Ideally, focus groups may be used recursively, with communication from an organization's managers then flowing back to field employees during times

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of organizational change. This practice-based study demonstrates how the focus group method can be used both to identify key areas of uncertainty during times of organizational change, and to communicate lessons learned in everyday work environments (vertically and horizontally) across an organization.

Management Implications

- Lessons learned during the COVID-19 pandemic will continue to inform policies and procedures as land management organizations adapt to a post-pandemic world. Implementing systematic processes for communicating knowledge and adapting it into useable information during times of great uncertainty helps organizational managers to make appropriate adjustments to policies and procedures, and to improve risk management for field employees.
- Managing wildland fire and providing emergency response during the 2020 COVID-19 pandemic exacerbated preexisting challenges at both the systemic level (e.g., in procurement and training) and the individual level (e.g., stress and exhaustion) within the wildland fire system. Systemic and individual challenges do not operate in isolation; rather, they overlap and reinforce each other, often impacting employees simultaneously and chronically.
- The pandemic's long-term impact on land management organizations and their capacity to manage wildland fire is still unfolding. Better understanding the dynamics of organizational knowledge acquisition, sharing, and communication will help to capture and frame the emergent practices and lessons land managers learn as they continue to adapt to environments filled with uncertainty.

Introduction

In early 2020, wildland fire managers were already prepared for what they expected would be a challenging and drought-induced wildfire year (National Interagency Coordination Center, Predictive Services 2020). But then the COVID-19 pandemic emerged at a global scale at the same time as the 2020 wildland fire season was beginning. In the early stage of the pandemic, federal agencies and the general public alike faced substantial uncertainty about not only how the virus spread, but also what mitigation measures were needed to maintain the health of the public and of the wildland firefighting workforce (Moore et al. 2020; Wildland Fire Lessons Learned Center 2020). The US Forest Service (USFS), specifically, was considering how the uncertainty and evolving nature of the pandemic itself—and of knowledge about it—might impact wildland fire operations. As a result, the USFS Office of Innovation and Organizational Learning (IOL) began conducting weekly focus group interviews with wildland firefighters and fire managers to discover what issues or challenges were arising in the field as the wildfire season and wide-scale mitigation measures for COVID-19 unfolded in tandem. In total, IOL conducted 194 focus group meetings over the course of 32 weeks from March 2020 through October 2020.

The primary purpose of the focus groups was to provide a forum for wildland firefighters and fire managers at various levels to share organizational knowledge about

COVID-19's impact on wildland fire operations. Focus group participants shared organizational knowledge, discussed challenges firefighters encountered in the field, and engaged in collective sensemaking as they attempted to better understand how to adapt wildland fire operations to COVID-19, and how to provide higher levels of management with feedback regarding those adaptations. The secondary purpose of the focus groups was to collect qualitative data about the specific challenges the pandemic imposed on wildland fire operations during the 2020 wildfire season. This study presents a model for using focus groups as a tool for organizational knowledge sharing, and it highlights several mission critical issues the focus groups raised that helped the USFS remain adaptive and responsive to the emerging needs of the wildland fire workforce during the early stages of the pandemic.

Further, from a research perspective, the efforts of IOL through focus groups, analysis, and reporting of findings provided the opportunity for a tandem, practice-based study in which researchers analyzed not only the content gathered during the focus groups, but also the focus group process itself. First, by analyzing the content of the focus groups, we developed a clearer understanding of how wildland firefighters shouldered new responsibilities during COVID-19, and how pandemic conditions exacerbated known challenges within the USFS wildland fire organization. These challenges existed at systemic (e.g., resource procurement and employee training) and individual (e.g., exhaustion and stress) levels. Importantly, we learned that managing multiple sources of uncertainty during an extended crisis contributed to employee fatigue and burnout, as well as performance issues, and safety challenges. These important issues might not have surfaced as clearly or saliently for higher management to address had IOL not used focus groups for knowledge-sharing purposes.

Second, we were able to explore the multi-stage process of enacting, analyzing, and reporting on focus groups in order to foster organizational knowledge as an ongoing accomplishment throughout this geographically dispersed, national organization and beyond. Each of the stages offered an opportunity to better learn about and adapt to the pandemic. Many focus group projects result in a single report and analysis, but by conducting the focus groups weekly, we were able to adapt to the pandemic as it evolved and maintain an ongoing process of gaining and communicating knowledge.

Background

The World Health Organization (WHO) declared COVID-19 a global pandemic in March 2020 (Cucinotta and Vanelli 2020), prompting governments around the world to begin implementing new mandates to slow virus transmission. As the United States entered the spring and summer of the 2020 wildfire year, fire managers were receiving myriad forms of guidance regarding COVID-19 risk mitigation, while simultaneously navigating rapidly changing government protocols, implementing wildfire prevention and suppression operations, and attempting to keep employees safe. Thus, wildland fire managers faced the complexity and uncertainty of an emerging pandemic in addition to the already inherently risky mission of wildfire management. To address this added uncertainty, fire management organizations quickly sought to draft new work guidance and procedures (National Wildfire Coordinating Group 2020; Riley 2020; Rossi 2020). In the meantime, wildland fire professionals most often relied on informal

communication amongst themselves to share the most recent and relevant information from health advisors (National Wildfire Coordinating Group 2021). Despite attempts to mitigate the risks of COVID-19 outbreaks, wildland fire personnel inevitably experienced some COVID-19 illnesses and in some cases, fatalities (U.S. Fire Administration 2021, 2022; Wildland Fire Lessons Learned Center 2021b).

Critically, COVID-19 mitigation measures often obstructed wildland fire operations by conflicting with wildfire suppression strategies and/or creating new risks for field personnel. For example, adhering to the Center for Disease Control (CDC) guidance to wear masks to inhibit virus spread simultaneously introduced the potential for distorted communication (e.g., between dispatchers and pilots) and for interference with breathing and/or body-temperature regulation during physically demanding tasks (Wildland Fire Lessons Learned Center 2021a). Concerns also arose regarding restrictions on the sharing of personnel and equipment; guidelines for implementing and paying for quarantines and testing; and the possibility of firefighters spreading COVID-19 to family members (Stoof et al. 2020). Although the risks related to COVID-19 have changed in some ways since the pandemic (e.g., 81% of the population has now received at least one dose of the vaccine[1]), wildland firefighters are still learning how to balance wildfire response and COVID-19 risk mitigation efforts, and they will continue to factor different, unknown risks in the future. It is therefore important to reflect both on the processes used to share knowledge, adapt, and learn while managing this type of complexity, and on the actual work-based lessons that emerged from those processes. Toward that end, the next section discusses how organizational knowledge and communication are needed to frame the emergent practices and lessons learned.

Organizational Knowledge-Sharing Practices

The situated nature of wildfire and the emerging uncertainties of COVID-19 created a need for a problem-centered approach to emerge in real-time for managing both wildland fire operations and the pandemic. That is, the USFS faced an organization-wide need to engage in both information gathering and knowledgeable action. Rather than let each manager and leader engage in this process separately, they chose to engage in *knowledge-sharing,* a proactive strategy of communicating internally about emerging problems and their problem-solving actions. Knowledge sharing is more than simply sharing *information;* rather, it is a collective endeavor that involves applying members' domain expertise to make actionable sense out of the sets of information (e.g., individual challenges, uncertainties, and problem-solving approaches) that participants brought up in the focus groups (Heaton and Taylor 2002; Kuhn and Jackson 2008; Orlikowski 2002). In particular, focus groups were a tool for knowledge-sharing because they gave agency personnel a forum for combining information about how the pandemic was impacting wildland fire operations at local levels. From these conversations, participants were able to generate bigger-picture understandings about how the pandemic was creating challenges and uncertainties, and they applied their domain expertise to share best practices for addressing them.

While this case focuses on how a large, geographically dispersed federal agency used focus groups for knowledge sharing, it is possible that smaller organizations—perhaps with

less personnel capacity, or with more flexible vertical and horizontal communication—might also benefit from using focus groups for knowledge-sharing because they provide a dedicated forum for efficiently making sense of multiple, emerging priorities, uncertainties, problems, and solutions.

Organizational Knowledge-Sharing

In March of 2020, the USFS established multiple organizational knowledge-sharing efforts intended to connect wildland firefighters with each other and improve support to them as efficiently and effectively as possible (Christiansen 2020). One of these methods was the implementation of practice-based focus groups. Fire scientists and managers in the USFS Office of Innovation and Organizational Learning (IOL) conducted weekly focus groups with USFS wildfire personnel across the country via a virtual platform. The focus groups served two primary goals. First, they offered opportunities for wildland firefighters to communicate their emerging knowledge with others about adapting to COVID-19 mitigation policies and procedures, emerging issues, and the impact of these adaptations on them and their work. Second, IOL focus group facilitators analyzed the focus groups and delivered weekly briefings to inter-agency wildland fire personnel and USFS senior management, creating additional opportunities for understanding across the agency and interagency wildfire community. Organizational leadership gained knowledge about what was happening in the field and was able to act on that knowledge.

To summarize, in 2020 the USFS faced a dry wildfire season and the uncertainty of an emerging global pandemic, creating a need for ongoing knowledge sharing and innovative action. The organization responded by convening focus groups in each region of the country as well as weekly analysis and reporting of the focus group data. Both the process and the findings offer useful insights for management as well as practice-based research. Thus, we provide a detailed description of each stage in the process, the organizational lessons learned from the focus group reports, as well as our reflections on the implications for organizational learning and knowledge.

Focus Group Methodology

Applying the Focus Group Method

Wildland fire field personnel and managers participated in weekly focus groups for 32 weeks, with occasional weekly pauses until the completion of wildfire season, from March 23, 2020, through October 30, 2020. Focus group facilitators from the USFS IOL organized these weekly, hour-long virtual sessions with each of the nine USFS administrative regions in order to gather real-time qualitative data. Due to physical distancing guidelines and the logistics of conducting weekly focus groups across nine national administrative regions, the focus groups met via the Microsoft Teams online platform. IOL staff developed a sustainable and ongoing focus group process by implementing a detailed production schedule (Table 1). The schedule outlined roles, processes, and protocols for convening weekly focus groups, conducting analysis, and writing a consolidated weekly report. Focus group facilitators consisted of a team of

wildfire managers working in IOL who reached out to their respective networks of Forest Service wildfire personnel, deliberately seeking participants who represented wildland fire employees from each region and from a variety of occupations (e.g., aviation, dispatch, support, planning, and firefighters).

The focus group schedule included specific tasks for each day of the week, over two-week blocks of production and output. From Monday through Friday focus group facilitators organized and administered virtual focus groups while a second team of social science analysts evaluated focus group findings and searched for broader technical, financial, organizational, health, and social patterns within and across the data. The focus group facilitators and their writer/editors consisted of IOL practitioners with occupational ties to the USFS wildland fire workforce. The social science analysts included a group of professionally trained academic researchers who use diverse research methods, some of whom have wildland fire experience, and who are the authors of this practice-based article. Focus group facilitators and social science analysts were assigned a specific task for each day of the focus group schedule. Tasks ranged from

Table 1. Weekly report production schedule, March 23, 2020, through October 30, 2020.

Day	Team	Task	Purpose
Monday	Focus group facilitators & writer/editors	Facilitator status check-in and discussion	Organize personnel and discuss administrative issues
Monday and Tuesday	Focus group facilitators	Administer focus groups	Facilitators administer one focus group per region to capture information from the field
Wednesday	Focus group facilitators & writer/editors	Debrief among facilitators, note-takers, and the writer/editor	Facilitators resolve procedural issues and identify initial themes that emerge. Notetakers complete analysis and summary
Thursday	Focus group facilitators	Facilitator meeting	Develop focus group questions for the following week
Thursday	Focus group facilitators & writer/editors	Content analysis and writing	Conduct a broad analysis of the data and identify general themes for the weekly report
Friday	Focus group facilitators & writer/editors	Writing and editing	The writer/editor leads the writing for the weekly report, with assistance from the facilitators and notetakers
Following Monday and Tuesday	Social science analysts	Qualitative data analysis	Members analyze focus group data from the previous week
Following Tuesday	Writer/editors	Deliver weekly report to IOL director	Deadline for final edits, complete weekly reports
Following Wednesday	Social science analysts	Analyst team leader consolidates analysis	Consolidate and edit all individual team member analyses into one report
Following Thursday	IOL director	Present report to Risk Management Team	Deliver results to risk management team, Forest Service leaders, and focus group participants
Following Friday	Social science analysts	Analyst team meeting	Finalize weekly social science analyst reports and deliver to director of IOL

group check-ins on Monday of each week to final reporting at the end of each one- and two-week period. Each task had a specific and stepwise purpose to facilitate quick analysis of data and deliver report findings in real time to senior-level decision makers within the USFS wildland fire organization.

Focus group facilitators maintained a rigorous and consistent weekly production schedule from March through October. Each regional focus group session was scheduled for the same time each week. Facilitators sent email invitations and reminders to their respective focus group participants, lead their respective sessions, and offered impromptu contact with participants outside of scheduled meetings. A separate notetaker initiated the Microsoft Teams recording, used a template to take notes on the session, conducted initial analysis of the notes, and provided a summary to the writer/editor. To the extent possible, facilitators and notetakers remained with the same groups throughout the focus group period. New incoming facilitators spent at least one session as an observer before taking on the role of focus group facilitator.

In addition to the basic questions about how COVID-19 mitigation was being integrated to wildfire work, focus group facilitators formulated each week's questions based on new or changing information, guidance, and policies related to COVID-19 risk mitigation and wildland fire management; items posted on the Wildland Fire Lessons Learned website; emerging themes and issues from previous focus group sessions; and occasionally insights from the social science analysts. A total of 194 focus group meetings were convened, with each group varying between six to eight weekly participants. In addition, several participants joined more than once and were thus able to elaborate on the findings from prior weeks. However, focus group participation remained fluid from March through October as participants departed and returned from their two-week wildfire assignments.

The Focus Group Analysis

The aim of the focus group analysis was to understand the way wildland firefighters adapted to change and to document innovative processes they used in the field during the pandemic. Analysts met weekly to review emerging topics and to find commonalities across regional administrative areas. Focus group facilitators and social science analysts then delivered internal written reports and presentations based on weekly focus group findings to a governmental interagency group known as the Risk Management Assistance team (National Wildfire Coordinating Group n.d.) and to senior leadership in the USFS.

Additionally, analysts supported focus group facilitators by searching for patterns across multiple focus groups to identify emergent topics for further investigation, such as how employees were responding to top-down communication and mixed perceptions about how the organization was responding to the crisis. Analysts took an inductive approach to the focus group data, searching for potential patterns regarding the impact of COVID-19 and insights into how wildland fire personnel were mitigating risks. Because the IOL focus groups sought to capture rich, in-depth responses from participants, including how the participants were making sense of their own experiences, the data analysis required an inductive approach. The analysts took the following steps to maintain inductive rigor throughout the weekly focus group schedule, eventually

reaching redundancy, or saturation, in our qualitative findings by the end of the study and production of the final report:

1. Initial review of the data. Analysts familiarized themselves with the qualitative data by reading responses and meeting weekly to discuss initial perceptions of the data.
2. Identification of themes. Analysts then identified general themes from the various and complex responses that were gathered weekly and wrote internal agency reports that were delivered to the Director of USFS IOL.
3. Development of codes. Analysts developed initial codes, or more precise themes, which emerged from participant responses; these codes helped organize data at a granular level and allowed for discovery of connections across the qualitative data.
4. Discovery of relationships. Analysts then examined and collated general themes and potential relationships between themes, based on both frequency and intensity.
5. Reconciliation of codes and data. Analysts reviewed the coded data within each broad theme to ensure proper fit and, furthermore, checked broad themes for meaningful fit in the dataset.
6. Recursive framing of themes. Analysts provided both clarifying definitions of the themes, distilled from the data, and illustrative narrative descriptions of each broad theme, also pulled from the data, while keeping in mind the focus group purposes and study objectives (Braun and Clarke 2006).
7. Report of findings. Using notes, weekly reports, thematic descriptions, and exemplary data extracts, analysts produced this article, reporting six primary themes and 22 subthemes of wildfire management challenges during the initial year of the COVID-19 pandemic (See Table 2).

The primary themes and subthemes in Table 2 below are not presented in any hierarchical order; no single primary theme is of greater relevance than any other primary theme. Also, while subthemes in Table 2 are numbered, they are not numbered in order of importance but are numbered solely for readability and reference purposes. Participants expressed both challenges and concerns about work limitations due to COVID-19 but were also creative in developing innovative solutions to achieve wildland fire management objectives during the pandemic.

Overall, each phase of the process was enacted using a variety of experts with field-knowledge and/or methodological knowledge. The convening of focus groups, the analysis, and the reporting processes provided an ongoing set of opportunities at different levels to engage in knowledgeable actions to better respond to the pandemic, while simultaneously continuing to respond to wildfires. While specific to wildland fire management, the findings reveal several insights and challenges that can apply across many organizations and contexts.

Focus Group Findings

From more than 230 hours of conversation in 194 focus group meetings, we identified 22 subthemes, clustered into six primary themes. The six themes highlight meaningful challenges to wildland fire operations during the early phases of the pandemic: (1) *conflicting policies and procedures*, or tensions and contradictions between new COVID-19 mitigation guidance and established wildfire operation practices; (2) *poor*

Table 2. Fire management challenges during initial year of the COVID-19 pandemic: primary themes, subthemes, and associated definitions.

Theme/Subtheme	Definition
Theme 1: Conflicting policies and procedures	Tensions between COVID-19 mitigations and fire operations
Subtheme 1: Mask wearing	Initial guidance to wear a mask during fire operations and physical exhaustion of conducting fire operations
Subtheme 2: Physical distancing	Physical distancing requirements and typical field operations such as transportation, burning and suppression activities, evacuations, and during an incident-within-an-incident
Subtheme 3: Risk management	How to simultaneously mitigate for epidemiological and fire risks
Subtheme 4: Testing	Insufficient guidelines for testing requirements, when to get tested, and who pays for testing services before, during, and after fire operations
Theme 2: Poor communication	Mixed and inconsistent messages about COVID-19 mitigations
Subtheme 1: Too much & not enough information	Receiving information not directly relevant to fire operations and lack of relevant information on how to implement COVID-19 guidelines in wildland fire
Subtheme 2: Peer-to-peer communication	Fire managers relying on each other to receive the most applicable COVID-19 lessons learned and innovations
Subtheme 3: Sources of information	Lack of clarity about sources of information and credibility related to COVID-19
Theme 3: Ill-defined decision space	Making epidemiological decisions using minimal guidance
Subtheme 1: Who has authority	Lack of clarification over who has the authority to propose, approve, and implement COVID-19 mitigations into operations
Subtheme 2: Support for decisions	Unit-level decisions on how to implement COVID-19 mitigations were often siloed and leaders were uncertain if they would be supported by higher levels in their organization
Subtheme 3: Purchasing	Not having the authority to procure hygiene equipment and new COVID-19-related Personal Protective Equipment (PPE)
Theme 4: Barriers to sharing resources across administrative boundaries	Limitations on sharing resources across administrative boundaries
Subtheme 1: Workforce capacity	Uncertainty about sharing crews across units to manage fire during a COVID-19 outbreak
Subtheme 2: Reduction in support services	The inability to share supplies, meal services, aviation maintenance, accommodations, and transportation
Subtheme 3: Reduction in specialized services	Inability to share specialized resources such as meteorologists, aviation, air quality and remote sensing specialists
Theme 5: Negative impact on work-life balance	Overlap of work and home life
Subtheme 1: Long hours & weekends	Additional COVID-19 policies and procedures increased workload, which led to working longer hours and weekends
Subtheme 2: Working from home	Little to no separation between work life and home life
Subtheme 3: Children at home	Parents balancing virtual work with virtual schooling
Subtheme 4: Bringing COVID-19 home	Concern about becoming infected at work and bringing the virus home to their families
Subtheme 5: Mental health	Combined stress due to the overlap of work, home, and uncertainty about the virus created a significant wear upon mental health
Subtheme 6: Turning down work	Making personal financial tradeoffs between working and not working to reduce exposure to COVID-19
Theme 6: Reduction and/or cancelation of pre-season training	Reduction and cancelation of pre-season training
Subtheme 1: Cancelation of courses	Typical required and non-required pre-season courses were canceled or moved online
Subtheme 2: Pre-season community engagement	Preseason meetings and training with local communities were canceled
Subtheme 3: Prescribed burning	The cancelation of prescribed burns that serve the dual purpose of fuel management and pre-season training

communication, or mixed and inconsistent messaging about COVID-19 mitigation; (3) *ill-defined decision space*, or undetermined authority and minimal guidance for supervisors on how to make epidemiological decisions; (4) *barriers to sharing resources*

across administrative boundaries, including lack of access to and existence of resources previously shared among fire jurisdictions; (5) *negative impact on work-life balance*, or more specifically, the increasing overlap of work and home life; and (6) *reduction and/or cancelation of preseason training*, or the interruption of regular preparation and certification of wildland fire professionals. Subthemes, which further distinguish each primary theme, are identified and defined in Table 2.

Importantly, the definitions of subthemes in Table 2 identify various ways that implementing COVID-19 precautions introduced extra layers of uncertainty and risk into an already challenging wildfire year. Notably, although participants voiced most concerns about operational challenges, they also discussed creative solutions used to accomplish wildfire-related operations despite additional COVID-19 related restrictions. Additionally, while organizational plans were developed and implemented to meet the challenge of COVID-19, participants reported that they largely relied on their extensive experience assessing risk within their daily work environments to develop mitigations and attempt to stay safe.

Conflicting Policies and Procedures

When COVID-19 risk mitigation policies and procedures were first introduced, much of the initial guidance conflicted with normal wildfire operations in the field, creating tension between mitigation efforts and existing wildfire management protocols. For example, firefighters reported that mask wearing on the fire line increased physical exhaustion. Masks were also reportedly interrupting communication in the field. In addition, firefighters struggled with the requirement to maintain physical distance from one another because many standard practices depend on close contact and teamwork. One participant discussed the difficulties associated with interrupting traditional face-to-face expectations in the field: "You get into the woods, and you are just fighting fire and it is hard to break those habits" (FG April 21, 2020).

Other policies and procedures were described as ambiguous, such as how to apply the risk management decision process to virus spread or how to prepare for logistical hurdles related to testing and quarantine. Participants reported that national and regional epidemiological decision-making was being pushed down to field level managers trained in fire risk mitigation:

> We see all of those documents as "decentralized command" to let the people on the ground make the decisions based on the personalities on the ground. We have all come up with these plans at the local level, and at the regional level there are these multi-headed monsters. We are all kind of duplicating efforts without addressing the issue (FG April 20, 2020).[2]

Participants went on to describe new COVID-19 policies as unclear and ever-changing. Seemingly basic challenges such as how to quarantine upon testing positive while on a wildfire assignment persisted throughout the entire focus group data-gathering phase.

Poor Communication

Mixed and inconsistent messaging about COVID-19 mitigation created communication challenges—both vertically from senior-level managers to field-level personnel, and horizontally across different fire management organizations. Several participants

described being "flooded" with information and documents containing overlapping information about the virus. One participant described the disorganized information flow as follows:

> Trying to keep track of everything and determining what is useful to share with others is a struggle, especially with one to two new things coming out every day, with some being very specific and others not. A lot of duplication. Which one should we be following? (FG April 13, 2020).

The message processing related to COVID-19 during these early stages was even more complex, given that the USFS itself was one source of information, but individuals were also receiving messages from multiple highly credible sources (e.g., government entities, CDC, WHO, and local health officials). Rather than having that information filtered and delivered in a way they could digest and use in planning, firefighters reported being overwhelmed by the agency providing any and all information about COVID-19. In addition, information about the virus was constantly changing. It was difficult for employees to keep up with the most current measures and to know which policies were mandatory or which allowed fire managers to use discretion. As one participant put it:

> When the first conference calls started to come out, I listened to them. And then after a while, they were saying the same things over and over again. It was nothing new: "We appreciate you guys," and "Wash your hands." The mass emails and videos—the same information over and over again. The main information I am paying attention to is coming from my direct supervisors and contracting officers. The rest is just noise (FG April 20, 2022).

Thus, firefighters reported adapting by relying on information (and misinformation) from their coworkers and direct supervisors.

Ill-Defined Decision Space

Wildland firefighters described being uncertain about the amount of decision space and authority they had to implement COVID-19 risk mitigation measures, and about whether and when to implement or ignore certain measures. As one participant stated:

> We've been asked to provide initiative but later told that "no," we need to wait for direction from above. So, I really don't know where my decision space is (FG April 27, 2020).

Participants also reported receiving unclear and conflicting information on whether their organization's leadership would support them if they made a decision that resulted in an unintended outcome, such as a COVID-19 outbreak, injury, or fatality. Moreover, despite being told they had the discretion to make decisions at the field level, participants reported having less confidence in their organization's willingness to support them. Or, as one firefighter described the lack of confidence in organizational support for decision space:

> I do feel supported but ponder if it's only when the decisions have favorable outcomes. What happens when the best intended decision results in an unacceptable consequence? Not necessarily COVID related, but the stakes are higher now (FG April 14, 2020).

During early phases of the pandemic and throughout the focus group period, firefighters reported trusting leaders from the local level up to the Forest Supervisor level but remained doubtful of support from their leaders at the regional or national levels.

Barriers to Sharing Resources across Administrative Boundaries

The sharing of resources, whether personnel or equipment, is common in wildland fire operations. Multi-jurisdictional agreements typically are used to bolster firefighter capacity where resources are most needed; but during the pandemic, such arrangements were seen as potentially, albeit unintentionally, transmitting diseases among personnel between wildfire incidents (Belval et al. 2022). While different government agencies were developing and implementing their own respective COVID-19 restrictions, firefighters grew concerned with the lack of consistency and personal protective equipment (PPE) requirements, as one focus group participant related:

> There is a lack of consistency between DOI [Department of Interior] and USDA [United States Department of Agriculture]. DOI isn't going to do temperature-taking or using masks, and we are. This sends a mixed message since we do the same jobs (FG June 11, 2020).

Wildland firefighters anticipated that the inconsistent application of both minor and major mitigation practices could eventually disrupt the agency's capacity to mobilize resources around the nation and might therefore compromise its ability to manage large wildfires. When the fire outlook for 2020 predicted a difficult wildfire year, focus group participants expressed concern about not having access to logistical support services or to the specialists who support wildfire operations (National Interagency Coordination Center, Predictive Services 2020). Wildland firefighters raised specific concerns such as the availability of aviation resources, saying, "Three to six repeaters are down. Coast Guard repeaters are down. We aren't able to maintain our infrastructure due to lack of aviation assets" (FG April 21, 2020).

Firefighters were also concerned about traveling to destinations where they ran the dual risk of contracting COVID-19 from local communities and of being carriers themselves of COVID-19 to communities that lacked COVID-19 mitigation resources. One participant described this transmission risk as

> …finding that balance between making good fire business decisions and creating a risk for—being a transmission vector to—one of these communities. So, there's a balance in there somewhere, and it's not an obvious choice one way or the other, particularly for pre-position assignments (FG May 11, 2022).

Participants also explained that, rather than navigate local differences in COVID-19 mitigation approaches, some traveling crews decided to decline assignments altogether.

Negative Impact on Work-Life Balance

Wildland fire employees were required to stay at home, reporting to the office or field only during essential wildfire operations. As in so many other work situations during the pandemic, this created an uncomfortable strain between work and personal life. For many

wildland fire personnel, activities such as fire planning and preparation were completed from home, virtually. Working from home introduced technological problems, such as not having the appropriate hardware and software to work virtually or simply not having permissions to access intranet platforms and agency data. Participants also reported that requirements to implement new COVID-19 risk mitigation measures, along with extended virtual meetings throughout the day, often led to comparatively longer work hours, including working weekends to complete routine work projects or answer email. Thus, during the months of March and April prior to the summer of fire year 2020, employees were already working extended hours and reported being overwhelmed with additional work related to COVID-19 mitigation. As one participant stated early in the wildfire season, "I'm worried that the expectation is that we are rested and ready to go…but we are exhausted going into the season" (FG April 28, 2020).

As the summer wildfire season extended into autumn, large incidents occurred throughout the United States: the Pine Gulch, Cameron Peak, and East Troublesome fires were, at that time, the largest wildfires in Colorado's history (Colorado Division of Fire Prevention & Control 2023); similarly, the August Complex was the largest wildfire in California's history up to that date (California Department of Forestry and Fire Protection 2022). Firefighters reported that they and other wildland fire employees were exhausted and struggling with the lack of separation between work life and personal life:

> It's fire season so we are expected to be there and work these extra hours without any consideration for this added stress in our home life or work life (FG August 17, 2020).

These concerns emerged in a context and a profession in which mental health concerns already have a history of being overlooked. Firefighters are often trained to be "resilient" and to press on despite mental health challenges (Wooley, Powell, and Lowe 2019). The blurring of work and home life that resulted from COVID-19, and concerns about becoming infected at work and bringing the virus home to their families only increased the already significant wear on firefighter mental health.

> We accept risk, we hand off risk and we share risk constantly. It's the nature of our job. But that risk is ours…. We're asking folks to take this on but now we are going to take our family along with us…. I wouldn't take my family to go cut a tree that's on fire, but that is what we are asking folks to do (FG May 7, 2020).

Reduction and/or Cancelation of Pre-Season Training

Finally, reductions in and cancelations of pre-season training reduced employees' ability to interact with crewmembers for pre-fire planning and prescribed burning, something participants argued prevented the development of valuable crew cohesion. Cancelations in professional firefighter trainings also led to incomplete qualifications and concerns regarding expired position task books.[3] One participant explained the shortfall:

> I have had several orders come through that we could not fill, so I called to ask if they would want a trainee, I am getting, "We are not bringing on trainees." This is going to be a problem for people with task books that will expire (FG June 16, 2020).

Moreover, pre-season community engagements provide an opportunity to engage the public before wildfires begin. These moments to disseminate crucial information

about plans, strategies, and tactics for the season were canceled, and focus group participants consequently reported worrying about how this lack of communication would complicate both prescribed fire and wildland fire management down the road.

Collectively, the six primary themes offer rich insights into the experiences of the wildfire community during the pandemic. While some amplified existing challenges, others were unanticipated consequences of the complex challenges introduced by COVID-19. Each theme highlights an opportunity for learning throughout the organization.

Discussion

The focus group process described here provides a structured means for employees to collectively accomplish knowledge sharing by voicing their perspectives during periods of uncertainty and, in turn, to have their perspectives processed and shared. In this case, focus groups created connection, understanding, and learning across a complex and geographically dispersed organization. During the initial year of the COVID-19 pandemic, wildland firefighters continued to handle the physical risks of fire operations, and they did so at the same operational tempo as previous years. This impressive accomplishment should be recognized and applauded, but it should also be investigated and understood through myriad perspectives due to the likely lasting impact on a wildland fire workforce already struggling with operational uncertainty and still evolving methods of communication. Toward that end, this section highlights advantages, lessons, and limitations of using focus groups.

Advantages of Focus Groups for Organizational Knowledge Sharing

In the early spring of 2020, COVID-19 risk mitigation measures were widely and rapidly developed, implemented, and tested in land management and wildland fire organizations across the United States. The USFS IOL team conducted the focus groups as a means to learn about how firefighters integrated COVID-19 policies and procedures into their everyday work environment. The focus group process provided a means of communicating in real-time, encouraging wildland fire employees to articulate their experiences from the field via a carefully designed process with rapid turnaround reporting, supported by social science analysts.

This focus group process exemplifies a knowledge sharing practice because it involved participants collectively sharing information then applying their domain expertise to decide on actionable solutions to emerging problems (Kuhn and Jackson 2008). Moreover, participants noted that they appreciated the focus group process because it gave them a space to voice their beliefs and concerns in a safe setting among colleagues, and to share their respective lessons from the field with one another. Participants shared their experiences without a direct supervisor present and said they felt empowered to engage in meaningful conversations. The open-ended nature of in-depth focus groups allowed participants to make independent observations about how to navigate pandemic conditions in the wildland fire environment and engage in problem-solving actions (Orlikowski 2002). Focus groups also helped to contextualize complexity, which assisted managers shouldering new administrative responsibilities while simultaneously seeking to mitigate COVID-19 and wildfire risk in the field.

While focus group participants revealed several challenges and lessons learned through the fire year, they also produced a much deeper knowledge of the real-time challenges faced by firefighters during an extended crisis, and insights about the best ways to gather these experiences as they unfold. The focus group method thus met the goal of learning how firefighters were adapting to COVID-19 mitigation policies and procedures and what impact these adaptations were having on employees across the agency. Using focus groups for knowledge sharing worked well for generating bigger-picture understandings about emerging challenges, uncertainties, and best practices during the pandemic within a large, geographically dispersed federal agency. It is possible that focus groups could also be an efficient knowledge-sharing tool for other types of organizations (e.g., especially smaller organizations or those with less personnel capacity) because focus groups provide a dedicated forum for collectively making sense of multiple, emerging priorities, uncertainties, problems, and solutions. We offer the following lessons from our experience to guide future efforts.

Lessons Learned about Using Focus Groups

Of primary importance is the need to create a thorough plan for learning. In order to make the lessons learned from a particular crisis or unplanned event transferrable to other learning contexts, there must be adequate space provided for the expression, collection, analysis, and sharing of data. This plan should consider:

a. *Who should be included in the focus groups?* To encourage full participation and expression, attention should be paid to inviting a diversity of perspectives, providing flexibility in the amount of participation, and addressing whether or not supervisors should be included in these discussions. It is also important to consider the impact of using agency or organizational personnel to conduct the focus groups.
b. *How should the focus groups be conducted?* Not only is it important to create thoughtfully written questions that follow focus group best practices (e.g., open-ended, rather than closed-ended questions), but it is also important to consider the overall logistics regarding participation. Our focus groups were all virtually conducted using Microsoft Teams (for efficiency as well as safety), but we are aware of the limits of virtual communication. If equipment issues such as limited bandwidth, or off-site firewall restrictions are a problem, be ready to offer alternative modes of participation, such as emailing, texting, or even the collection of hard-copy responses from a specific drop point.
c. *How should the focus group data be analyzed?* It may be necessary to separate the task of collecting data from the task of analyzing data, as we learned in this case. The personnel who conducted the focus groups were managing a large amount of raw data, and offered some preliminary analysis or otherwise directing attention to themes that seemed to occur frequently or with great intensity. However, the social science analysts examined the specific data coming in from the different regions, compared their regional findings, and were able to detect trends; in some cases, they provided information about what to expect from one region to the next. Because the social science analysts were watching video of the focus groups and reading written reports, we were also able to provide feedback on the types of questions that seemed the most fruitful,

or other suggestions based on the success and failures of other focus groups.

d. *How will the focus group data be shared?* When planning a learning effort such as this one, it is important to have a vision of how to share the findings and with whom. The audience for the oral briefings and written reports must be a central consideration. Recognizing who needs the findings, and for what purposes, will help to package the data in such a way that it is most useful. In other words, it won't matter how good your thirty-five-page summary is if the person asking for it only has time to read five bullet points. Another consideration is how the findings will be shared with the participants themselves. This feedback loop is important to encourage lateral learning during an unfolding event, as well as confirm to the participants that their voices have been heard.

Any successful plan has to adapt based on the demands to personnel and resources for the duration of the crisis or unplanned event. For participants to experience ownership in the ideas and the process, they also need to be a part of ongoing efforts to critique the process, in real time.

Limitations of Focus Groups for Organizational Knowledge Sharing

Using focus groups as a method of discovery in a loosely coupled, nationally dispersed organization uncovered how pandemic conditions exacerbated organizational distances. In particular, COVID-19 amplified the disconnect between senior managers and field personnel, so the focus groups provided an important opportunity to contribute feedback to senior agency leaders. These insights helped leaders understand how the challenges of COVID-19 and the mitigation of its associated risks were unfolding in the field and, furthermore, how they might incorporate that knowledge into their executive direction at an enterprise level. The reports led to policy adjustments made by senior executives to respond to issues such as paying for COVID-19 testing. The reports did create better understanding for the leaders to use in their own context, but by their nature, the reports fell short of the direct, interactive communication experienced by the focus group participants.

The focus groups were designed to establish real-time, bidirectional information flow between enterprise and real-time risk management. Focus group facilitators hoped that leaders would raise questions and provide direct responses to questions from focus group participants. However, senior management were also overwhelmed with COVID-19 mitigation policies and procedures, and thus rarely offered direct questions, comments, and answers to those in the field. Although IOL provided a structure and process for a bidirectional information flow, communication from leaders did not flow as readily back to the field through the focus group process. Instead, leaders communicated with the field mainly through the national office of communication and through official agency letters providing COVID-19 and wildfire management guidance. As a result, the agency missed opportunities to directly engage with focus group participants, communicate to them that their voices mattered, and improve connection within and across the organization in general. Also, senior managers missed the opportunity to pose their own questions to the focus groups and learn from their responses. Instead, IOL assumed responsibility for developing focus group questions.

Nonetheless, while senior managers did not use the focus group process to communicate to the field, they did listen to focus group participants and used their feedback

to implement COVID-19 policies and guidance on: testing procedures, methods of payment for testing, methods of payment for quarantine of firefighters who tested positive, mask wearing, and protocols for physically distancing during wildfire operations.

The wildland fire management workforce was profoundly and diversely impacted by COVID-19 mitigation measures, as were other natural resource management professionals more generally. Land management agencies may shoulder a significant financial cost in administering continuous focus groups; in this case, the investment on return yielded valuable insight for high level decision making during a time of crisis and insight into how field-going employees could best blend wildfire operations and COVID-19 mitigation. As a result, wildland fire management organizations are now better equipped to address not only COVID-19 variant surges as they appear, but also pandemics in general. In the United States, the national Fire Management Board along with the National Wildfire Coordinating Group (NWCG) maintain the most recent COVID-19 guidance and epidemiologically based risk mitigation measures from health advisors. The NWCG website provides a substantial amount of COVID-19-related guidance on prevention and management during wildfires, hazard and prevention toolkits, checklists for mobilizing of resources, testing flowcharts, contact-tracing investigations, and incident-tracking systems (National Wildfire Coordinating Group 2021). As pandemic conditions devolve into endemic conditions, land management organizations will continue to require the most up-to-date information to maintain operational readiness.

Conclusion

In 2020, the USFS used focus groups as a method of organizational communication to learn how wildland firefighters were adapting to COVID-19 mitigation policies and procedures in real-time. This feedback mechanism was employed by a very large and geographically diverse organization to adapt to a rapidly changing situation. This practice-based study exemplifies how, during an extended period of crisis, focus group data were gathered, processed, and disseminated using a structured production reporting schedule. In addition, this study identifies the impact of COVID-19 mitigation on wildland fire employees and wildfire operations across the agency, such as conflicting policies and procedures, poor communication, ill-defined decision space, barriers to sharing resources across administrative boundaries, negative impact on work-life balance, and reduction and/or cancelation of preseason training.

Applying the focus group method for organizational communication and learning reveals the nuances of how employees in the field adapt to policies and procedures in their everyday work environment. This process can provide organizational enterprise and strategic management with important information for distributing comprehensive guidance grounded in the actual experiences of field employees.

Notes

1. https://covid.cdc.gov/covid-data-tracker/#vaccinations_vacc-people-booster-percent-pop5.
2. Quotes taken from focus groups are cited using the date the group met. While some focus group meetings met on the same day, identifying participants by date maintained participant anonymity throughout the focus group process.

3. The National Wildfire Coordinating Group (NWCG) position task books (PTBs) are a key component of the qualification process for specified NWCG positions. The PTB provides an observable, measurable, and standardized means to evaluate and document trainee proficiency (NWCG Position Task Book Catalog | NWCG).

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Disclaimer

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Data Availability Statement

The data that support this study cannot be publicly shared due to ethical or privacy reasons but may be shared with individuals upon reasonable request to the corresponding author if appropriate.

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