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Psychological Safety

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On the Cover:

A sawyer fells a burning snag as part of mopup operations on the 2018 Cougar Creek Fire in Washington. Photo: Kari Greer, USDA Forest Service.

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IN THIS ISSUE

Psychological Safety

By Patty Grantham
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I hesitated before writing this article. The theme of this issue of *Fire Management Today* is psychological safety—a vitally important subject—and I wasn't sure what I could contribute. In the end, I realized that every voice needs to be heard on this subject and that a chance to speak out should not be missed.

Just so we all start on the same footing, a definition is in order (from Harvard Business School Professor Amy Edmondson, who is credited with coining the term): "Psychological safety is the belief that one will not be punished or humiliated for speaking up with ideas, questions, concerns, or mistakes."

I believe that I first heard the term "psychological safety" within the past 6 or 8 months. Even though the phrase was new to me, I immediately knew what it meant. I *felt* what it meant. I'd experienced it—or, maybe more to the point, I'd experienced the *lack* of it. I bet most or even all of us have. As with most strong emotional memories, I'd wager that we all have total recall of the times we felt that lack. Thinking back on those times, I feel the anxiety again and, in some instances, even shame and embarrassment.

I also must admit that I have not always provided psychological safety to others. I feel shame about that too, and I have done my best to make amends and learn from these mistakes.

For me, the things that are in the mix with psychological safety—overall well-being, resilience, rest, and self-care—were mightily tested in 2020. I can rattle off what everyone knows: the record duration, geographic extent, and intensity of the fire year; the crushing uncertainty and stress of fire response amid the pandemic; and the strain we all carried at home in caring for our loved ones through chaos, lockdowns, and quarantines. If 2020 had been a work of fiction, no one would have read it—the premise would have been just too crazy. Yet we lived it.

We must change the parts of our culture that are harming colleagues, whether it be psychological safety, harassment, or other contributors to a negative work environment.

Few of us are truly physically and emotionally rested and ready for fire years to come, which means that an open discussion of psychological safety has never been more needed. With our resilience reserves less than full, we need to go the extra mile to support one another this year if we are to succeed. We must change the parts of our culture that are harming colleagues, whether it be psychological safety, harassment, or other contributors to a negative work environment.

How are you showing up at work to do this? How are you building systems to include others—to ensure that people feel comfortable in speaking up? How are you creating trust?

Sometimes, psychological safety is lacking due to ignorance. Our agency is working to change that because awareness is the first step toward change. Where the lack is due to malice or other ill intent, our agency is working to change that too.

Ultimately, safety is safety. Our agency's commitment to physical safety is longstanding and continues to evolve and improve. I was recently reminded that, as late as the 1970s, employees had to purchase their own safety glasses. Although that is not a history to be proud of, it is *our* history and a small testimonial to how much we have changed.

As part of our evolution, we also now know that caring for our psychological safety is just as important as the physical part; in fact, the two are undeniably intertwined. Suffering mistreatment at work affects our ability to perform our jobs and engage meaningfully with others, and the harms are cumulative. We will never meet the challenges of intensifying fire years or realize our dreams of landscape-level solutions if each of us is not safe, valued, and included.

I admit to another reason for writing this article: it will be my last chance to write

ANCHOR POINT

an Anchor Point. On May 31, 2021, after almost 41 years with the Forest Service and after submitting 1,000-plus timesheets, I will fill out the magical "final one." After being a resource specialist for the first 12 years of my career and then serving in life-altering assignments as a line officer for the next 28 years, I've had the honor to serve the last 11 months as the national Director of Fire and Aviation Management.

This final opportunity and experience have been incredible in ways I never could have imagined, thanks to the inspiring colleagues I've worked with and the important work we've done. I am blessed to have spent two-thirds of my life amid the wonders of the national forests and infinitely lucky to have had the chance to work with all of you. In reflecting on psychological safety, as much as I recall situations when it was lacking, I also remember all the leaders I've worked with who provided that safety to me. For their leadership, I am eternally grateful; and if I have amounted to anything at work, it's because someone took the time to care about me. I challenge you to do the same.

And I leave you with this thought from my opening comments: when tough things are being discussed and you get a chance to put your voice in the room, never hesitate.

I wish good fortune to us all.

Mt. Rainer rises above smoke from the 2018 Miriam Fire in the Goat Rocks Wilderness as firefighters scout early management options from a remote vantage point. Photo: USDA Forest Service.

The Big Quiet*

Holly Krake, Jim Gumm, Kari Grover-Wier, and Alan Sinclair

It's 2012 and the medical unit leader is having another panic attack, knowing she'll have to sit next to the agency administrator who stares at her chest and smirks for the 11th day in a row.

It's 2005 and an engine captain quietly drinks the winter away, ashamed to tell anyone that he can't move past his recent divorce, a divorce driven in part by his long absences from family on assignments.

It's 1911 and Ed Pulaski is returning to duty with few benefits after being severely injured in the Big Blowup of 1910, losing five crew members, and having his family and community traumatized.

Instances like these (see the sidebar on the next page for more), though common in the wildland fire community, are difficult to put down in black and white. We'd much rather be writing about the courage, integrity, honesty, and good we find so much of in our fire management world.

But, as early social justice pioneer and kids' TV personality Mr. Rogers once said, "Anything that is human is mentionable. And anything that is mentionable is manageable." And we'd guess that these experiences are common enough to fit the "human" part rather well. After all, anyone working in or around the wildland fire world for long knows someone who resembles one or more of these stories. Maybe, just maybe, that someone is you—or has been you in the past.

So if it's human, then it must also be mentionable, right? And if it's mentionable, then what does that mean? In this context, "mentionable" means something that can be and is called out—something that can be readily named, something that people can freely talk about, both as individuals and collectively as part of our organizational culture.

INGRAINED SILENCE

And into that context drops "The Big Quiet"—a quiet so big, so deep, and so ingrained in our ways of being

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** A live narration by the authors is at vimeo.*

If it's human, it's mentionable…

It's 1929 and Ed Pulaski has spent the better part of 19 years petitioning for funding to maintain the graves of fallen firefighters and for his own medical treatments.

It's 1962 and the Forest Service has just issued handbook 5125.3 (The Fireman's Guide). This comprehensive guide defines safety responsibilities as wearing "non-skid shoes" and "carrying one's saw on shoulder with teeth out."

It's 2017 and a small mountain valley community reels from the smoke of a tiny prescribed fire after back-to-back years of megafires with hundreds of homes lost.

It's 1987 and a Black crew member joins a small district fuels crew for the first time—never overtly harassed but never feeling empowered to speak up without fear of rejection or punishment.

It's 2018 and the USDA issues the 514-page Green Book as the handbook for all things health and safety, from livestock handling to hypothermia.

It's 1999 and a forestry tech doesn't understand why he can't seem to talk with his kids or get out of bed anymore. Between fire assignments, he's just pulled his second body from a river popular for outdoor recreation.

It's 2019 and the 10th edition of the Incident Response Pocket Guide hits the streets with robust content on everything from "how to properly refuse risk" to "human factor barriers to situational awareness."

It's 2020 and you're sobbing at your desk after a gut-wrenching conversation with a long-time fire management officer who confides that they're done—they've just been walking on autopilot, hollowed out by the cumulative stress they've carried for days, month, and years.

A firefighter monitors a burnout operation along the Trans-Alaska Oil Pipeline on the 2015 Aggie Creek Fire in Alaska. Photo: USDA Forest Service.

and doing that we in the wildland fire community did not—maybe could not—name it for over a century, even as we witnessed and personally lived too many versions of it. Much in the same way as Mark Smith's essay "The Big Lie" jolted our collective consciousness regarding physical safety (Smith 2016), naming "The Big Quiet" is intended as a jolt regarding psychological safety. In fact, the common thread through each example above is silence on psychological safety, even when the symptoms of the silence are deafeningly loud.

If you had a hand in any of the safety documents, committees, or training sessions alluded to in the opening chronology, please know that we value your incredible work on physical safety. Moreover, many people go to extraordinary lengths to create a psychologically safe workplace and to help friends, coworkers, and strangers recover from traumatic events. But their voices are too few and their capacities too disparate not to soon be swallowed in a pervasive sea of silence.

What we really need here is a systemic cultural transformation in our fire organization to make psychological safety a named, understood, and accepted part of our values-based decision making, relationships, and ways of being. We need a culture in which our systems, structures, and rewards authentically and consistently reflect psychological safety, both internally and externally. We need a rising crescendo of effort in terms of both personal responsibility and national systems that resonate within the smallest rural district and the largest metropolitan office.

So how do we define this thing that is so pervasively silent in our ways of being—so absent from our otherwise highly reliable fire management organization?

For our purposes, we'll use Dr. Timothy Clark's idea that psychological safety refers to "the ability to be safe with oneself, to rely on one's own ability to self-protect against any destructive impulses coming from within oneself or deriving from other people and to keep oneself out of harm's way" (Clark 2020). Hallmarks of a person with high psychological safety include self-efficacy, self-esteem, self-empowerment, and the ability to relate to the world in healthy ways as traumas occur. Like most other types of safety, psychological safety is often related in sequential phases, from basic inclusion all the way to honoring challenges of ideas, process, and action. According to Clark (2020), inclusion satisfies "a basic human need to connect and belong. In fact, the need to be accepted precedes the need to be heard.

Granting inclusion safety to another person is a moral imperative that activates our humanity."

ACTIVATING OUR HUMANITY

Now let's bring that down out of the intellectual ether. Drawing on the examples at the opening of this piece, how might Ed Pulaski's story have been different if his crew and boss had viewed him through the lens of his need to be accepted again? How might that engine captain's journey to recovery have been radically transformed if just one person had been mindful of his need for human connection?

In what ways would you be in a healthier place if you could freely talk about your crumbling work/life balance, with your kids home from school, and receive the support you need? How would your mental health improve if you could talk openly and without shame or perceived weakness about the seeming impossibility of accepting yet another fire assignment so you can carry the mortgage after your partner lost their job in the pandemic?

Let's be honest with ourselves, both as individuals and as part of the wildland fire community, by owning up to the fact that we are just not there yet—by admitting that you yourself are just not there yet. Go ahead and say it out loud, wherever you are reading this.

But here's the thing: it's okay not to be okay. Or, to put it more clearly, it's okay for something to be aspirational so long as you can name it as a starting place. Leslie Weldon, the Forest Service's Chief Executive for Work Environment, put it this way: "If you can't name it, you can't start to work on it."

The Forest Service took a huge step in the spring of 2019 by explicitly naming it for the first time in over a century of being. By the end of that year, more than 30,000 copies of a little booklet were mailed to every station, district, and base clearly stating that, as employees of the Forest Service, we believe in safety in every way—physical, psychological, and social (USDA Forest Service 2019).

But naming something is not an end in itself.

SO WHAT'S NEXT?

If you're asking yourself what the next steps are, you're not alone. Your questions might look like this:

- How will fire leadership be accountable for psychological safety?
- How can I hold myself accountable for this?
- Will assessing a community's psychological safety be written into RX–301 or a 215A form?
- Will my unit be bold in offering an award for something around psychological safety this year?
- When will psychological services be available to firefighters year-round?
- How can I lead out on this with my team right now?
- Can I acknowledge for myself where this fire year has brought me mentally?
- Can I share my mental state with a few trusted coworkers and, in turn, check on them?

These are all great questions that we don't have great answers for yet. Much in the same way as a pandemic was unknown to us both personally and professionally before the coronavirus disease of 2019 (COVID-19), we suggest that getting real about psychological safety is an unreached milestone for us, beyond brief forays such as the human factors study following the 1994 South Canyon Fire (TriData Corporation 1996). If we pause to think about the physical safety marathon dating all the way back to 1910, it took many decades of hard truths, missteps, and painful—sometimes fatal—lessons learned to arrive at our current point on the journey. That's more than a hundred years, folks! And although that perspective is refreshing, we don't have another century—or even another decade—to delay moving forward with psychological safety as part of our values-based decision making. Work and life stressors are compounding at a rate we've never experienced before. With the pandemic untamed, the 2021 fire year promised to bring ongoing social separation, unprecedented family pressures, untold loneliness, rising rates of depression and suicide, and so much more.

OUR OTHERWISE HIGHLY RELIABLE ORGANIZATION

But here is where we can learn from "The Big Lie" as we face down "The Big Quiet." Plainly put, the incipient

A crew pauses to rest for a moment while working the night shift on the 2017 Thomas Fire in California. Photo: USDA Forest Service.

journey toward psychological safety will never be free from social injustice, burnovers, broken trust, shaming, harassment, long assignments, rollovers, exclusion, exhausting travel, discrimination, training accidents, indifference, humiliation, flaming fronts, blowups, disdain, and the like. Indeed, we should watch out for the well-meaning but ultimately self-defeating objective of eliminating all those things from the human condition or from the physical nature of fire response.

Rather, we should reconcile ourselves, both as individuals and as a fire organization, to the understanding that "peace is not the absence of conflict, but the ability to cope with it" (a saying generally attributed to Mahatma Gandhi). Aiming for a peaceful system in our dynamic and dangerous operating environment could potentially lead us back to "The Big Lie," yet we can still aim to avoid the chaos that often overtakes us and drives us into "The Big Quiet." The opposite of chaos is not calm but rather cosmos—order, structure, plan, and system. We can rationally understand, plan for, and manage a system designed for the truth that there will always be rollovers or blowups.

As a highly reliable organization, we respond in timely and appropriate ways. Time and again, our wildland fire management has been lauded for this in the physical safety sphere. However, the quest for psychological safety invites us to rationally understand, plan for, and manage a system designed for the truth that there will always be errors in the human condition resulting in injustice, depression, prejudice, harassment, exclusion, and the like. As an otherwise highly reliable organization, the impetus for response is unchanged, is it not? The answer is a resounding yes.

THE WORK AHEAD

The heaviest work lies ahead: taking a hard look at psychological safety in ways that allow us as a fire organization to stay true to who we are, what we believe, and our unique mission in wildland fire management. Each of us can begin today. Right from wherever you sit, you can look at where and how to bring some structure and a bit of order into your workplace, along with the beginnings of a plan to stop "The Big Quiet" in its tracks. Whatever you accomplish, everyone can benefit if you share it up, down, and side to side in the organization, building upon the experiences and wisdom of others to create a place where "The Big Quiet" cannot exist.

At the Forest Service, our core value of safety should be evident in everything we do and how we do it (USDA Forest Service 2019), including in our fire organization. However, safety alone—in this context, psychological safety—doesn't solve the problem. Rather, it can guide us, telling us what to consider. We can and should apply our world-class leadership and expertise in understanding how highly reliable organizations, risk management, and human factors apply to psychological safety, not only for each of us individually but also for the boots to our right and left. We can also break with comfort and be curious about the psychological safety of our partners and communities in everything we do, from prescribed fire to type 1 incidents. We can and should also be humble, recognizing that we don't know everything and don't have all the answers. And in our humility, all of us in the fire management world can bring our own vignettes to the table—inviting, considering, and even celebrating the perspectives, expertise, and experience of others.

COVID-19 didn't cause this moment of reckoning, but it sure ripped the proverbial bandaid off and opened the door to a much-needed community conversation. In a world where everything from the pandemic, to childcare, to the availability of toilet paper seems to be out of our control, "The Big Quiet" only exists if we allow it to in our fire organization. So say what's in your heart, say what's on your mind, say something … anything… the only wrong thing to say is nothing.

Resources for Psychological Safety

Psychological safety and its related outcomes are not yet universally understood or embedded into our ways of being in the wildland fire community. However, related resources are available for employees of the Forest Service, including Suicide Prevention, the Casualty Assistance Program, tools for Resilience and Personal Effectiveness, and a roadmap for Accessing Mental Health Support. Other resources and support might be available through your local city, county, or State health services. You do not stand alone.

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The Wildland Firefighters National Monument at the National Interagency Fire Center, Boise, ID. Honoring all wildland firefighters and those who support them, the monument was conceived as a tribute to the 14 wildland firefighters who lost their lives during the 1994 South Canyon Fire. Photo: Elizabeth Wharton, USDA Forest Service.

Incorporating Psychological Wellness Into Our Safety Concept*

Leslie Weldon

I've been thinking about my experiences with the Forest Service and our quest to become a learning organization. In 2010, the Forest Service launched its Safety Learning Journey, with the goal of activating an organizational culture where every employee shares responsibility for doing all we can to perform our work safely and to help our colleagues do the same.

Employees across the Forest Service got together to talk about the realities of—and hard truths about—our approaches to safety. We focused on reducing the chances of being physically harmed while doing our work in accordance with the motto, "It's not worth doing if it can't be done safely."

We explored the dynamic tension between our desire for results and productivity and our desire to do our work safely as job number 1. We also shifted away from the stance, "I'll get in trouble if an accident happens," to a stance of sharing what we learned from accidents to improve the chances of future success for others. As a counterpoint to the old "compliance culture," we established a new "learning culture." We encouraged employees to speak up and "pull the safety card" to bring immediate attention to unsafe situations and to allow employees and supervisors to "stop, talk, think, then act" to ensure the safety of all before proceeding with the job at hand.

Ultimately, Forest Service employees committed to our Safety Learning Journey, which has shifted our culture and reduced accidents and injuries (Brown 2019), even as we continue to do outstanding work in service and conservation. We are learning from accidents when they happen.

Our experiences related to safety have helped us to further explore and express our agency core values: safety, service, diversity, interdependence, and conservation. As our notion of safety has continued to evolve, it has come to include psychological safety and well-being in addition to the physical side of safety. We have learned that

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** Editor's note: The article is adapted from "Inside the Forest Service," Leadership Corner, 5 February 2021.*

Physical and psychological safety are connected.

psychological well-being is at the foundation of a safe, respectful, and inclusive work environment where we can all thrive.

Physical and psychological safety are connected. However, we still have a lot of work to do to develop a safety culture that is both physically and psychologically safe for all employees. Although we offer a variety of resources for employee well-being, psychological safety is a growth area for the Forest Service. How do we get rid of the associated stigma and silence, which are such a hindrance to employee well-being and performance? How do we target resources toward our colleagues most in need and provide even greater benefits to employees?

In the winter of 2021, we assigned a team to talk with employees, evaluate current activities, and develop responses to these and other questions. Our goal is to establish a solid Forest Service approach to behavioral well-being.

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Great Northern Fire Crew, a type 2 crew on the Flathead National Forest in Montana. Photo: USDA Forest Service.

Psychological Safety and The Big Quiet

Interview by Jim Gumm With Leslie Weldon and Holly Krake

I look back on it now and realize how important it was for me to feel like the Forest Service was a place for me to be.

Jim Gumm: I have the privilege of talking to Leslie Weldon and Holly Krake about psychological safety in general and, in particular, an article that Holly led in writing called "The Big Quiet." Leslie, let's start with you: What comes to mind when we say psychological safety?

Leslie Weldon: I think about it in really personal terms. I started with the Forest Service in the summer of 1981, coming from Virginia Tech in southwestern Virginia. My first job was on the North Bend Ranger District of the Mount Baker-Snoqualmie National Forest. I was extremely excited and ready for this great work in natural resources conservation. But I came as a 19-year-old Black female to work for the Forest Service, and I couldn't have switched from more different worlds. And I was very concerned.

So when I talk about psychological safety, I want to reflect on the fact that I joined up with a reforestation crew and then a fire crew where I really felt like the people there wanted me to be there—that they were concerned about me. They wanted to make sure I could do my work well. They were nice to me—not just on the job but also living on the compound, making sure I was okay. And I look back on that now and realize how important it was for me to feel like the Forest Service was a place for me to be. And those relationships I had, that sense of care and belonging,

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We've named safety as a core value and have been focusing for the past decade on what it means to bring that to life.

encouraged me to know that I was making the right choice of career with the Forest Service.

So one way of talking about psychological safety is in terms of that sense of belonging, caring, and respect that you want to feel when you come to work with people. And it helped me to do my work better because I wasn't so worried that people were seeing me just as a Black woman coming from some place else or as a young person who didn't know anything. Having that sense of safety and well-being, from a psychological standpoint, really helped me to do my work well, and I think that's fed into my success for the rest of my career. So this thing called psychological safety is important, and I'm glad we're talking about it.

Jim: Excellent, thanks for sharing that. Holly, what do you think of when we talk about psychological safety?

Holly Krake: So when I think about psychological safety, much like Leslie, I start with myself as a human being and my various experiences in this agency—in fire camps, on interdisciplinary teams, on different leadership teams, and on crews that I've been a part of. And thinking about the ebbs and flows in terms of how psychologically safe people felt to bring their whole selves forward—that ability to successfully navigate and overcome traumas, uncertainty, disorder, and disruptions in their personal lives and their work/life balance and to overcome those things in healthy ways that protected and nurtured who they were as individuals.

And then, beyond ourselves as individuals, those relationships that were so fundamental to being able to meet our mission. So whether that's a botany crew, a budget office group, human resources, research and development, or a helitack supervisor—whatever our role is in the agency, we can think of our relationships and think about those moments in time when we've been able to most effectively meet our mission and do our work.

And probably somewhere in there, you'll realize that you felt a high degree of psychological safety, self-esteem, self-worth, and self-awareness, both for yourself and for the folks around you.

Jim: Both of you are really touching on some significant points here. Leslie, I want to go back to you as a senior executive. Is there a business case for psychological safety? Is there a reason that this is really important to the organization, other than caring about our people?

Leslie: I think things have really evolved within the Forest Service. We've named safety as a core value and have been focusing for the past decade on what it means to bring that to life. We started with the idea of our physical safety and our belief that we should try to do everything in as safe a manner as possible—and, when we do have accidents, that we learn from them and we bring that learning forward for others.

As we got into that journey, we realized that things like trust, respect, and a sense of belonging were underlying aspects of why some of our accidents occurred. And we realized that we needed to pay attention to this thing called psychological safety just as much as delivering our work well and in a physically safe manner.

So the business case is really about ensuring that every one of us as employees can show up in as strong a way as possible to deliver this great mission, and that includes our psychological and emotional well-being and the quality of our relationships.

We're learning our way through this, and I'm glad that we're doing it in a way that's capturing what's been discovered in other parts of our organization.

Now we're acknowledging that it's critically important for us in relation to why we have a Code and Commitments. Those are all related to our interactions and our best practices to ensure that everyone is included, well respected, and cared for as we do our mission-related work. The bottom line is: It makes a difference in how well we're able to deliver our mission.

Jim: Holly, what compelled you to write your article on psychological safety, and why is it called "The Big Quiet"?

Holly: I was compelled to write this article together with a group of coauthors because 2020 happened, right? And while the coronavirus pandemic or racial injustice didn't cause this moment of reckoning, I think it really did rip off the proverbial bandaid and opened the door to a much-needed conversation: all of the sudden, the impacts of psychological safety issues and the needs that were always there for so much of our workforce were suddenly at everybody's doorstep. It wasn't just one or two people on the district or one or two people at the office, it was everyone. So it became high time that we started talking about it.

The name itself is a play on Mark Smith's 2016 essay "The Big Lie," and we settled on the title of "The Big Quiet" as the most apt description of our current culture around this particular aspect of safety. "The Big Lie" really shook up our collective understanding of physical safety, and we hope that "The Big Quiet" will shake us up and bring about awareness of needs related to psychological safety. It's there; it's always been there. We just need to normalize talking about this issue as one of the first steps towards changing our culture around it.

Jim: So, Leslie, I want to thank you. As we were getting into psychological safety issues, we came to you, and

We just need to normalize talking about this issue as one of the first steps towards changing our culture around it.

you found time for us. With your busy schedule, I'm not sure how. But you kept doing that for us, including holding this interview with us. So why did you do that? Why is this so important for a senior executive like you to find time in your schedule to work on this?

Leslie: Well, I've been hearing from people like Holly and many others who have dedicated themselves to improving our critical incident management as part of our facilitated learning. We're discovering something, and I've had some excellent conversations with a few other colleagues and with [Forest Service] Chief [Vicki] Christiansen, who said it's really time for us to get beyond hearing things on the side—to take this on as a central piece of learning and then act on it.

So we're in the perfect place, with everything that happened in this really incredible year we've been through, letting us be responsive to what our employees have been saying to us: that we need to focus on what it means to be personally effective and resilient. That has to do with our psychological and behavioral well-being, which we need to grow into, just like we have grown into what it means for us to physically deliver our work well. We're worldclass at that. Our work around our psychological and our emotional well-being in the context of safely performing our work needs to get that same kind of attention.

So I'm really happy that there's been a group of people who've come together across deputy areas—from our safety shop, to work environment, to fire, to our Chief Financial Officer, to the Casualty Assistance Program—our colleagues are coming together to really dig into this, to ask the right questions, to listen and then listen some more so that we can begin to do like we do with other things that are important to us. We set an intention, and then we invest in people, time, and resources so that we can make that come to life.

So I'm looking forward to seeing what comes out of that, and I'm glad that I'm not the only executive who cares about this. It's something in which elements of our leaders' stance, like shared leadership and finding opportunity, are really coming into play now.

Jim: Holly, what do you want people to take away from "The Big Quiet"? What do you hope they take away and do, if anything?

Holly: I think this is really a moment to live out some of our core values, not only safety but also around interdependence and service. We are most interdependent and in best service to each other when we hear the implied imperative here—that call to stop, think, talk, and then act. My greatest desire for this article is that it leads us, as individuals and as an organization, to pause a moment and reflect on psychological safety, to think about where we are with it, both as individuals and collectively. To talk about it with a friend, a crew member, your district, or your supervisory group. Just in talking and thinking about it, you're already acting and defeating "The Big Quiet" by no longer staying silent about it.

Jim: Leslie, what do you think our next steps are at the agency level? What do you see us doing next?

Leslie: I learned from someone I really respect that you can't change what you can't talk about. We're in a place now where we're learning from each other, we're hearing each other's stories, and we're interpreting what it means to focus on psychological safety in service to our very complex and challenging mission of providing benefits and caring for the land for all of our citizens.

So what comes next is the rest of this discovery and learning together, and I'm looking forward to seeing some real options that we can come together and talk about. I'm looking forward to getting more folks involved and making some choices about what we want to invest in by way of an intent for this agency. Then we need to back that up with the right kind of programs, the right kind of skills, and the right kind of expectations and outcomes.

A member of the Lassen Interagency Hotshot Crew pauses during a burning operation on the northwest flank above Ruth Valley on the August Complex North Zone in 2020, northern California. Photo: Mike McMillan, USDA Forest Service.

Leaning Into Psychological Safety as a Hotshot

Ben McLane

No matter where my career takes me, my experience on a hotshot crew will be a part of my identity forever.

I am a *hotshot*—a member of an interagency hotshot crew. To the many members of the fire service, that title means something—sometimes good, sometimes bad. To me, it means that I have signed up to have a little extra asked of me and to gladly say yes—yes to staying on the line later, to going out farther, to hiking with the heavier pack up the steeper hill.

IDENTITY AS A HOTSHOT

It's a title that, for many who are familiar with it, paints a dynamic picture—a picture that might be attractive to some and undesirable to others. For me and so many before me, the elevated responsibilities intrigued us, which makes for individuals who enjoy risk, uncertainty, and service to others. We wanted to be wildland firefighters who looked more like loggers and Gifford Pinchot's original forest rangers than like the folks in red trucks at the local fire department.

You learn quickly that the title and the image don't mean much. What matters and has kept me coming back is the identity. No matter where my career takes me in title and task, my experience on a hotshot crew will be a part of my identity forever. It will influence my behavior, decisions, and demeanor for years to come. My hope is that the influence will be positive.

For all the glimpses you get of them and the stories you hear about them, hotshots spend countless hours far from home, with only their crewmates for company. During those hours, they are a group of people pushing themselves far past what they ever thought they were capable of enduring physically, mentally, and emotionally, all under tremendously difficult circumstances.

In a situation like this, you start your first shift on an assignment because of your job title and image. But finishing the last shift becomes about your identity—who you really are, even when no one is watching. If you work for long enough in the environments that hotshots often do, your job title unavoidably becomes part of you. Personally, earning that part of my character has been the most difficult thing I've ever done. I believe this to be the case for many others as well, and it is why those of us with that identity feel a strong bond with each other.

It's impossible to fully articulate everything that this identity entails, but

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you don't have to spend very long in the fire service to hear about the wildland firefighting exploits of hotshots. But there are also plenty of other stories about all the good and bad things a stereotypical hotshot might do. People talk about us when we work hard, when we drink too much, when we stay on the line all night so that others can go back to camp and rest, and when we take all the chocolate milk and hot sauce at fire camp.

SAFETY AT RISK

My least favorite story is the one most people are all too familiar with—the story about a time when we die on a fire.

The possibility of death is something everyone in the fire service faces and accepts, an unfortunate consequence of working under hazardous conditions. Hotshots might take on a little extra risk. We do our best to mitigate the extra risk through extra qualification and training, but shrinking the risk to zero—or even to a level that is acceptable to most others in the fire service—is impossible. Therefore, the death stories are many, and because of our shared identity, the stories weigh heavy on our hearts.

Smith River Interagency Hotshot Crew members on the Cedar Fire on the Sequoia National Forest in California in 2016. Photo: Lance Cheung, USDA Forest Service.

I am proud and grateful to have started my career after a major shift in safety culture within the fire service.

I am proud and grateful to have started my career after a major shift in safety culture within the fire service (Brown 2019), which significantly reduced our physical risk. Since I began my career, however, it has become abundantly clear that suffering physical harm while working on a fireline is not the only risk we face. What worries me more are the wildland firefighter deaths resulting from risks that the job poses to mental, emotional, and behavioral health.

Record-setting fire seasons and the additional physical risk they pose don't scare me. The next time I hear a story of another hotshot killed in the line of duty, I will go back to work with a heavy heart but no fear.

What does scare me? Firefighter suicide, divorce, and addiction. My concern stems from the fact that consequences suffered by firefighters that are *not* in the line of duty are often related to our career choices. A growing body of evidence shows that the stress of our daily duties can easily influence our behaviors at home.

PSYCHOLOGICAL STRESSES

I believe that it is our obligation in the wildland fire community to respond to the mental, emotional, and behavioral consequences of our career choices in the same way we responded to the physical consequences of a lack of operational safety decades ago. We can pat ourselves on the back for the latter; now it's time to deal with our psychological safety.

I have been told that the fire service as a whole, and especially the Forest Service, has a relatively high number of introverts. I think this is probably true, and I know that figuring out how other people think and feel can be a challenge for introverts. The realm of psychology might seem intimidating, especially to those of us whose expertise on the inner workings of a chainsaw is far superior to our knowledge of the human psyche.

That being said, I have found that the topic of psychological safety comes very naturally to those of us in the fire service. Our shared identity lays the groundwork for trust, the foundation for psychological safety.

The trust I have earned and returned to my crewmates has resulted in countless conversations about difficult subjects. We didn't have to do anything extra; there were no AgLearn sessions or forestwide meetings to attend. We just worked hard together and fostered trust; we had tough conversations on the fireline that mitigated impending consequences at home—and our psychological safety increased as a result.

That is "the Big Why" for pursuing psychological safety throughout the fire service. The national fire environment demands that we innovate and quickly adapt, which will require some hard discussions. For these to happen, we have to feel safe having critical conversations with our fellow fire enthusiasts and experts, both up and down the chain of command. Psychological safety must be taken seriously and trust must be built.

When that occurs, the incredible growth I have witnessed within my own crew might be replicated across the whole fire service. What makes me so sure? Because I have seen it play out within a group of hotshots, and none of them had any external motivation. They just

Psychological safety must be taken seriously and trust must be built.

wanted to be better at their jobs and to take care of each other, both on and off the fireline, so they put in the work to improve the team.

THE CHALLENGE AHEAD

This issue of *Fire Management Today* contains a series of articles devoted to the concept of psychological safety. I hope they inspire you to innovate and pursue a healthier work environment for yourself, your peers, your supervisors, and your employees. Through innovation and adaptation, we have already given fire managers all over the world the tools they need to successfully assess the operational readiness of the resources they are responsible for. Now the fire environment is asking more of our people and their loved ones; we owe it to them to develop the tools we need to respond in a new era of fire with resilience and strength, both at work and at home.

My challenge to you, the readers of this issue, is to think seriously about how you might use the information presented here to innovate within the fire service. Let's work hard together, build trust, and give fire managers the ability to successfully assess the psychological well-being of their fire personnel, along with their operational readiness.

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Firefighters watch a prescribed burn on the Monongahela National Forest in West Virginia on May 1, 2018. Photo: Tanya E. Flores, USDA Forest Service.

What Psychological Safety Means to Me

Drag Sharp

Psychological safety—What is it? Why does it matter to me?

REFLECTIONS ON PSYCHOLOGICAL SAFETY

Those questions ran through my mind when I was approached by John Phipps, former Forest Service Deputy Chief for State and Private Forestry. Our conversation revolved around psychological safety being just as important as physical safety for the Forest Service's fire organization and just as deserving of consideration. I listened more than I talked, and I can recall wondering whether this was just another passing agency initiative or whether it was something serious on the mind of a concerned leader. Having known John for almost 3 decades, I concluded that this conversation was genuine and important.

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Experts have many different definitions for psychological safety, and I was initially confused.

We spoke for 30 minutes about the topic. When we finished, I did what many would do: I googled psychological safety. I soon realized that there was much I didn't know. Experts have many different definitions for psychological safety, and I was initially confused.

Two definitions resonated most with me. Psychological safety is:

- Being able to show and employ yourself without fear of adverse consequences for your self-image, status, or career; and
- The knowledge by every member of your team that the team will not embarrass, reject, or punish you for speaking up.

CULTURE IN THE FIRE ORGANIZATION

I spent the first two decades of my career committed to the idea that hierarchy, conformity to culture and tradition, and relational trust were not only essential to my success but also critical to my survival. Though never explicitly stated, such expectations came across during physically demanding fitness training, during classroom and field exercises, and even during afterhours social events. Organizational status and your place in the pecking order on your team or crew are awarded for being the best runner, receiving the highest score, or making the most sacrifices. Unfortunately, none of these things necessarily make for the skills required to be a leader.

By the time I reached the module leader level, I also understood that we have a belief, deeply embedded in our culture, that challenges our openness to be inclusive of someone until they have proven that they are one of us. I don't mean to be provocative, to ridicule, or to pass judgment—it is simply part of our culture. I know, having experienced it from both sides.

After my indoctrination into the culture, I faithfully strove for many years to meet its expectations. I pushed myself physically, mentally, and emotionally to be the best I could be. With safety as my watchword and real concerns about injuries and fatalities, justifying why I didn't think an individual was cut out for wildland fire management wasn't that difficult. I thought my reasons were never influenced by gender, ethnicity, religion, or socioeconomic status. I was wrong.

Let me pause here to make a point about psychological safety. For 99 percent of the time, the final decision to hire or fire someone wasn't mine. However, I was a leader; and in a leadership position, I had a tremendous amount of influence. I sat on selection panels, performed outreach and recruitment, and advocated for or against a candidate's qualifications. I've been complicit in the outcome more times than I care to admit. I know now that having a better understanding of psychological safety and a stronger commitment to it earlier in my career would have fostered a more inclusive and diverse work environment in Fire and Aviation Management.

As a leader, you should never cross a line that questions morality or damages dignity and self-respect.

As a leader, when your objectives are to teach lessons, assess character, and support and counsel individuals in determining whether a career choice is right for them, then many of the practices and norms in our wildland fire organization suffice. However, you should never cross a line that questions morality or damages dignity and self-respect.

A PERSONAL STORY

I'll share a personal story. I was born and raised in a segregated town in Texas. I lived in so-called sundown towns, meaning that people of color should not be seen outdoors after nightfall.

When I started my Fire and Aviation Management career, I was 19 years old. I accepted a position as a seasonal wildland firefighter in California on the Eldorado National Forest. I traveled from Texas to Sacramento, where I met up with the district fire management officer, who would become my leader, mentor, and friend. I had never been so far away from home, and I was excited about the opportunity. I was also a little nervous and cautious because I recognized that there wouldn't be many (if any) other people of color around. I could become socially isolated far from home.

Traveling from Sacramento to the barracks in Pollock Pines took us through the town of Placerville. In the center of town, we stopped at the traffic light. I casually looked out my window and there it was—one of my deepest fears confirmed: in the town's central square was a large sign that read, "Old Hang Town." Not far away was a mannequin that appeared to be

Kelsey Chaloupka of the North Haines Volunteer Fire Department based in Rapid City, SD, on the 2012 Myrtle Fire on the Black Hills National Forest in South Dakota. Photo: David Kosling, USDA.

Looking back at my 19-year-old self, I recognize that my level of psychological safety was pretty low.

nonwhite hanging from Hangman's Tree Historic Spot in Placerville, for all to see.

I felt a flurry of emotions. I vividly remember not commenting on what I'd witnessed. As we drove away, it was seared into my psyche that Placerville was a sundown town.

Over the next few months, I would encounter other scenes with ignorant, hateful, and racially charged undertones. From my perspective, the Forest Service—whether unintentionally or not—had not done enough due diligence in the community to anticipate the arrival of students who looked like me.

Looking back at my 19-year-old self, I recognize that my level of psychological safety was pretty low. As I began to experience additional pressures from the physical demands of the job and all the stress that came with classroom training and field exercises, I often had thoughts and feelings that I couldn't do this and wouldn't return the following year. Fortunately, I found the personal determination to work through it all, with help from leaders on the unit who went the extra mile to provide support, mentoring, and companionship. Looking back on a career that spans more than 3 decades, I'm reminded of the women and other people of color who didn't have that support and who didn't come back. I think about the talent that was lost and the influence that psychological safety might have had on those careers.

IMPORTANCE OF PSYCHOLOGICAL SAFETY

So why does psychological safety matter to me?

Each of us has a basic obligation to one another as human beings for our survival. My own shaky start in Fire and Aviation Management occurred over 30 years ago, but similar scenarios are still playing out today.

The Forest Service has anchored itself as an organization in a set of core values—safety, interdependence, diversity, service, and conservation (USDA Forest Service 2019). Our Fire and Aviation Management community has embraced additional values—duty, integrity, and respect—and we will soon add moral courage.

These core values contribute to who you are and who we are. I use them to find the common ground between us. I use them to create space for psychological safety. I use them to see the humanity in you, in all of us … because we need to have that conversation.

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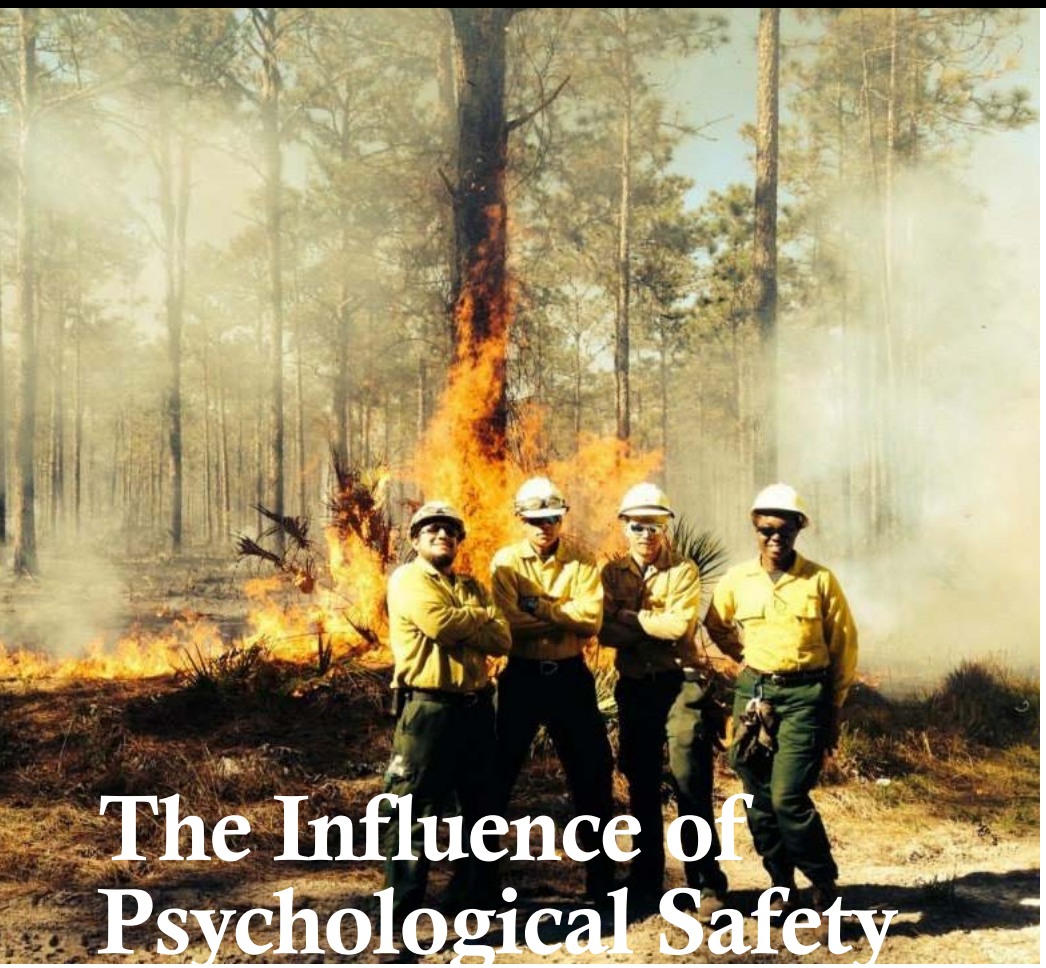

Firefighters near the end of a prescribed fire assignment in the Forest Service's Southern Region, part of the Davidson River Advanced Fire Training Program hosted by the Schenck Job Corps Center. Left to right are Victor Dominguez, Exgar Sanchez, James Huber, and Michaela Hall. Photo: Michaela Hall, USDA Forest Service.

The Influence of Psychological Safety on Expressions of Diversity

Michaela Hall

"Do I have to cut my hair?"

We were conducting job offers by video, and this student's question caught me off guard. As a Black woman living during the time of the "natural hair movement" and embracing styles best suited for my hair's characteristics, I understood the need to know whether a hairstyle would be accepted in the workplace.

But I hadn't recognized that this concern could come from a white male with a ponytail. We assured our future intern that he didn't need a certain hairstyle to work for the Forest Service. It was a relief to say so confidently.

In essence, cultivating diversity is central to our success as individuals and as an organization.

WORKPLACE DIVERSITY

The interaction left me with questions I could spend all day thinking about and still not be able to answer:

- What about the Forest Service brand caused this student to wonder whether his hairstyle would be allowed?
- What about our society produced a student eager to conform instead of demanding to be accepted?
- How is it possible, when the world is full of problems needing to be solved, that our legislatures are working to prohibit "race-based hair discrimination"? Shouldn't our society have evolved beyond the need for such a law?

Apparently not. According to the CROWN Coalition—the organization working to ensure that legislation against hair discrimination passes—Black women are 80 percent more likely to agree that they must change their hair "from its natural state to fit in at the office." They're also 1.5 times more likely to be sent home from the workplace because of their hair.

Thankfully, as a Forest Service employee, I didn't need legislation to wear my hair how I wanted. I had leadership encouragement.

I will never forget the day when a high-grade employee—someone I admired—came to work with purple hair. I was inspired and put at ease. I enjoyed different hair colors, and I believed that if she could wear colorful hair, so could I.

Hairstyling wasn't the only way that leaders showed me it was okay to be me. I observed leaders sporting bold tattoo sleeves and leaders who introduced coworkers to their same-sex partner. Some leaders admitted to not having a college degree and to feeling a lack of confidence

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at times. Through such instances of nonconformity, I've been empowered to showcase my own diversity.

In *This Is Who We Are*, the Forest Service urges employees to focus on the shared purpose, values, and behaviors guiding our work. The guide states that our belief in diversity spans "people and cultures; perspectives and ideas; and experiences and ecosystems" (USDA Forest Service 2019). In essence, cultivating diversity is central to our success as individuals and as an organization.

As a recruiter, I encounter countless people who are interested in working with the Forest Service. They include students, veterans, and individuals with disabilities, and they receive training at Job Corps centers and at colleges. Their interests vary from wildlife to forestry and finance. They look like you, me, and so many others, in every variation of human appearance. The diversity is out there; as an agency, we need not only to draw it in but also to retain it by maintaining safe and inclusive spaces.

Fire personnel on the Mendocino Complex fire in California in 2018. Left to right are Lisa Renken, Michaela Hall, Nancy Guerrero, and Brian Hicks. Photo: Michaela Hall, USDA Forest Service.

DIVERSITY AND PSYCHOLOGICAL SAFETY

Psychological safety is necessary to get the greatest benefit from our workforce diversity. I'll lean on a metaphor to illustrate why and to connect psychological safety to diversity.

If *diversity* is being invited to the party, then *inclusion* is being asked to dance. *Belonging* is when they play your favorite song, and *psychological safety* is feeling comfortable enough to dance to it.

People entering our workforce should be empowered to be themselves, as should current employees. If people don't feel comfortable with simple forms of expression, such as hairstyling, how can they be expected to freely share their thoughts—especially if they have dissenting or unconventional points of view? Variations in thought, appearance, and other qualities are necessary for the Forest Service to truly represent the public we serve.

The Forest Service workforce of 2021 looks drastically different from the workforce of 1910, and so does our workload. Just as changing public demographics, values, and needs have altered who we are and what we do, so has our appreciation of what makes a good workplace. Today, we understand that the "greatest" workplace is the one that makes room for diverse looks, perspectives, and methods.

I appreciate efforts by Forest Service leaders to create a psychologically safe work environment. Psychological safety gives diversity room to express itself. Take hair, for example: if we don't feel psychologically safe, we're more likely to adopt a conventional hairstyle rather than choose from among the diverse hairstyles we might prefer. Even though we're diverse, our hair and our other self-expressions and personal behaviors won't fully reflect our diversity—unless we feel safe.

The examples of showing trust set by Forest Service leaders and their dedication to fostering platforms for others to build and show trust create a deep sense of pride in the agency I work and recruit for. I couldn't, in good conscience, recruit someone into an agency I didn't have faith in. The Forest Service isn't without faults, but I believe we're moving in the right direction. As the older folks in my family say, "When you know better, do better." I believe we are doing just that.

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Fire camp on the 2018 Pole Creek Fire in Utah. Michaela Hall, camp crew boss trainee (fourth from left), poses with students from the Weber Basin Job Corps Camp Crew. Photo: Michaela Hall, USDA Forest Service.

Aftermath of the Big Blowup of 1910 in the St. Joe River drainage, near where Ed Pulaski's fire crews were deployed. Photo: R.H. McKay, USDA Forest Service.

Big Ed and The Big Quiet

Hutch Brown

The archetypical old-time ranger was largely left to process his trauma alone.

"Come outside, boys, the boss is dead."

"Like hell he is."

These lines are some of the best known in the annals of wildland firefighting. They are from Forest Ranger Edward C. Pulaski's own account of the Big Blowup of 1910 (Pulaski 1923), when "Big Ed," acting as fire boss, saved dozens of firefighters from almost certain death.

Less well understood is what happened later. Pulaski—the "archetypical old-time ranger" who "did everything for his men" (Maclean 2002), though injured physically and emotionally as well—was largely left to process his trauma alone (Kramer 2010).

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ONE OF THE BEST

Born in Ohio, Pulaski moved to Idaho during the Gold Rush in 1884 (Pyne, n.d.; USDA Forest Service, n.d.). Over the next 24 years, he worked in trades ranging from prospecting to ranching and blacksmithing. The Forest Service hired him in 1908 as an assistant forest ranger on the Coeur d'Alene National Forest in northern Idaho, with headquarters in the town of Wallace. Based on his outstanding woodsmanship and knowledge of the backcountry, Pulaski was considered "one of the best and safest men to be placed in charge of a crew of men in the hills," according to the official Forest Service account of the Big Blowup (Weigle 1911).

On August 20, 1910, after a hot dry summer, hurricane-force winds blew wildfires across more than a million acres (400,000 ha) in the Northern Rockies (Egan 2009; Koch and Halm 1978; Pyne 2001). Scores of fire crews were already fighting fires in the hills, and the Big Blowup trapped many of them, ultimately costing 78 firefighters their lives. Assigned to supervise and resupply multiple fire crews in the hills, Pulaski had come down to Wallace on August 19 to collect supplies. He left home again after telling his family where to take shelter if the fires burned into town (as they ultimately did). "I may never see you again," he told his wife (Pulaski, n.d.).

Pulaski rode into the hills and gathered 45 firefighters, giving his horse to an older man who couldn't keep up. Another firefighter, hit by a falling tree, was left behind on the trail and perished (Pulaski, n.d.; USDA Forest Service 2010a). Pulaski led the rest into an abandoned mine shaft, where he stood at the entrance while the firestorm raged outside, dousing the burning timbers

Like Pulaski, most survivors suffered from terrible burns as well as eye or lung damage.

with wet blankets. When one panicking firefighter tried to flee into the flames, Pulaski drew a gun and threatened to shoot anyone else who tried to get past him. No one did.

Most of the firefighters finally passed out, as did Pulaski. When he awoke in the morning, someone had just stumbled across his prone body and thought he was dead. Five others never revived, but the rest made it back to Wallace. Although Wallace itself was partly destroyed, with about $350,000 in fire damages (about $9.2 million in 2021), the hospital—and Pulaski's own home—remained intact (Pulaski, n.d.; USDA Forest Service 2010b). The surviving firefighters were treated in the hospital for their physical injuries (though not for any emotional trauma); for at least one, the injuries proved fatal (Pulaski, n.d.).

AFTERMATH

On November 9, 1910, Forest Service Chief Henry Graves sent Pulaski a letter of appreciation, acknowledging that "it was wholly due to the courage and judgment you displayed, at great personal risk, that your entire crew was not killed" (Graves 1910). At the time, "Big Ed" was "everyone's vision of what a hero ought to look like" (Pyne n.d.), well over 6 feet tall and with a "commanding presence." When he retired from the Forest Service in 1929, a newspaper in Missoula, MT, reported that the "Hero Of Great Fire Will Leave Service" (Pyne, n.d.).

However, Pulaski received little material support for his heroism. He was badly injured on the fire, with severe burns over much of his body and lung damage from inhaling noxious gases. Moreover, his eyes had been burned; blinded and suffering from pneumonia, he spent months recovering in the hospital but never fully regained his vision or his health. Hospital bills exhausted his family savings, including bills paid for another survivor.

In June 1911, Forest Supervisor W.G. Weigle issued his official report on the Big Blowup. According to Weigle (1911), the agency tried to identify the fallen firefighters but was often unable to—many were itinerants, strangers to their fire bosses. Most were buried where they lay, although many were later moved to a common graveyard in St. Maries, ID, a memorial site today. The five who died in what would become known as the Pulaski Tunnel were brought to Wallace and buried in Nine Mile Cemetery.

Weigle (1911) found "no claims [made] against the Government … for the death of any of the men." He made no mention of physical (or psychological) injuries to firefighters or their hospital costs; at the time, Government employees in any way injured on the job had little or no claim to compensation. Like Pulaski, most survivors suffered from terrible burns as well as eye or lung damage, with 101 firefighters hospitalized on the Coeur d'Alene National Forest alone (USDA Forest Service 2010a). They covered the costs themselves because "fiscal difficulties and lack of legal authorization and appropriations created great difficulty in caring for the injured men" (USDA Forest Service 2010a).

Sympathizers raised charitable donations (USDA Forest Service 2010a). Forest Service employees raised $1,700 (about $45,000 in 2021) to help the injured firefighters, and the Red Cross contributed another $1,000 (about $26,000 in 2021). Congress finally voted to cover hospitalization costs and compensation, but not everyone got the help they needed (Kramer 2010). Encouraged by a colleague, Pulaski petitioned the Government to compensate him and other Big Blowup survivors, to no avail (Kramer 2010; Ritchie 1979).

The Nicholson Mine (now known as the Pulaski Tunnel) in the aftermath of the Big Blowup of 1910. Pulaski and his crew sheltered from the firestorm here. Photo: R.H. McKay, USDA Forest Service.

INVISIBLE TRAUMA

With damaged lungs and poor eyesight, Pulaski returned to his duties as forest ranger in 1911, eventually designing the firefighting tool that bears his name. Despite his physical recovery, Pulaski probably suffered from psychological trauma unknown and undiagnosed at the time. Psychology as a medical science was still under development by Sigmund Freud and others in Europe, and modern psychology did not emerge until the 1950s–60s. Moreover, psychological afflictions carried a social stigma in the 20th century that often relegated them to silence.

In charge of his Wallace Ranger District, Pulaski spent the next 2 years responding to fire-related claims, which disturbed him—something his supervisor knew (Ritchie 1979). Pulaski also tended to the graves of fallen firefighters in his spare time and "was troubled by the fact that a suitable monument had never been erected" for the firefighters who died under his command (Ritchie 1979). He designed a granite monument himself, only to have the design turned down in 1921 when the Forest Service finally allocated $500 (about $13,000 in 2021) for a gravesite memorial. Not until 2010 would a granite monument based on Pulaski's design be dedicated to the fallen firefighters on Pulaski's crew (in Wallace's Nine Mile Cemetery).

Both Pulaski and his wife left accounts of the Big Blowup, and neither expressed grievance or regrets. Pulaski had a specific purpose in mind: writing in a forestry journal to win a prize, he told the tale of "my most exciting experience as a forest ranger" (Pulaski 1923). Emma Pulaski related the experiences of a Forest Service wife, which she found both "thrilling" and "dangerous" (Pulaski n.d.); Gifford Pinchot, the first Forest Service Chief (1905–10), was soliciting such stories from Forest Service wives for his signature work about the early Forest Service (Gaston 2016; Pinchot 1947). Both accounts ended on the same positive note: "My experience left me with poor eyes, weak lungs and throat,"

Pulaski was troubled by the fact that a suitable monument had never been erected for the firefighters who died under his command.

Forest Ranger Edward C. Pulaski in about 1910. Photo: USDA Forest Service.

wrote Pulaski (1923), "but, thank God, I am not now blind."

Yet Pulaski's injuries, both physical and emotional, and his treatment by the Government left him, in some sense, "a broken, bitter man" (Kramer 2010). According to Jason Kirchner, a spokesman for the Idaho Panhandle National Forests, Pulaski "felt that the Government [had] abandoned him" (Kramer 2010). "He felt that the Government owed these firefighters a huge debt of gratitude. Some received remuneration, but it wasn't consistent across the board. That offended him."

Today, Pulaski would be astounded by the extent of Government support for the victims of natural disasters. In 2020, in the wake of catastrophic events ranging from a pandemic to wildfires and hurricanes, the Forest Service launched Operation Care and Recovery to give affected employees and communities the help they needed. Forest Service employees could draw on a range of related resources, including the Casualty Assistance Program, Critical Incident Stress Management Leads and Peers, Family and Hospital Liaisons, and the Employee Assistance Program. In 2021, the agency prepared to offer additional mental health resources through Operation Care and Recovery.

SERVICE AND SAFETY

It came too late for "Big Ed," who died in 1931, not long after retiring from the Forest Service. By then, Pulaski was coming to personify one of the Forest Service's foundational stories: selfless dedication to service, a core value for the agency (USDA Forest Service 2019). As one observer put it, "A mystique developed around the rugged outdoorsman who had firsthand experience on the land and who used it to save his crew" (Kramer 2010). Pulaski embodied the "can-do" spirit of the early Forest Service in service to the Nation, in accordance with Gifford Pinchot's dictum "Certainly it can be done" (Pinchot 1947).

The agency's "can-do" culture, though a strength, was also a weakness: it emboldened employees, including firefighters, to take unacceptable risks—physical, psychological, and social—to get the job done. In the mid-2000s, in response to persistent accidents and fatalities over many decades, the Forest Service launched a long-term "safety journey" that has shown signs of success (Brown 2019). Accordingly, the agency has embraced safety as a core value—safety "in every way: physical, psychological, and social" (USDA Forest Service 2019).

Pulaski risked his life—and sacrificed his long-term health—for the physical safety

Wallace, ID, in the aftermath of the Big Blowup of 1910. A large part of town burned, including many homes and businesses (foreground). Photo: USDA Forest Service.

of his crew members, rescuing as many as he could. However, psychological safety was all but unknown in the early Forest Service, led as it was by rugged individualists in the mold of Gifford Pinchot and Theodore Roosevelt, with beliefs about culture and medicine limited by the science of their day. In the same "can-do" spirit of self-reliance in the woods, Pulaski probably never saw himself as a victim of "The Big Quiet" enveloping the emotional and psychological needs of Forest Service employees, including his own.

THE BIG QUIET

Yet, in the aftermath of the Big Blowup, Pulaski almost certainly suffered from psychological trauma. Aside from financial loss and ongoing problems with his physical health, Pulaski was apparently grappling with traumatic memories of the firestorm, constantly refreshed by the fire-related claims he handled on the job, some made by or for people he knew (Ritchie 1979). He might also have been grappling with a survivor's guilt for the deaths of the firefighters he led, along with a feeling of abandonment by the Government he served (Kramer 2010). "The Big Quiet" is the silence associated with such suffering, glossed over in the stories told by Pulaski and his wife, who put a socially and culturally acceptable "best face" on personal tragedy: at least he didn't go blind (Pulaski, n.d.; Pulaski 1923).

The silence, long ingrained in Forest Service culture, is finally being broken by naming the need for psychological safety (USDA Forest Service 2019; see also the preceding articles in this issue). Perhaps the story of Ed Pulaski and the Big Blowup, after serving for so long as a foundational tale of heroism and self-sacrifice in service to the Nation, can also serve as a cautionary tale about "The Big Quiet."

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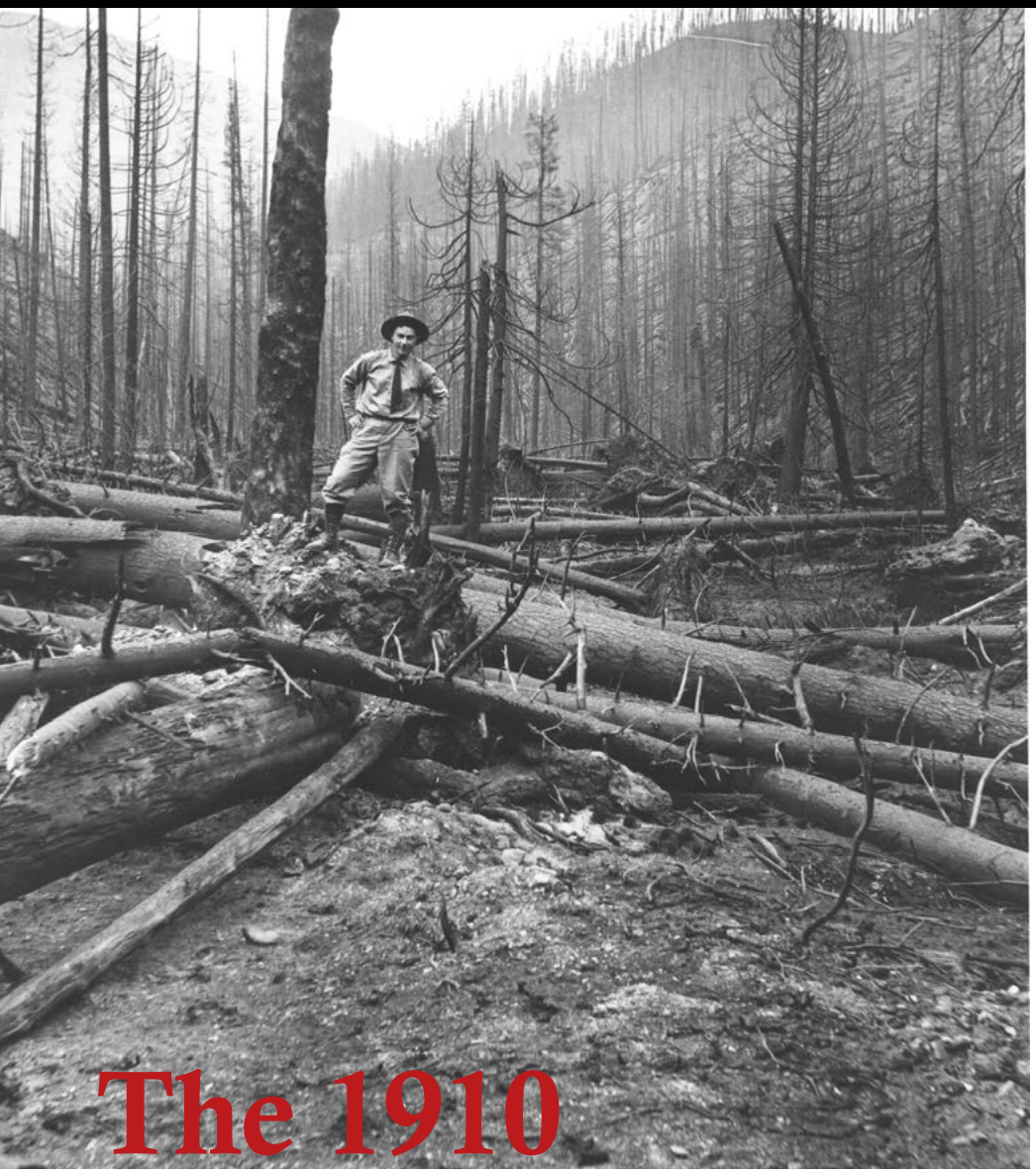

The 1910 Wildfire Debacle*

Stephen F. Arno

In August 1910, wildfires swept through 3 million acres (1.6 million ha) of heavily forested mountain country in northern Idaho and adjacent Montana. About 85 people perished in the flames, and the Forest Service's fire protection program was caught short.

DISASTER AND HEROISM

In 1910, the fledgling Forest Service—established in 1905—had few experienced firefighters. To fill crews, Forest Service fire bosses hired day laborers from towns like Coeur d'Alene, ID, and Missoula, MT, sometimes rounding them up from saloons. Inexperienced and ill-equipped men were pressed into service on the firelines, including many who had inadequate clothing and no boots or gloves. Scores died in the mountains, trapped by the firestorm.

The civilian death toll would have been higher except for the Buffalo Soldiers.

The civilian death toll would have been higher except for the Buffalo Soldiers, thousands of Black soldiers from the 25th Infantry Regiment stationed at Fort Missoula who helped fight fires during the Big Blowup. Troops lit a backburn that saved the isolated town of Avery,

Forest Service Ranger Joe Halm in the aftermath of the Big Blowup of 1910 on the Coeur d'Alene National Forest near the mouth of Champion Creek in the drainage of Little North Fork St. Joe River. Photo: USDA Forest Service.

Reenactor at a 2010 event in Missoula, MT, commemorating the centennial of the Big Blowup and the role of the Buffalo Soldiers in fighting the fires. Thousands of Black troops from the 25th Infantry Regiment stationed at Fort Missoula mobilized to fight fires during the Big Blowup. Photo: USDA Forest Service.

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** The article, adapted from Arno, n.d., is partly based on Egan (2009).*

Key to the conflagration in August 1910 was a gigantic dry-lightning storm packing hurricane-force winds.

ID (USDA Forest Service, n.d.). From Avery and other towns, engineers ran trains through the flaming forest to carry trapped Idaho residents eastward into Montana using the trestles and tunnels of the Milwaukee Railroad.

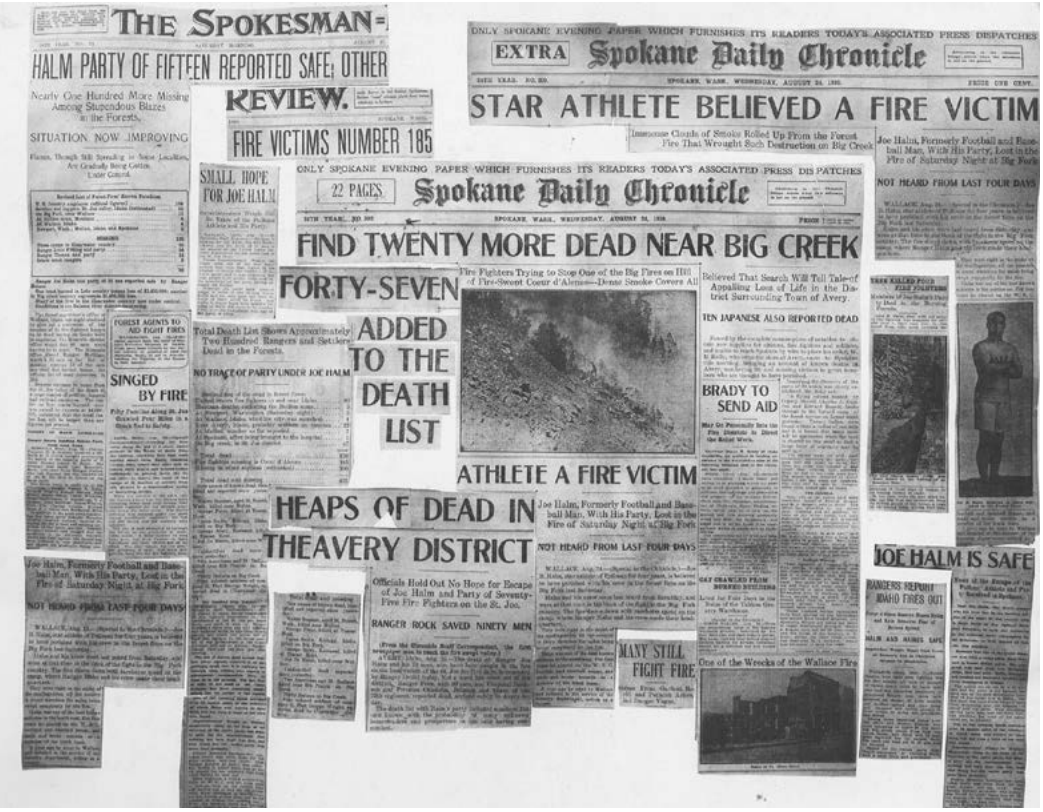
Another hero of the 1910 fires was Forest Ranger Ed Pulaski, who herded 45 firefighters into an abandoned mine shaft near the town of Wallace, ID. About 30 percent of this mining town burned to the ground. Pulaski eventually had to force the terrified firefighters at gunpoint to stay put until it was safe to leave the tunnel (Pyne 2001). Only five firefighters died, along with two horses. Visitors can see the historic Pulaski Tunnel by hiking the 2-mile (3.2-km) Pulaski Trail, which starts near Wallace.

During the firestorm, Pulaski stationed himself at the mine's entrance and covered it with wet blankets. He damaged his lungs and eyes, injuries he bore for the rest of his life. Although he petitioned the Forest Service multiple times, the agency never compensated him for his injuries and heroics; firefighters today are treated far better.

In 1911, Pulaski invented the pulaski tool, widely used for digging and chopping firelines. The pulaski has a small mattock or hoe at one and an axe at the other. Many of us family forest landowners have one or two on hand to control burns.

BURNING CONDITIONS

The "perfect firestorm" was produced by a rare convergence of factors:



Contemporary newspaper reports about the Big Blowup on August 20, 1910. Photo: K.D. Swan, USDA Forest Service (1930).

- Severe drought;
- Large masses of logging slash;
- Ignitions along the Northern Pacific and Milwaukee Railroad train tracks from cinders shot out from the stacks of steam engines; and
- Fires set by loggers and settlers.

Key to the conflagration in August 1910 was a gigantic dry-lightning storm packing hurricane-force winds. The nearest modern analog is probably the repeated dry-lightning storms accompanied by sustained 50-mile-per-hour (80-km/h) winds every 6 to 7 days that produced the widely publicized 1988 wildfires in Yellowstone National Park and the Northern Rockies. But even those conditions don't match the burning conditions for the 1910 fires.

Pundits sometimes equate the 1910 fires to 21st-century conflagrations. From about 1935 until 1970, however, western wildfires were mostly in drier forest types (like ponderosa pine and Douglas-fir) that historically experienced frequent surface fires. In ponderosa pine forests, the oldest needles, typically 4 to 5 years old, turn brown and drop off in late summer and autumn. They accumulate in prodigious quantities, an adaptation that virtually ensures frequent fire and sustains open-grown pine forests.

By contrast, the 1910 blowup burned mostly through forests of western white pine, western redcedar, and western hemlock. These forests historically burned infrequently—and when they did, it was often in patchy crown fires. In the 21st century, wildfires have been sweeping through entire landscapes due to continuous fuel buildups, longer droughts, and the millions of wildland–urban interface homes that divert firefighters from controlling the fires themselves.

The 1910 fires are sometimes called the largest ever known in western forests. In 1889, however, the *New York Times* repeatedly (on August 14, 15, and 20) covered fires burning from the outskirts of Portland, OR, to Miles City in southeastern Montana. Other literature reported massive 1889 fires extending from Boise, ID, through much of

western Montana and northward into Jasper National Park in Alberta, Canada (Tande 1979; Taylor 1989).

In 1889, however, the General Land Office (GLO) was responsible for Federal forest lands, and its primary mission was to transfer land to homesteaders and timber companies. The GLO had no wildland fire suppression campaign and no ability to control forest fires. Perhaps that's why the 1889 fires are overlooked by nearly all historians.

LEGACY OF FIRE EXCLUSION

The underfunded Forest Service used the 1910 catastrophe to gain more funding from Congress for fighting fires. That was quite a feat because a parsimonious Congress was ruled by "Uncle Joe" Cannon at the time, also known as "Czar Cannon." Joseph G. Cannon (R–IL) was a leader of the Republican Party and Speaker of the House from 1903 to 1911.

In his best-selling book *Teddy Roosevelt and the Fire That Saved America*, Timothy Egan described how Cannon, joined by powerful congressional representatives from Idaho, wanted to get rid of the Forest Service (Egan 2010). Many ranchers in the West resented Forest Service control of publicly owned forests because they wanted to log them at will for firewood, fencing, log structures, and lumber.

Fire That Saved America refers to the switch that western congressional representatives made after the 1910 fires to support the agency that tried to control the fires. Many Idaho residents also changed their tune. The Forest Service promised that it could prevent catastrophic wildfires in the future if Congress granted the funds needed to greatly expand its wildland fire suppression program. Congress did, essentially granting an open checkbook for fighting wildfires.

Unfortunately, the 1910 fires and the ensuing fire exclusion policy have brought increasingly destructive megafires. At the turn of the 20th century, many timberland owners in the West were advocating "light burning"—the use of frequent low-severity fires to sustain ponderosa pine and mixed-conifer forests for timber production. One California timberland owner, George Hoxie, published an article in *Sunset* magazine in 1910. "We must count on fire to help in practical forestry," he argued, "… as a servant … [otherwise] it will surely be master in a short time." Light burning was also practiced by ponderosa pine timberland owners in central Oregon, northwestern Montana, and South Dakota's Black Hills.

Mixed-conifer forest codominated by western white pine and Douglas-fir on the Coeur d'Alene National Forest in Idaho. The forests that burned in the 1910 Big Blowup looked much like this. Photo: K.D. Swan, USDA Forest Service (1932).

However, Hoxie's article coincided with the Big Blowup of 1910. That same year, a light burn in California blew up and burned across 33,000 acres (13,300 ha) before it was stopped at the edge of a national forest. Then as now, few people discerned the difference between burning a layer of dead pine needles and other litter beneath an open-grown forest and a wildfire burning dense forest augmented by heavy slash. The 1910 fires came to stand for all wildland fire in the public mind, and the Forest Service's policy of fire exclusion won the day.

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Figure 1—*The FLIR-One thermal imaging system being tested on an obvious hotspot. Photo: Joe O'Brien, USDA Forest Service.*

Consumer-Grade Infrared Thermal Imagers Are Useful for Fireline Operations

Joseph J. O'Brien, J. Kevin Hiers, Adam Humbach, Brian Lopez, and Whitney Machado

Satellite and aerial infrared imagery has been an important tool in wildland fire management for decades. The platform most widely used in the United States uses infrared line scanners deployed in aircraft with products generated by the National Infrared Operations Unit for synoptic intelligence on fireline intensity and position.

However, small uncooled infrared sensors have revolutionized wildland fire research by making instrumentation portable and easily deployed. Further development of very small uncooled infrared imagers has created a market for inexpensive consumer-grade thermal imagers that are available as stand-alone equipment or as smartphone accessories. These imagers have created an opportunity for widespread application to fireline operations, especially during mopup (fig. 1).

Small thermal imagers offer a higher probably of hotspot detection than cold trailing.

"Cold trailing" is a common technique used during mopup, whereby firefighters use their bare hands to detect buried heat sources on particularly critical control lines. Thermoreception, or the ability of skin to detect changes in surface temperatures at a distance, is relatively limited in humans. Typically, cold trailing requires the bare back of the hand to be swept within a few centimeters of the soil surface to detect buried smoldering combustion. The task is laborious and requires awkward physical positions or crawling on hands and knees; it is time consuming and inefficient. In some cases, contact with poisonous vegetation such as poison ivy or oak (*Toxicodendron* spp.) makes the task a health risk. Small thermal imagers offer a means of efficiently scanning wide areas with a higher probably of hotspot detection than cold trailing because of the high sensitivity of the

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imagers. Here, we report on a field test of these imagers on the West Mims Fire in May 2017.

TESTING THE IMAGERS

The West Mims Fire was ignited by lightning on the Okeefenokee National Wildlife Refuge and first reported on April 6, 2017. Droughty conditions resulted in the fire reaching more than 150,000 acres (60,000 ha) over a 50-day period. The refuge is surrounded by properties in a variety of land uses, including extensive pine plantations. Much of the acreage surrounding the refuge has not seen fire in many years; as a result, the area had heavy fuel loads and a well-developed duff layer.

When duff ignites, it can smolder for long periods of time and reignite other receptive fuels, especially after scorched needles are shed. These reignitions can compromise critical holding lines. Smoldering duff can also be buried by heavy equipment during fireline construction; these hotspots are particularly problematic because they are immediately adjacent to the control line.

On the West Mims Fire, we tested the application of small consumer-grade imagers in identifying hotspots on critical control lines. A team of field observers both used and trained hand crews. Although we did not create an experimental design that would allow us to quantify differences in detection probabilities among crews and imagers, we did feel confident in our qualitative observations on their effectiveness (fig. 2).

We chose the FLIR-One system, which is used in conjunction with either an Android or iOS smartphone application. (Many options are available for both smartphone accessory and stand-alone imagers, and this test is not an endorsement.) This particular imager has a temperature sensitivity of 0.2 °F (0.1 °C) and an 80-by-30-pixel resolution. The experiment was a success.

LESSONS LEARNED

The imagers were efficient and detected hotspots that cold trailing missed. Furthermore, a much larger area could be scanned in a shorter period of time, allowing a smaller crew to patrol firelines more efficiently and better detect areas in need of treatment. However, there are several caveats for efficient use of the imagers:

1. Users must be aware that imagers are optical sensors, so any obstruction—such as foliage or tree trunks—will hinder detection.
2. Solar radiation can heat blackened soils enough to cause the imager (or the cold trailer, for that matter) to miss buried smoldering combustion (fig. 3). During late afternoon on

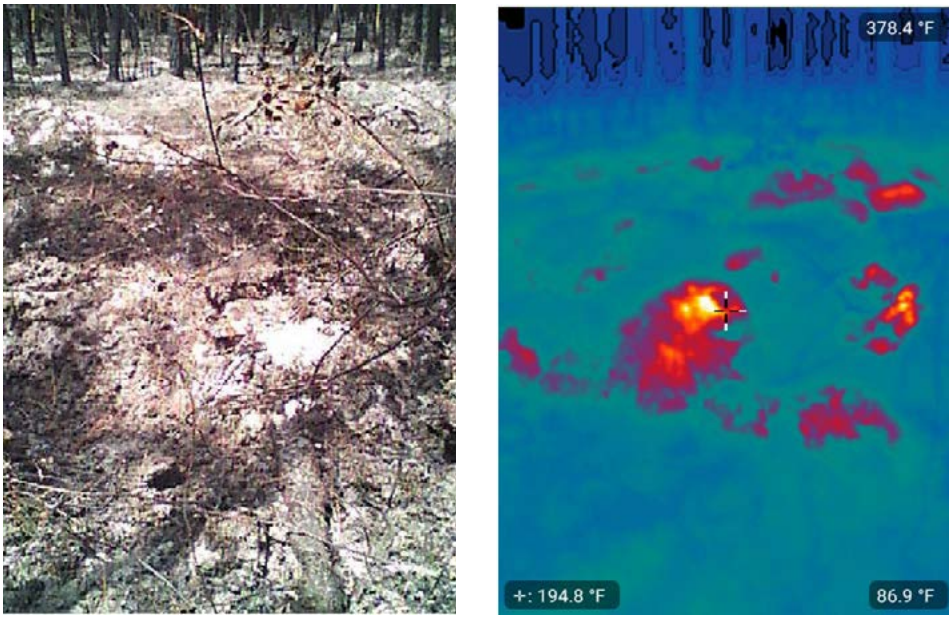

Figure 2—*Visual (left) and thermal image (right) of hotspots adjacent to a plowline. The areas of buried smoldering combustion were readily detectable from a distance and are indicated by the warmer colors in the color temperature scale on the right of the image. Photo: Joe O'Brien, USDA Forest Service.*

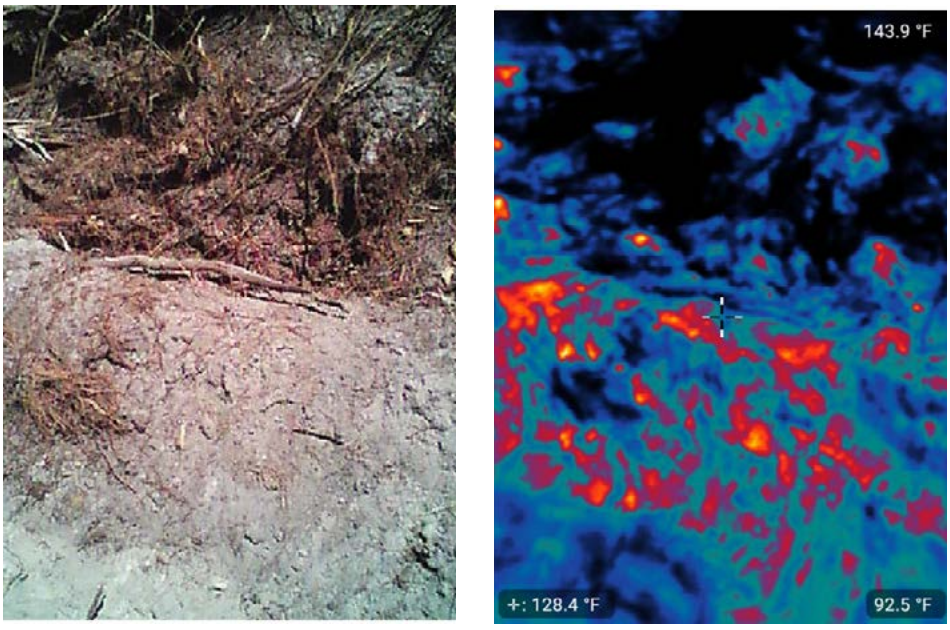

Figure 3—*Examples of solar heating mimicking buried smoldering materials. The visual image (left) shows direct solar heating of the edge of a plowline. The high temperatures shown in red and orange in the thermal scene (right) are false positives but are predictable at midday on hot sunny days. Photo: Joe O'Brien, USDA Forest Service.*

the West Mims Fire, soil surface temperatures approached 170 °F (80 °C) from solar heating. We found that the imagers, in the Southeastern United States in May, were best used from 4 p.m. to sunset and from dawn to about 10 a.m. The imagers would also work well at night, if desired.

3. The imager control software is constantly evolving, with FLIR and other versions being developed, so the user must become familiar with whatever application is chosen to integrate with the imager.

The FLIR application we tested could be improved by including audible detection alarms and an easy-to-set thresholding level, which would obscure temperatures in the scene below the temperature expected from buried smoldering combustion, about 130 °F (55 °C). A more durable housing would be an improvement; the male USB C connector is a point of weakness, and more battery capacity would be a plus. Our team engineered external battery packs and extension cables to increase imager utility.

Overall, the system proved effective off the shelf for patrolling critical plowlines on the West Mims Fire (fig. 4). It also has other potential useful applications, such as checking firefighter temperatures and for search and rescue. Stand-alone versions might be better suited for fireline operations because they are somewhat more rugged and do not require a smartphone. Smartphone external battery packs are useful for extending scanning time.

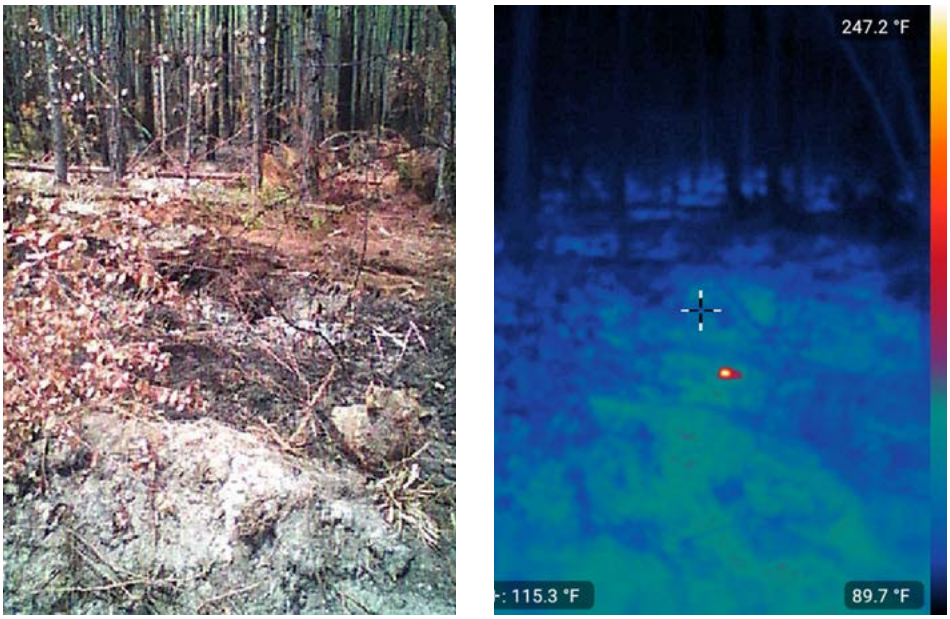

Figure 4—*A hotspot at about 50 feet (15 m) with no obvious visual cues (left) but easily detected by the thermal imager (right). Photo: Joe O'Brien, USDA Forest Service.*

Scene from Time's Running Out*: volunteer fire crew fighting a wildfire in West Virginia in 1969.*

Time's Running Out— A Successful Wildfire Prevention Film in West Virginia

Robert Beanblossom

Time's Running Out was a wildfire prevention film made in West Virginia in 1969. It succeeded in its day because its producers crafted its fire prevention themes to appeal to a targeted audience of Appalachian mountaineers. Though dated, the film contains lessons for foresters and others on how to convey key fire prevention messages to a particular audience.

TARGETED AUDIENCE

Human-caused wildfires were a perpetual problem in West Virginia in the 20th century. By the 1960s, the worst wildfires were concentrated in the coalfields of southern West Virginia. In 1968, a 10-county area with 29 percent of the State's forests accounted for 65 percent of its wildfires and 84 percent of its area burned. A Forest Service study in the late 1960s found that the 10-county area had wildfires at a rate more than six times higher than the rest of the State—and an average fire size more than twice as large.

Most land in the area was owned by out-of-State coal and land companies more interested in extracting energy resources than in managing forests. With little stake in the land, few residents developed a land ethic. Poverty, unemployment, and high school dropout rates were high and levels of formal education low, with little local knowledge of conservation. The prevailing local attitude toward wildfires was, "It's the coal company's property, so let them worry about it."

The coal industry was a major employer, and safety and health conditions were often poor in the mines; thousands of miners were killed or maimed in mining accidents, and thousands more suffered from black lung disease. No middle class existed to push for reforms. Strong fundamentalist religious beliefs led local residents to accept their fate and resist any change. Ongoing poverty and hopelessness have contributed to widespread opioid use today.

The film contains lessons on how to convey key fire prevention messages to a particular audience.

West Virginia has a long tradition of hunting, and hunters were often careless with fire, some using it to smoke out game. In 1964, hunters caused 41.9 percent of the 1,361 fires during autumn in southern West Virginia. Other common sources of wildfires included

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The prevailing local attitude toward wildfires was, "It's the coal company's property, so let them worry about it."

sparks from railroads as well as debris burning, the only way to dispose of trash for many mountaineers. Arson was also a leading cause of wildfires, typically used to retaliate against coal companies and other absentee forest landowners.

FIRE PREVENTION CAMPAIGN

Though perpetually underfunded, the Division of Forestry in the West Virginia Department of Natural Resources used some of its scarce resources to launch a fire prevention campaign in 1969. In the southern part of the State, specialists from the Department of Natural Resources visited every elementary school in Logan County to give a fire prevention talk and a seedling to every student. Planting the seedlings near homes, it was hoped, would give students a stake in the future of the forest, making them unwilling to see it burn. Unfortunately, the seedling campaign failed to take

Scene from Time's Running Out*: grandfather and kids explore the woods of West Virginia, establishing a sense of place.*

Appalachian culture into account: many local residents held a superstitious belief that "If you plant a tree, when it grows large enough to shade a grave, someone will die."

Another idea was production of a fire prevention film with a local flavor, a joint initiative by West Virginia University's Cooperative Extension Service and the Department of Natural Resources. The Cooperative

Officials believe that *Time's Running Out* helped to reduce carelessness with fire in the woods.

Extension Service paid $50,000 to cover production costs (about $360,000 today). *Time's Running Out* was the result, a 20-minute film shot primarily in southern West Virginia. Norman Simpkins of Marshall University offered insights on Appalachian culture in relation to wildland fire, key to the film's success. The movie featured local actors using local language; the theme song was performed by a popular local country music singer. The film premiered in October 1969 at a local school.

Time's Running Out is the story of damage caused by wildfires in southern West Virginia's mountains, as seen through the eyes of a grandfather on a hike through the woods with his grandchildren. The movie depicts damage to plants, timber, wildlife, recreation, and water resources, all patiently explained by the grandfather. The film shows scenes from actual fire towers; a State forest ranger on the radio in his truck; and scenes of white-tailed deer and other wildlife. It also shows

Scene from Time's Running Out*: mountaineer explains the need to be careful with fire in the woods of West Virginia.*

a staged wildfire and a fire crew made up of Federal trainees (using none of the personal protective equipment that firefighters use today).

KEYS TO SUCCESS

Since the 1960s, wildland fire management has greatly improved in the 10-county area of southern West Virginia, with the number of wildfires greatly reduced. The reasons include the following:

- Garbage service has improved, reducing the number of trash fires;
- The population has fallen as people have moved away in search of jobs;
- The completion of corridor G of the Appalachian Highway System (now U.S. Highway 119 from Charleston to the Kentucky border) and other roads have improved access to the area, discouraging arson and facilitating fire suppression;
- Introducing 911 calls has improved the reporting of wildfires, for a more rapid response; and
- Technological advances in spark arresters and braking systems have reduced the number of railroad fires.

Although it's difficult to evaluate the impact of a single film, officials believe that *Time's Running Out* helped to reduce carelessness with fire in the woods of southern West Virginia. In the 1980s–90s, the Division of Forestry built on the film's success by targeting arson and debris burning in further fire prevention campaigns.

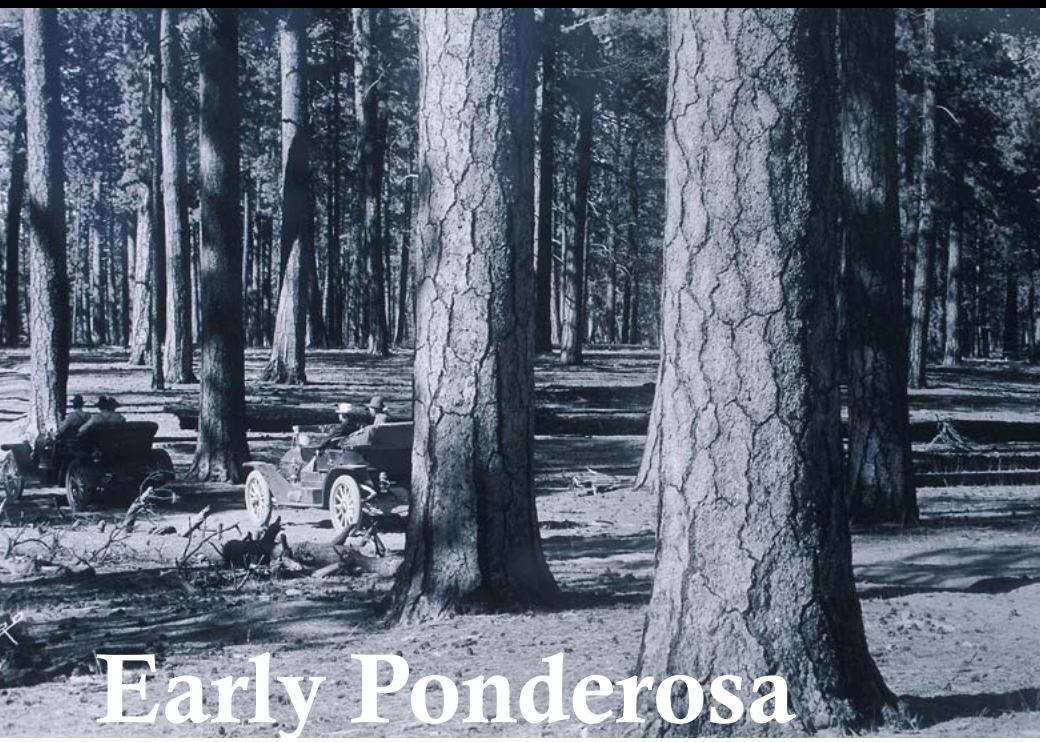
The film succeeded in connecting with its rural audience because the entire script incorporated elements of Appalachian culture.

The film succeeded in connecting with its rural audience because the entire script incorporated elements of Appalachian culture. For example:

- A grandfather was chosen as the main character rather than a father or mother because the grandfather has more control over extended families than any other family member.
- The grandfather repeatedly refers to God as the creator of nature, appealing to strong fundamentalist religious beliefs.
- Specific mention and depiction of southern West Virginia's mountains and forests in the film appeal to the mountaineer's strong sense of place.
- The grandfather uses specific words and phrases common in Appalachian culture, such as "quick as double-geared lightning," "doddy" for rotten, and "rock dust" for black lung disease. All three actors speak in the local dialect, for example pronouncing "fire" as "far" and using "hit" for the word "it."

In the last scene, the grandfather turns to face the camera and says, "How about it now? We'll all help out, won't we?" This scene was deliberately written into the script because individuals in Appalachian culture will seldom refuse a direct appeal for aid.

The film was effective for its time because it was tailored to a specific audience. The filmmakers used the backdrop of events and conditions in the Appalachian Mountains of southern West Virginia in the 1960s to create their film. Its success was due to a deliberate and thoughtful analysis of a particular targeted audience. Foresters and other natural resource professionals might benefit from the example in their own outreach and educational activities today.



Early Ponderosa Pine Forests: Notes on Fire Ecology*

Stephen F. Arno

Exhausted immigrants soon entered a realm of giant pines, grassy glades, and clear-flowing streams.

Wildland fire shaped the historical ponderosa pine and mixed-conifer forest landscapes throughout the West. Fire was also a controlling force in most of the drier vegetation types, ranging from shortgrass prairie to chaparral, scrub oak, and pinyon–juniper woodlands. It is therefore no surprise that wildland fire suppression in all of these landscapes has had profound effects.

OPEN-GROWN CONDITIONS

Ponderosa pine ranges from Mexico to Canada, covering about 40 million acres (16 million ha) across parts of most Western States. Historical photos and accounts of southwestern ponderosa pine forests document their open-grown conditions, with an undergrowth of luxuriant grass. In a 1960 monograph about changes in southwestern pine forests since white settlement, Charles Cooper cited a number of locations and sources (Cooper 1960).

In 1857 and again the following winter, Lieutenant Edward Beale led a famous corps of camels that was expected to revolutionize transportation across the Southwest. In what is now northern Arizona (on the Coconino National Forest), Beale described "a glorious forest of lofty pines, through which we have travelled ten miles [16 km]" (Lesley 1929). He recorded seeing "beautiful, broad grassy vales extending in every direction. The forest was perfectly open and unencumbered with brush wood."

An open stand of old-growth ponderosa pine in Oregon at the turn of the 20th century (on the Deschutes National Forest today). Photo: USDA Forest Service.

Joseph Rothrock, a botanist with the Wheeler Survey of 1875, described the region just south of Gallup, NM (Cooper 1960):

> *Gaining the summit, a thousand feet [300 m] above Fort Wingate, we were at an altitude of about 8,000 feet [2,400 m] above the sea, a fine, open, park-like region with a large growth of yellow pine [ponderosa and fir] covering the hillsides. A diversified herbaceous vegetation was out in the most brilliant colors, beautifying alike the woods and open grounds. … Good forage was abundant.*

Cooper (1960) described the same area as "almost bare of herbaceous ground cover, and dense thickets of pine saplings predominate."

Clarence Dutton's 1887 U.S. Geological Survey report on the Grand Canyon Region said of the Kaibab Plateau (Biswell 1972):

> *The trees [ponderosa] are large and noble in aspect and stand widely apart, except part of the plateau where spruces [likely Douglas-fir] predominate. Instead of dense thickets where we are shut in by impenetrable foliage, we can look far beyond and see the tree trunks vanishing away like an infinite colonnade. … There is a constant succession of parks and glades—dreamy avenues of grass and flowers …. From June until September there is a display of wild flowers which is quite beyond description.*

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** The article is adapted from Fiedler and Arno (2015).*

Ponderosa pine's decline is due to the effects of fire exclusion through wildland fire suppression and prevention.

Hundreds of miles farther north, pioneers on the Oregon and California trails rejoiced when, after months of struggling to cross scorching plains and deserts, they sighted the ponderosa pine forest. Exhausted immigrants soon entered a realm of giant pines, grassy glades, and clear-flowing streams. Rebecca Ketcham's 1853 account of reaching eastern Oregon's Blue Mountains conveyed the pioneer sentiment (Evans 1991): "Our road has been nearly the whole day through the woods, that is, if beautiful groves of [ponderosa] pine trees can be called woods. … The country all over is burnt over so often there is not the least underbrush, but the grass grows thick and beautiful."

Although the early descriptions all focused on an open forest of large ponderosa pines, several accounts described patches of young pines as well (Cooper 1960). One account is from John Hanson Beadle in 1873, based on his 5 years of exploring "the undeveloped West" (Beadle 1873). Beadle traversed the 75-mile-long (121-km-long) Defiance Plateau extending from northern Arizona into New Mexico. He found that "tall sugar pines [ponderosa] from 3 inches to 2 feet [8 cm to 0.6 m] in diameter, mingled with a few dwarfish oaks, were scattered in regular proportion" (Beadle 1873). This aligns with findings in California by Harold Weaver that ponderosa pine can regenerate successfully in open stands of large trees, despite frequent wildland fires (Weaver 1943). It also debunks assertions by the early Forest Service that "light burning" would eliminate pine reproduction (Greeley 1920).

An extensive review of historical conditions also confirms Weaver's finding that trees in forests dominated by ponderosa pine throughout most of the West were irregularly spaced (Hood and Miller 2007). Patches of pines of different ages were generally open growing, with grassy meadows in the openings. Although some patches were fairly dense, the forest generally had 40 to 60 trees of all sizes per acre. Low- to moderate-intensity surface fires predominated in ponderosa pine woodlands throughout the West.

PONDEROSA PINE DEGRADATION

Today, many of these open woodlands have become dense forests averaging hundreds of trees per acre, including thickets that erupt into a crown fire when lightning or people ignite them under dry conditions. A huge part of the wildland–urban interface is in ponderosa pine-dominated forests bordering public lands. No wonder there is an ever-increasing problem with controlling wildfires. Weaver (1943) and Cooper (1960) already noted that fire exclusion in ponderosa pine was resulting in dense thickets of young trees. Today, the thickets are even more widespread,

Ponderosa pine with regeneration on the Lincoln National Forest in New Mexico in 1922 (part of the Capitan Wilderness today). Photo: S. Strickland, USDA Forest Service.

Living Artifacts: "Indian Trees"

Indian Trees are officially recognized as living artifacts because of distinctive scars in the bark made by American Indians as long ago as the 17th century. Indian women, with help from children, peeled away the inner bark on one side of the tree each spring, when the bark was saturated with sugar and nutrient-rich sap. The women used a long wooden chisel called a spud.

Many Tribes used the inner bark, which was like a thick layer of saturated felt, as a food sweetener and as an additive to preserve the mixture of dried meat, tallow, nuts, and berries called pemmican. They also used the saturated inner bark to preserve the heavy cord or thin rope they made from sinew.

Many Indian Trees have multiple scars from different years. However, the bark peelers were careful not to cut away the inner bark and cambium completely around the tree, thus killing it by girdling it. Indian Trees grow in nearly all Western States, including Colorado, Utah, Arizona, and New Mexico.

Thickening of the forest canopy has serious implications for western watersheds and stream-flows.

making it nearly impossible to protect old orange-bark ponderosa pines from severe wildfires.

One tragic result is that "Indian Trees"—living artifacts and a classic part of our national heritage in the West (see the sidebar on the previous page)—can no longer be protected from wildfires. In western Montana alone, hundreds of Indian Trees are documented and designated as historic objects that must be preserved, and at least two areas have interpretive displays (Arno and others 2008; Josefsson and others 2012). During the Lewis and Clark Expedition (1803–06), Captain Meriwether Lewis recorded Indian Trees on his journey up Lolo Creek and over the Bitterroot Mountains (DeVoto 1997).

The upper Bitterroot River drainages have the highest known concentration of Indian Trees. Professor Lars Östlund and his students from Umeå University in Sweden documented 274 Indian Trees in the two areas they studied alone. One forest road branching off from U.S. Highway 93 at the southern end of the Bitterroot Valley leads to Indian Trees Campground, which contains multiple Indian Trees. A display at the entrance shows how Indian women peeled the sap-rich inner bark of these pines in spring. However, the open-grown ponderosa pines are being invaded and crowded out by young Douglas-firs due to the elimination of wildland fire. Even before you get to the campground, you see some of the big, ancient, bark-peeled ponderosa pines and the young invading Douglas-firs.

Virgin ponderosa pine stand on the Lincoln National Forest in New Mexico in 1928. Heavy grazing by goats has eliminated pine reproduction and most herbaceous ground cover. Photo: E.S. Shipp, USDA Forest Service.

On moist sites in mixed-conifer forests—which historically didn't burn as often—fuels accumulated and thickets of Douglas-fir and white fir let wildland fires torch through patches of forest. The burns sometimes became wind-driven crown fires, which were limited in size by a landscape mosaic that included open forest, aspen groves, and grassy meadows. Native insects and diseases weakened and killed ponderosa pines in the original forests, but frequent wildland fires tended to limit their impact. Today, various species of bark beetles, rust and root-rot fungi, dwarf mistletoe, and needle-cast disease take a heavy toll.

On south- or west-facing slopes, relict old-growth ponderosa pine stands can still be found at surprisingly high elevations—6,000 feet (1,800 m) in the Northwest and 8,500 feet (2,600 m) in the Southwest. However, such sites have now been mostly taken over by firs. In the Northern Rockies, the original area of forest dominated by ponderosa pine, which included trees 500 to 800 years old, is thought to have decreased by about 40 percent. The decline is due to the effects of fire exclusion through wildland fire suppression and prevention. On southern Utah's Fishlake National Forest, ponderosa pine once covered about 135,000 acres (55,000 ha); but by 1998, it occupied only about 41,000 acres (17,000 ha), mostly due to encroachment by firs (Hood and Miller 2007).

ADVERSE IMPACTS

Thickening of the forest canopy has serious implications for western watersheds and streamflows. The dense cover of trees intercepts a large percentage of the rain and snow, allowing most of it to evaporate or sublimate directly back into the dry atmosphere, thereby preventing replenishment of groundwater. Then, when a conflagration engulfs the forest, accelerated erosion can wreak havoc in the form of downstream flooding, washing out roads and filling streambeds and reservoirs with silt and debris.

In many parts of the Interior West and Rocky Mountains, unregulated livestock grazing to supply mining boomtowns began in the 1860s; although Federal agencies enacted grazing restrictions in the 1920s, effective enforcement was difficult to achieve until late in the 20th century. Abusive grazing trampled and removed native grasses and forbs as well as flowering herbaceous plants, leaving bare ground that was colonized by unpalatable shrubs and a variety of noxious weeds that now plague meadows and forests. Countless millions of dollars have been spent applying a variety of herbicides to control weeds on forest land, mostly with limited success.

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The cockpit of a Cessna 182. Photo: Randall C. Thomas, USDA Forest Service.

A Dispatcher's Aviation Mishap Guide

Randall C. Thomas

Dispatch centers are often the first point of notification for aviation incidents and accidents.

I was very fortunate throughout my years of working with the fire and aviation programs for the National Park Service and the Forest Service: I never witnessed—or was involved in—flight operations that resulted in an aircraft accident where an agency employee (or, for that matter, the pilot of an aircraft on a Government contract) resulted in a fatality. Most of my involvement with aviation activities was as a dispatcher in dispatch centers.

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Recently, I read a "6 Minutes For Safety" aviation mishap review. The review says this:

> *A posted and accessible written mishap action plan is an important first step. A checklist of actions will ensure that nothing is missed in a stressful, time-critical period. All crew members must know where to find the plan and must understand how to use it in an emergency.*

Many of the bullet points that follow are the same as what is published in the Incident Response Pocket Guide we use today for fire suppression and aviation operations. The guide is published by the National Wildfire Coordinating Group (PMS 461).

As stated in the master Aviation Mishap Guide and Checklist (PMS 503), "This checklist must be tailored to the local organization, mission, and operational location." An aviation hazard map should be posted in the dispatch office; and a mishap plan, updated annually, should be at each dispatch desk. It is important that the pilot and the chief of party be briefed on the aerial hazards for the dispatch area.

Dispatch centers are often the first point of notification for aviation incidents and accidents. I have used an interagency aviation mishap response guide and checklist, and it has proven to be very useful. Once was when we had an air patrol aircraft go down in a field; another time, some Forest Service units told me of a privately owned plane (not on contract with the Government) that had gone down on a national forest. On both incidents, the county had jurisdictional responsibility and Forest Service personnel assisted in the emergency response. The county dispatch center coordinated the emergency response, and I assisted as a fire dispatcher. Dealing with agency and nonagency aviation accidents requires using different protocols.

I have been involved in helping to edit and review aviation mishap guides and checklists, which should be done

Aviation accidents generally create a lot of anxiety and high emotions.

on a yearly basis. Most of my work pertained to the safety aspect of aircraft operations, such as flight-following aircraft from liftoff to landing; at times, I advised pilots of aircraft that were flying close to their locations. In the event that a dispatcher loses contact with an aircraft and it has gone missing or is overdue, the Aviation Mishap Guide and Checklist has a section that outlines what to do.

Every aviation accident requires that we protect people first, dispatching first responders, giving them accurate information, and updating them while they are on their way. Not everything will be under your control as a dispatcher, but having the aircraft protected and all the evidence secured is essential, especially for the aircraft accident investigation.

Aviation accidents generally create a lot of anxiety and high emotions. As soon as the word gets out, you might have people around you, possibly with a lot of aviation experience, who start telling you why they think the accident occurred. It is best to not speculate and not to let anyone around you affect your concentration on the task at hand. ***Note:*** It might even become necessary to ask your supervisor to clear the office of all nonessential personnel who are making noise and distracting you from dealing with the incident.

As a dispatcher, you should document the contacts made. You can make notes on the aviation mishap plan, but local dispatch procedures might require you to document everything associated with the aviation accident in an incident log. If help is available, you can have someone else make notes of contacts while you dispatch resources to the scene of the accident.

Remember, it is always a bad day when dealing with an aircraft accident. But you can go a long way toward reducing your stress level by having reviewed your local aviation mishap guide and checklist, following through with the tabbed information in order, and having contacts and phone numbers up to date. Taking these simple steps can make you more comfortable and efficient in accomplishing your emergency dispatching operations.

Fire Management today

GUIDELINES for Contributors

Fire Management Today (FMT) is an international magazine for the wildland fire community. The purpose of FMT is to share information and raise issues related to wildland fire management for the benefit of the wildland fire community. FMT welcomes unsolicited manuscripts from readers on any subject related to wildland fire management.

However, FMT is not a forum for airing personal grievances or for marketing commercial products. The Forest Service's Fire and Aviation Management staff reserves the right to reject submissions that do not meet the purpose of FMT.

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Submit electronic files in PC format. Submit manuscripts in Word (.doc or .docx). Submit illustrations and photographs as separate files; do not include visual materials (such as photographs, maps, charts, or graphs) as embedded illustrations in the electronic manuscript file. You may submit digital photographs in JPEG, TIFF, or EPS format; they must be at high resolution: at least 300 dpi at a minimum size of 4 by 7 inches. Include information for photo captions and photographer's name and affiliation at the end of the manuscript. Submit charts and graphs along with the electronic source files or data needed to reconstruct them and any special instructions for layout. Include a description of each illustration at the end of the manuscript for use in the caption.

For all submissions, include the complete name(s), title(s), affiliation(s), and address(es) of the author(s), illustrator(s), and photographer(s), as well as their telephone number(s) and email address(es). If the same or a similar manuscript is being submitted for publication elsewhere, include that information also. Authors should submit a photograph of themselves or a logo for their agency, institution, or organization.

STYLE

Authors are responsible for using wildland fire terminology that conforms to the latest standards set by the National Wildfire Coordinating Group under the National Interagency Incident Management System. FMT uses the spelling, capitalization, hyphenation, and other styles recommended in the U.S. Government Printing Office Style Manual, as required by the U.S. Department of Agriculture. Authors should use the U.S. system of weight and measure, with equivalent values in the metric system. Keep titles concise and descriptive; subheadings and bulleted material are useful and help readability. As a general rule of clear writing, use the active voice (for example, write, "Fire managers know…" and not, "It is known…"). Give spellouts for all abbreviations.

TABLES

Tables should be logical and understandable without reading the text. Include tables at the end of the manuscript with appropriate titles.

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Figures, illustrations, and clear photographs are often essential to the understanding of articles. Clearly label all photographs and illustrations (figure 1, 2, 3; photograph A, B, C). At the end of the manuscript, include clear, thorough figure and photo captions labeled in the same way as the corresponding material (figure 1, 2, 3; photograph A, B, C). Captions should make photographs and illustrations understandable without reading the text. For photographs, indicate the name and affiliation of the photographer and the year the photo was taken.

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