

The US Forest Service Life First safety initiative: exploring unnecessary exposure to risk

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ABSTRACT

In 2016, the US Forest Service initiated small-group safety discussions among members of its wildland firefighting organisation. Known as the Life First National Engagement Sessions, the discussions presented an opportunity for wildland firefighters to address systemic and cultural dysfunctions in the wildland fire system. The Life First initiative included a post-engagement survey in which more than 2600 Forest Service employees provided open-ended feedback. In that qualitative subset of results, survey respondents described four main situations in which wildland firefighters commonly accepted unnecessary exposure to risk, related to driving, mop up, aviation and communication. Findings reveal how firefighters experienced social, political and economic pressures upon and within the wildland fire system. They shared that these perceived pressures and their mission-oriented work culture interacted, transforming otherwise unremarkable work operations into situations of unnecessary exposure to risk.

Keywords: high reliability organisation, organisational culture, organisational learning, risk, safety, unnecessary exposure, US Forest Service, wildland firefighting.

Introduction

Wildland firefighting organisations are on a continual journey to improve firefighter safety (USDA Forest Service and DOI Office of Wildland Fire Coordination 2011). In the USA, this responsibility belongs in part to the US Forest Service, which houses the nation's largest wildland firefighting operation (National Interagency Coordination Center 2020). The cultural norms regarding safety in the Forest Service became deeply embedded in work practices over time, and they remain particularly powerful among its firefighters. Despite decades of effort and policies designed to keep them safer during fire suppression activities, wildland firefighters continue to suffer injuries and fatalities (Thompson 2014) – not only in tragedy fires but during the course of normal work, in everyday situations of unnecessary exposure to risk, or UE. The ubiquity of UE prompted a more expansive consideration of perspectives from the field about safety, and an effort to bring US Forest Service fire operations into greater alignment with principles followed by high reliability organisations (HROs), wherein the unexpected is common, small events make a difference, failure is a strong possibility, and lives are on the line (Weick and Sutcliffe 2007). During the spring and summer of 2016, the US Forest Service hosted an organisational learning program known as the Life First National Engagement Sessions (hereafter also referred to as Life First). The Life First small-group safety discussions invited the agency's wildland fire employees to highlight concerns regarding safety and risk management in the culture of wildland fire response (Thompson *et al.* 2018).

The Life First program is part of a long history of safety in US Forest Service fire management. Inscribed by natural and physical scientific advances in firefighter safety, the agency expanded efforts for fire science risk modelling, response and prevention strategies, and made investments in training, protective equipment, and communication technologies (Pyne 2015; Rollins *et al.* 2017). By the mid-1990s, the US Forest Service also began incorporating social science for inquiries into the social and cultural mechanisms that

shape safety practices (Putnam 1995; USDA Forest Service 1995; Flores and Haire 2021). This included using the theoretical approach of high reliability organisation (HRO) for the development of a safety culture in wildfire management (Putnam 1995; Weick and Sutcliffe 2007; Black and Baldauf McBride 2013). These applied science endeavours were part of a broader rethinking of the US multi-agency wildland fire system, in which objectives on wildfire incidents are managed for the least exposure to risk and the highest probability of success (Steelman and McCaffrey 2011; Thompson 2014; Calkin *et al.* 2015; North *et al.* 2015; Olson *et al.* 2015; Thompson *et al.* 2015; Barnett *et al.* 2016; Tidwell 2016; Dunn *et al.* 2017).

For organisations to successfully practice HRO principles, it is recommended that they adopt an informed culture that stretches horizontally and vertically through the organisation (Vaughan 1996; Weick and Sutcliffe 2007; Vogus and Sutcliffe 2012). The goal is to create a psychologically safe (Schein and Bennis 1965; Edmondson 1999) work environment in which people are treated fairly, constantly share information, and are open to learning so they can identify and act on missteps that are otherwise uncovered only in the aftermath of a crisis. The 2016 Life First National Engagement Sessions were intended as a mechanism to foster workplace psychological safety, in forums designed for employees to 'discuss differences of opinion openly rather than privately or outside the group' (Edmondson 1999, p. 353), and therefore to identify long-standing dysfunctions in the normal work operations of wildfire management.

In this study, we examined how US Forest Service wildland firefighters described unnecessary exposure to risk. The identification of UE is distinct from determining acceptable risk in wildland fire response. *Acceptable risk* is determined by risk management assessment processes. It describes the anticipated but 'minimal probability of firefighter injury or fatality' that is associated with conducting fire operations in extreme conditions (National Interagency Fire Center 2016, p. 181). Acceptable risk involves an expectation that US Forest Service employees work safely toward mission objectives while minimising exposure to the hazards inherent in, or necessary to, fire suppression (pp. 109–110). *Unnecessary exposure* to risk, however, is an informal field-based experience. Firefighters learn to identify UE in subtle cultural ways, typically by observing taken-for-granted behaviours in the daily work routines of other firefighters. UE represents extraneous margins of risk that have indirect relevance to the work at hand, and which would be considered unsafe and unacceptable by formal metrics. Instances of UE exemplify the effective, long-established values of mission-driven hard work and self-reliance in wildland firefighting cultures. Unfortunately, UE also displays the haste and competition associated with achieving short-term efficiency goals of daily work. Practically, UE refers to opportunities to engage in risky behaviour in the name of accomplishing work objectives. This has been discussed elsewhere as the implicit

risk that exists in the tension between production pressure and safety tradeoffs:

When operating under production and efficiency pressures, evidence of increased risk on safety may be missed or discounted. As a result, organizations act in ways that are riskier than they realize or want, until an accident or failure occurs (Woods 2005 p. 303).

To relax efficiency pressures for the sake of effective safety is a 'sacrifice decision' – sacrificing the organisation's momentum and instead prioritising health and safety, thereby reducing UE. The Life First program's design, down to its name, reflected this paradigm. The HRO-driven organisational learning program sought to bring learned risk exposures into focus, thereby creating the potential to account for and better understand them.

Although a decentralised organisational hierarchy prevails in the US Forest Service, Life First was an effort to flatten hierarchical constraints and to cultivate open communication (Jahn and Black 2017) and learning in the everyday operations of the wildland fire work environment. Despite the existence of the Wildland Fire Lessons Learned Center and its vast database of post-incident education, our findings described below indicate that there remains a gap in the social relations of normal work that flag potential errors, and that this gap can lead to disastrous events. Missing from the literature on HROs is an elaboration of how perceived social, political, and economic pressures, when combined with internal cultural attitudes and a mission-oriented work ethic (Desmond 2007), can influence decision-making, disrupt psychological safety, and compromise physical safety. Life First utilised close collaboration between fire managers and research social scientists to address how in wildland firefighting (1) unnecessary risks are common and (2) in what situations more tailored risk-management approaches may be needed.

Methods

In 2016, an estimated 8100 US Forest Service full-time and seasonal fire employees were required to participate in a Life First session. The day-long engagement sessions involved small-group dialogues and consisted of personnel working in diverse occupations across the wildland fire sector, from fire management officers to aviation and dispatch, and US Forest Service line officers. Participants in the sessions were asked to identify UE in the field. In doing so, employees discussed a variety of cultural, social, political, and economic pressures embedded in the normal work environment of wildland fire. Following each Life First engagement session, participants were asked to respond voluntarily to a post-engagement survey, available online from April 2016 to December 2016. To protect the anonymity of survey respondents, demographic

questions were limited to occupational specialty and to date and location of their engagement sessions.

Based on the 2601 received surveys, this article presents findings from a series of five open-ended questions that asked respondents to define what UE meant to them and to provide specific examples of situations in which they commonly observed UE in the field. This generated 7621 unique qualitative responses; they were not only voluminous but, as is typical of text-based data, provided complex and contradictory information (Ambert *et al.* 1995). We used NVivo 11 computer-assisted qualitative data analysis software (CAQDAS) to organise our coding and analysis of open-ended survey responses. Rather than assigning the data to preset codes, we allowed themes to be grounded in the data, which opened the possibility for unanticipated, emergent findings (Charmaz 2000) of more than 150 identified themes. As coding progressed, we condensed the UE themes (e.g. field, safety, leadership, etc.) into 'selective' or 'core' categories by the type of field-based operation in which UE situations were identified (Bowen 2008, p. 145). Preliminary survey results were then discussed for feedback during an on-line webinar with fire managers. We then used cognitive mapping – a technique to model relationships among ideas, beliefs, values and attitudes (Eden 1988) – in the software to make legible the overall contours of the data, resulting in four general situations of unnecessary exposure to risk: driving-related UE; mop-up-related UE; aviation-related UE; and communication-related UE.

Findings

Life First participants who provided open-ended survey responses had intelligent, subjective, and sometimes critical interpretations of unnecessary exposure. They also reported examples of UE that were routine operations that became charged with social and interpersonal expressions of dominance, political motivations, or fiscal and financial imperatives. Repeated observations or experiences of UE normalised and destigmatised UE, perpetuating certain risk behaviours where internal and external pressures on the wildland fire system are manifested in everyday decision-making processes of normal work. We summarise their feedback in the findings below.

Identifying unnecessary exposure to risk

Most Life First survey respondents expressed that elaborating a definition of UE was complicated. Meanings of UE were subject to wildland firefighters' own assessments of personal risk and were situational, dependent on the wide variety of their work environments and experiences. According to one respondent:

Unnecessary exposure is a broad term that leaves a lot of room for interpretation. The nature of fighting fire and the variety of circumstances that occur prevent further

definition of exactly what this term means. I believe it will mean different things to different leaders at different times.

Others articulated general characteristics of UE as:

whenever we as an agency engage in fire suppression for political reasons as opposed to those that support our agency mission; in situations of management buckling to the social pressure of businesses and the public; or some tasks or targets are still pushed to be completed for the fiscal year even though safety can be compromised.

Additionally, nearly 200 respondents were critical of the phrase 'unnecessary exposure to risk,' stating that 'Firefighters don't accept 'unnecessary risk.' It's insulting that FS Leadership thinks we do.' This subgroup consistently rejected the term and resisted sharing a meaningful definition of UE.

The vast majority of survey respondents, however, readily shared examples of UE, rather than a cohesive definition, and described in detail many situations of unnecessary exposure to risk they had either observed among their colleagues or experienced themselves. Therefore, our determinations of what constitutes UE came directly from the vivid examples, not abstracted meanings, shared by respondents. Although we identified the four most reported situations of unnecessary exposure to risk as discrete categories, Life First survey respondents rarely described them as isolated. Rather, UE was woven into the larger web of perceived outside pressures and internalised cultural attitudes on safety that may influence stepwise decision-making in the wildland fire system, making the actions of firefighters prone to problems of miscommunication and miscalculation at multiple levels of analysis that prioritised action first rather than life first.

The engagement sessions revealed key areas in wildland fire management where UE had become engrained into the everyday and uneventful normal work culture, where decision-making processes are difficult to capture. Our findings describe how Life First participants spoke frankly about safety in the field, and identified four prevalent situations of unnecessary exposure to risk related to: *driving* (the operation of motor vehicles in risky situations, including after working late nights, during high-tempo response, and over dangerous roads or terrain); *mop up* (undertaking redundant fire and smoke control measures for political rather than operational reasons); *aviation* (the unnecessary use of aircraft for fire suppression), and *communication of objectives* (gaps in the relay of information and difficulties with dissent). Although US Forest Service employees identified how commonly accepted UE existed in their normal, everyday work environment of wildland firefighting, they also described UE as influenced by external pressures originating outside of regular operations. That is, respondents perceived that UE was produced by decision making within a wildland fire system influenced by social, political, and economic pressures. Respondents continued, saying that pressures originated

outside the fire system then combined with their mission-oriented culture, and led to their acceptance of unnecessary exposure to risk during what became performative demonstrations of fire suppression.

Driving-related UE

Driving is common in any remote work project, and over half of Life First survey respondents cited high-mileage, high-frequency driving in extreme conditions as one of the most dangerous routine tasks they perform, whether to get to a fire or to attend regular meetings and trainings. This occurred in personal, organisational, and cultural ways and, according to respondents, unnecessary driving, especially with work-related fatigue, frequently culminated in vehicle incidents.

People [are] driving and working long days to accomplish work across the zone rather than staying overnight at the end of the day. Driving at the end of the day is the unnecessary risk exposure during long trips.

The personal desire to use their homes as a point of departure also motivated firefighters to drive 'way too early or way too late to and from a fire. It becomes such common practice in order to meet date and time needed, or to get home after a long assignment.' Decisions to drive in situations of UE were also perceived as fiscal impositions made by the organisation, such as cost-saving travel restrictions. For example, as one respondent stated:

The reoccurring theme [in my engagement session] that stood out was driving fatigued after long work shifts in the field. This hazard was recognized by multiple participants and has become more common in the face of diminishing budgets and travel caps. Budgets to provide lodging for crews involved with field campaigns have dwindled, pushing employees to accomplish mission goals with longer, more intensive work shifts that often involve extended commutes after a long day in the woods.

Survey respondents also identified that when driving during a fire assignment, there is a cultural sense of urgency based on learned processes of efficiency and effectiveness, and social pressures from local stakeholders to respond quickly, compelling firefighters to drive at higher speeds and for longer distances. Additionally, perceived pressure from local leaders for firefighters to demonstrate emergency response was also reportedly put on fire leaders, affecting how they managed fire incidents and how they moved personnel to and from assignments around the country.

Mop-up-related UE

Mopping up is the post-fire extinguishing of residual fuel, and although its primary purpose is to secure safety along the control line, it is also used to reduce smoke.

Survey participants emphasised that UE was often related to mopping up, and it occurred in the context of both the local community and the fire organisation. Survey respondents recognised the generally difficult field conditions experienced by wildland firefighters, including deployment into remote sites of unsafe terrain, with potential animal encounters, snags, smoke, extreme weather, night work, and poor visibility. These known field hazards were typically physical, but were compounded by additional social, psychological, and physiological risks introduced by operational conditions such as: security and law enforcement incidents; interaction with the public; long workdays, work overload, and fatigue; and sedentary habits, physical unfitness, or stress. However, the UE respondents recognised was related to tactical decisions, such as the unnecessary use of resources and excessive or extraneous procedures, including issues related to structure protection of private property and to tensions over fire suppression for the protection of privately owned structures versus alternative fire management strategies. These unnecessary demonstrations of fire suppression were distilled in mop up activities.

Life First respondents identified what several termed 'mopping up political smokes' as one of the most commonly accepted actions that led to UE. 'Mopping up political smokes' referenced fire control operations that were conducted to assuage the political and social influences of stakeholders and community members. As [Canton-Thompson et al. \(2008\)](#) describe, these types of mop ups are public displays of progress in fire control that contribute neither to overall fire management objectives nor to actual containment of the fire itself. They instead contain public attitudes and influences. As one survey respondent described, UE exists on a community or 'public' sphere:

We cave to public pressure and send firefighters to extinguish 'political smokes' when we know full well the fire/smoke is not going to spread.

Wildland firefighters stated that mop ups were often undertaken in areas that were unsafe to them, felt arbitrary, or were not tied to need. Noting additional examples of UE generated in the fire organisation through political pressure, respondents stated:

Political pressures cause us to take increased risk. Example: Sending resources to extinguish a fire/smoke solely because it is visible from a community but poses no threat to any values.

and

'Political smokes.' Being assigned to mop up highly visible smokes, in areas that were unsafe. Smoke was not a threat to the fireline. Main objective was to make the high dollar homeowners happy.

These perceived pressures from the local community and the fire organisation are often tied to the belief that population increase in the Wildland Urban Interface (WUI) creates external political pressure to suppress fire in order to maintain amenity services (Canton-Thompson *et al.* 2008). Respondents argued that this perceived external pressure, combined with the internal cultural predisposition to respond to public demand, often led to commonly accepted actions of mop-up-related UE.

Also contributing to mop-up-related UE were the variable mop up standards that exist in the USA among cooperating fire agencies or, conversely, the overly strict standards that were not adapted to the local fire context. Firefighters identified UE in the unrealistic mop up parameters that extended into hazardous areas, difficult terrain, or areas with no values at risk; aggressive mop up in areas of low risk for fire recurrence due to external pressures from stakeholders to reduce smoke; and mop up in conjunction with air support not well coordinated with ground crews. Internal pressures of UE also occurred when mop up was used as a resource management strategy to keep crews mobilised and extend work opportunities to firefighters. Overall, respondents described when mop up procedures proved to be unsafe and the complex ways in which internal and external pressures affected wildfire incident decision making, and ultimately UE.

Aviation-related UE

In addition to the prevalence of UE in driving unsafely and during mop up, survey respondents reported the most compelling display of suppression action resulting in UE was the misuse of aircraft, with origins from pilots and air support contractors, from political leaders, and from the local community. Aircraft can be used effectively when deployed in alignment with fire management objectives and when coordinated with ground resources. Those are typical conditions; but Life First respondents stated that they often witnessed UE when aircraft were misused or overused, without appropriate ground support, over 'countless hours of aircraft flight time in order to apply water/retardant when it is clearly not being effective.' Examples of aviation-related UE included: operational decisions internal to the agency to use aircraft to expedite ground crew transport; overreliance on aviation by leadership for purposes of full suppression despite lack of tactical advantage; the interruption and endangerment of ground crew operations by aviators or the mis-coordination of simultaneous ground and aviation operations; the transfer of risk from ground crews to air crews, but also from air crews to ground crews; heli-mopping; and flying in bad weather, with low visibility, or in aging aircraft. Survey respondents also recognised UE when the use of aircraft was influenced by external pressures, such as political officials who wished to demonstrate that the Forest Service and its partners were actively suppressing fire. As one respondent

pointed out, the entanglement of aircraft operations and political motives was ultimately ineffective:

I have seen a line officer engage with a governor about actions on a fire by the IMT [Incident Management Team], demanding that retardant be dropped on a crew put into a certain area. The line officer explained the team's reasoning, which was [that in] steep and dangerous terrain, [there was] unlikelihood of retardant helping or even penetrating the canopy and many other reasons. But the governor insisted and threatened action (phone calls). The line officer finally agreed to send in a hotshot crew and drop some retardant. It did no good.

The use of aircraft to drop retardant is perhaps the most dramatic demonstration of action on a fire for external constituents. Aircraft are easily seen by local community members and their elected officials, and the media readily captures video of aircraft dropping fire retardant. Survey respondents relayed that because ground forces were often used in conjunction with aircraft, external pressure from the media to deploy aircraft then impacted internal decisions on how ground resources were used. As stated by one Life First respondent:

Observed 20-person hand crew ordered to hike a half-mile into a fire that had been mopped up for three days in order to be present for a helicopter recon with members of the media on board the ship. Their task was completed, fire checked, no visible smoke was present, and they were told to stir up smoke if they could for the media to see.

Communication-related UE

Life First survey respondents explained that cultural issues internal to the agency and external social, political, and media influences strongly influenced decision-making in fire management, often resulting in firefighters taking unnecessary risks in driving, mopping up, and aviation use. Those three observable physical instances of UE, however, were often accompanied by less obvious, internalised cultural and symbolic instances of unnecessary exposure to risk through interpersonal communication, specifically in the miscommunication of fire management objectives by administrators and in firefighters' difficulties expressing dissent.

Wildfires often travel across land management boundaries, through multiple national, state, county, and city jurisdictions. Communication of objectives must be aligned both vertically and horizontally across the wildland fire system in interagency fires, despite each government entity's unique organisational culture, communication style, or management goals. This is complicated by the fact that fire management objectives within an agency and across multiple agencies in the USA often change, and change quickly, during incidents.

Reasons for those shifts are not always well communicated to fire crews – nor are the distinctions regarding priority of fire suppression or non-suppression always conveyed. Life First survey respondents described in detail the necessity of knowing why objectives were important and for whom they were important. The incident command system (ICS), developed in the 1970s to overcome these interagency communication and management challenges, was the organisational model for subsequent national emergency management in the USA. According to Life First survey respondents, however, communication often remained a critical obstacle and created instances of UE, in operational and cultural ways.

Although communication-related UE sometimes began with decisions made prior to firefighters arriving at an incident, it became even more impactful on site because firefighters had to prioritise which agency's operational objectives would lead the fire management response.

New fire inside city boundary with low capacity fire department—we rushed in with mixed objectives, uncertain who was in command, poor communication with all personnel.

Occasionally, different functional areas *within* a US Forest Service unit did not receive the most recent fire management objectives.

Information about accidents that happened on the forest sometimes does not get shared across functional boundaries. Even if it doesn't seem relevant to someone else, the communication would help to control misinformation.

Life First respondents offered additional examples of communication-related UE that had operational implications, such as communication failures in decision support, research, emergency notification, incident resolution, and dispatch. There were also systemic issues, first in the authority structure that distances administrative officers and field crews (Schultz *et al.* 2019), and secondly, in the lack of explanation of rationale within the US Forest Service and across other agencies (Jahn and Black 2017). Culturally based issues included a reluctance among employees to communicate, disagree, intervene, or question authority figures or fellow firefighters for fear of reprisal or retaliation; and on the part of the agency, poorly defined standards regarding safety, structure protection, values at risk, and overall US Forest Service goals.

Gaps in operational communication and employees' cultural difficulty with dissent can lead to decisions that deploy firefighters into areas of unanticipated risk. Although such decisions may appear to occur within the local community, communication challenges that begin prior to arriving at an incident, along with mixed objectives upon arrival, highlight challenges of communication-related UE in the larger wildland firefighting system.

Micro-case study and discussion

As one Life First survey respondent explained, firefighters 'often choose the best worst idea' when negotiating ordinary UE, especially when more convoluted incidents in the wildland fire system erupt. The same respondent provided a cluster of UE he experienced during a common assignment to protect a structure on a large fire. Despite having some inexperienced crew members, his crew was asked to hike 3 h downhill to prepare a structure with fire-resistant wrap. They cleared brush and made defensible space around the structure, but because of concerns that the fire was advancing toward their position, they had a 5-h 'hurry-up' hike uphill back to the road, with a 2000–3000-foot (600–900 m) elevation gain. The next day, they were asked to hike back to the structure with additional materials and 48 h of food and water, while the fire grew closer. Using the 'how to properly refuse risk' protocol described in the Incident Response Pocket Guide, the crew boss turned down the assignment, because the crew was already fatigued and would hike even more slowly with all the extra gear. He suggested that if a risk-mitigation strategy of slinging the gear in aerially could be implemented, he would accept the assignment. The incident commander initially argued against this approach but ultimately decided to sling the gear in; however, the helicopter pilot assigned to the task was given the wrong coordinates. After getting the logistics correct and arriving at the helispot, the pilot experienced a rotor strike that required an emergency release of the load. The crew had to make their way through difficult brush to recover the gear and complete their assignment.

The above scenario illustrates that the working environments of wildland firefighters are hazardous by default and are therefore unremarkable: no injuries were incurred, the load drop did not culminate in tragedy, and no emergency 'incident within an incident' triggered an agency review or captured corrective attention. But in the above account and through similar shares by other survey respondents, firefighters reported that cultural perspectives regarding mission, which influence personnel decisions about operations and safety and contribute to estimations of human resource capacity and accountability, exist within conditions such as staffing deficits, budgetary constraints and occasional fiscal excesses – all of which contributed to UE. The structure protection assignment also highlights that multiple decisions are influenced by the internal and external entanglements of systemic UE. As Canton-Thompson *et al.* (2008) argue, external social-political pressures outside the wildland fire system often affect incident management team (IMT) decision making. Because these decisions are often interpretive on the part of managers and opaque to crews on the ground, they can contribute to the undoing of HRO precepts. Thus, unnecessary exposure to risk is embedded in the authority mechanisms of wildland firefighting. Risk assessment and situational awareness are necessary,

continuous baselines of typical operations in the field (Thompson *et al.* 2018), but social and cultural wherewithal is also crucial during interpersonal confrontation and difficulties with dissent. Mid-level managers and incident teams have been unenviably positioned to absorb perceived political pressure from the public, from their own administrators, and through interagency commitments, often leading to ambiguity in fire management goals (Schultz *et al.* 2019). At the same time, economic pressure has varied in form (Canton-Thompson *et al.* 2008), including personal financial incentivisation of risk taking through opportunities like overtime pay, where mid-level managers are influenced to keep firefighters available for the financial security of their employees, and to accept the conditions of their assignments to absorb external pressures on the organisation.

The challenges faced by wildland firefighting included normalised unnecessary exposure to risk, in which employees demonstrated robust, dramatic, and sometimes ill-conceived suppression actions in their normal work operations. The everyday desensitisation to unnecessary risk further led some employees to resign themselves to the extreme risk of injury and fatality. One survey respondent described the 2016 work environment as

extremely dangerous, hazardous, etc. We can and do everything and continue to do everything including discussions such as this, however the reality is folks will perish.

This internal mission-oriented attitude of can-do-everything, when combined with perceived external social, political, and economic pressures, can corrode risk assessment and supersede safety practices in an HRO. But the cultural predisposition for action and risk acceptance also paves a decision-making path toward full fire suppression (Desmond 2007). Life First survey respondents perceived their leadership as biased toward suppression and as exhibiting maximum action during normal fire operations in response to pressures outside of the wildland fire system. Wildland firefighters did *not* describe leaders as diverging from hierarchical decision-making processes, deferring to expertise on the ground, nor generating the HRO stance of a collective mindfulness toward reliable safety. Instead, their responses indicate mechanisms by which suppression remains entrenched as the standard wildland firefighting strategy (Schultz *et al.* 2019), despite its comparatively intensified risk (Thompson *et al.* 2016), increased costs (Hoover 2020), and higher potential for injury and fatality.

The US Forest Service produced the Life First initiative as an HRO-inspired learning initiative to encourage psychological safety and to invigorate systemic and cultural changes in normal work. In theory, Life First was an effort to bring the agency's wildland fire operations into greater alignment with HRO principles. In practice, firefighters revealed an important amalgam of risk not identified in previous studies

of HROs (Rochlin *et al.* 1987; Marcus 1995; Berwick 2013) – namely unnecessary risk, in which perceived pressures upon wildland firefighting operations and internalised cultural attitudes about work can create conditions of risk accepted and minimised by employees in their normal work operations.

Limitations

The primary limitation of this study is that the Life First engagement sessions and post-engagement survey were originally designed as feedback mechanisms from wildland firefighters to US Forest Service senior leaders, not for basic research. We were not the original designers of the engagement sessions or the evaluative survey, but we did provide consultation during the survey design and led the post-survey analysis. Second, we were limited to content analysis. Because survey responses were anonymous, we were unable to proceed with follow-up interviews to clarify responses obscured by occupational jargon, assumptions, or biases.

Finally, self-selection bias cascades through the project, from the required employee participation in the safety program, to survey completion, to contributions to the open-ended survey items. Notably, survey participants attended Life First engagements from May through September, overlapping the height of wildland fire season in many administrative regions of the US Forest Service. The timing likely affected regional engagement participation and survey response. A majority (57%) of survey respondents reportedly attended engagements in the typically wetter, more prescriptive-oriented southern and eastern regions 8 and 9, with the remaining respondents (43%) in the historically more arid and suppression-oriented western regions 1, 2, 3, 4, 5, and 6, and the Alaskan region 10. Despite these limitations, analysis of the post-engagement survey data facilitated a deeper understanding of wildland firefighters' perceptions of unnecessary exposure to risk in the field and how they explain why taken-for-granted risk behaviours are inherent to the normal work environment of wildland fire.

Conclusion

This study reveals a number of influences on the acceptance of UE where perceived external social, political, and economic pressures interact with internal cultural attitudes and a mission-oriented work ethic inside the wildland fire system. US Forest Service wildfire employees reported instances of commonly accepted UE in the normal work environment of wildland fire, which emerged during four general situations where internal and external pressures are embodied in decision making related to: driving, mop up, aviation use, and communication of objectives. We suggest a further investigation into the social interaction of external and internal pressures on decision making in normal work operations

using social science research methods and theoretical frameworks beyond the commonly accepted framework of HROs in this field, to better understand both the organisational culture of wildland firefighting and the strategies by which individual firefighters interpret their everyday work experiences, group goals, and professional identities.

Future research could also explore the intersection of organisational culture and gender dynamics. Life First survey respondents were not asked to report their sex or gender in the survey. Nonetheless, there were several responses in the open-ended questions that we believe warrant further analysis of gendered interactions within the wildland firefighting community.

Another area of future research, mentioned in the research limitations above, relates to the geographically organised, ecologically situated cultural distinctions among the regions that may shape decisions, risk behaviour, safety, and the acceptance of UE during normal wildland fire operations.

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