



WILDFIRE

QUARTER 2, 2023
UNITING THE GLOBAL WILDLAND FIRE COMMUNITY


An official publication of the INTERNATIONAL ASSOCIATION OF WILDLAND FIRE

SITUATION REPORT

THE IMPACT OF CLIMATE CHANGE
ON THE 2023 WILDLAND FIRE SEASON

WILDFIRE SCIENCE & TECHNOLOGY SOLUTIONS

FOR WILDLAND FIRE AGENCIES
AND ELECTRIC UTILITY

 technosylva.com



*Learn more about our
scientific research
and collaborations.*



Our products operationalize wildfire science and have been implemented across the USA, Europe, and South America, providing **robust and proven technology** solutions to enhance daily decision making. Our software is used to manage more than **20,000 incidents per year worldwide**.



Advanced wildfire risk forecasting, on-demand fire spread predictions, and fire behavior analysis.



Full-featured COP providing comprehensive situational awareness through seamless data integration.



Enterprise-wide incident & resource management tracking system supporting the entire lifecycle of an incident.



NEWS AND OPINION

FIRELINE 5
BY LAURA KING

PRESIDENT'S DESK 6
PROFESSIONAL FIRE FIGHTING IS A WHOLE-YEAR JOB
BY JOAQUIN RAMIREZ CISNERO

THOUGHTS ON LEADERSHIP 46
CARING FOR THE LEADER WHEN THE LEADER IS YOU
BY MIICHAEL DEGROSKY

SITUATION REPORT

CANADA: MOVING WATER 10
RESEARCH INFORMS CARETAKER PROGRAM
BY COLIN MCFAYDEN AND JASON ROBINSON

GREECE: NOT BUSINESS AS USUAL 12
NEW PROJECTS, PERSONNEL, AND POLICIES AIM TO PREVENT WILDFIRE DISASTERS
BY GAVRIIL XANTHOPOULOS, EMMANOUELA ZEYGOLI, AND KONSTANTINOS KAOUKIS

SCANDINAVIAN PENINSULA: TAKING STOCK 16
VEGETATION AND CLIMATE CHANGE PRESENT CHALLENGES
BY NIEVES FERNANDEZ-ANEZ AND FRIDA VERMINA PLATHNER

SOUTH AFRICA: RISK MANAGEMENT 20
POLICIES AND CO-OPERATION REQUIRE ENHANCEMENT
BY TESSA OLIVER

CHINA: PRECIPITATION AND TEMPERATURE 24
CLIMATE CHANGE IMPACTS THE FIRE LANDSCAPE
BY MINGCHUN SHI, CONG GAO, AND XINYAN HUANG

MALAYSIA: GETTING TO THE ROOT OF PEAT FIRES 28
RESEARCHERS PROPOSE INCREASED COLLABORATION
BY MOHD ZAHIRASRI MOHD TOHIR AND DAYANG NUR SAKINAH MUSA

AUSTRALIA: THE NEED TO BE PROACTIVE 30
ACTIVELY PREDICTING FIRE-SEASON SEVERITY FROM ANALYSIS OF
HISTORIC FIRE CLIMATOLOGY
BY ANDY ACKLAND AND MUSA KILINC

FEATURES

THE THINGS THEY CARRIED 8
ODE TO A HOTSHOT CREW
BY NICOLE PEPAJ

WAY DOWN SOUTH 36
UNITED KINGDOM PROVIDES WILDFIRE TRAINING AND EQUIPMENT TO
FALKLAND ISLANDS
BY ROB GAZZARD

THE IGNITION 40
A FIREFIGHTER'S JOURNEY TO FINDING CALM IN CHAOS
BY BEQUI LIVINGSTON

ON THE COVER

Typical flame heights in no-wind, no-slope conditions on the Scandinavian Peninsula (Sweden and Norway). The forest floor of the pine stand is carpeted with Pleurozium moss and Cladonia lichens under a Vaccinium field layer. See Situation Report – Scandanivian Peninsula, page 16. Photo by Frida Vermina Plathner.

EDITORIAL

Laura King managing editor
laura@iawfonline.org

BUSINESS

Mikel Robinson administration
execdir@iawfonline.org
Kim Skufca advertising associate
Kim@iawfonline.org
Shauna Murphy graphic design
Century Publishing
Post Falls, Idaho

COMMUNICATIONS COMMITTEE (IAWF)

David Bruce, chair
Mariona Borrás
Amy Christianson
Lucian Deaton
Jennifer Fawcett
Xinyan Huang
Laura King
Richard McCrea
Mikel Robinson
Kim Skufca
Ron Steffens
Michele Steinberg
Gavriil Xanthopoulos

ASSOCIATE EDITORS

David Bruce, chair (Australia)
G. Matt Davies (Scotland)
Richard McCrea (U.S.)
Michael Scott Hill (U.S.)
Albert Simeoni (U.S.)
Cathelijne Stoof (Netherlands)

BOARD OF DIRECTORS

Joaquin Ramirez (U.S.), president
Kelly Martin (U.S.), vice-president
Sarah Harris (Australia), secretary
Sara McAllister (U.S.), treasurer
Mikel Robinson (U.S.), executive director
Amy Cardinal Christianson (Canada)
Scott Goodrick (U.S.)
Tom Harbour (U.S.)
Trevor Howard (Australia)
Xinyan Huang (Hong Kong)
Michael Norton (Canada)
Ciaran Nugent (Ireland)
Nuria Prat-Guitart (Spain)
David Shew (U.S.)
Amber Soja (U.S.)
Naomi Eva Stephens (Australia)
Vivien Thomson (Australia)

THE WORLD IS FACING THE GREAT WILDFIRES OF THE XXI CENTURY

ARE YOU READY?



vallfire
the wildfire
company

Modern Equipment for Today's Wildland Fires



vft safety



vft tools



vft frontline

Visit our website and find your dealer

www.vftnorthamerica.com

A GLOBAL SIT-REP

BY LAURA KING

We're thrilled to feature some new writers in this issue, with insight into the wildland fire situation around the globe – in particular, the Scandinavian Peninsula, South Africa and Malaysia.

We asked our writers, and our enthusiastic IAWF board members, to provide overviews for 2023 – predictions, preparation, technology, research, and lessons learned that can be shared.

Our Situation Report section (pages 10 through 34), features stories from Canada, Greece, the Scandinavian Peninsula, South Africa, China, Malaysia, and Australia.

In Canada (page 10), researchers are looking at the principles needed to understand and compare airtanker effectiveness – the size and concentration of a drop and what that drop will mean in context of the change in fire behavior. According to writers Colin MacFayden and Jacob Robinson, the research included a novel means to measure water drop patterns at high spatial resolution using infra-red scanning technology. One of the early results of this research will be the publication of the Reference Guide to the Drop Effectiveness of Skimmer and Rotary Wing Airtankers. According to MacFayden and Robinson, the guide will provide “a systematic and objective method for the relative comparison of the water drop effectiveness of both fixed- and rotary-wing airtankers commonly used in the North American boreal regions.”

After the challenging wildfire seasons in Greece in 2018 and 2021, that country increased prevention through a forest fuels treatment program, and suppression via arial resources. Although 500 promised new personnel have not yet been hired, and Greece is only beginning to consider prescribed fire, there's progress.

Similarly, although there are applied fire programs in the Scandinavian Peninsula – Sweden and Norway – both countries are experiencing new challenges and anticipate intense wildland fire seasons (page 16).

In South Africa, according to writer Tessa Oliver, there have been more wildfires – and more intense wildfires – recently. Prescribed burning is necessary for fuel reduction and ecosystem maintenance (page 20), but there is a lack of experience and capacity to implement such a program.

China is similarly working to reduce the incidences of fire, particularly in subtropical China where most wildfires are human-ignited. But as writers Mingchun Shi, Cong Gao and Xinyan Huang explain (page 24), worsening fire weather that favors ignition and spread could render new restrictions on human ignition in vain.

In Malaysia, peat fires are not new, but there are new methods to control them. An award-winning invention sprays water on the surface while also flooding the underground fire. In parallel with the Peatland Fire Prevention Programme (page 28), and collaboration among stakeholders, the peat fire issue is being better managed.

Australian bushfire trends are concerning, according to writers and researchers Andy Ackland and Musa Kilinc. And although it's important to make predictions, Ackland and Kilinc explain (page 30) a fire climatology analysis system that has been used since 2007 to assess property loss, fatalities, area burned, and weather patterns since 1900.

“The system reveals that all of Victoria's worst bushfire seasons . . . followed a period of severe cumulative rainfall deficit commencing the autumn prior to the fire season,” the writers say. “Virtually all seasons with a January-to-October anomaly beyond -150 millimetres go on to have severe bushfires.”

Way down south, in the Falkland Islands (page 36), policy advisor Rob Gazzard details the development of a program to understand wildfire challenges. The Falkland Islands – an archipelago the size of Northern Ireland – is mostly covered in shallow and deep peat that stores millions of tonnes of carbon and has experienced an increasing number of wildfires because of drying from climate change.

The three remaining pieces in this issue – Michael DeGrosky's Thoughts on Leadership column focusing on self-care (page 46), Bequi Livingston's remarkable first-person account of her journey through post-traumatic stress after the Yarnell 19 (page 40), and Nicole Pepaj's delightful twist on *The Things They Carried* (page 8), make for compelling reading no matter where you are, or what you carry.



PROFESSIONAL FIRE FIGHTING IS A WHOLE-YEAR JOB

BY JOAQUIN RAMIREZ

One of the global challenges for our wildfire community is how to advance the concept of wildland firefighter professionalism around the world. In the United States, we are accustomed to levels of established fire response – from local fire departments to state agencies and federal resources – but other countries are just starting on this response journey. Agencies and organizations in these countries need to ensure that firefighters understand the specific risks of wildfire in their environments, have the right personal protective equipment, and respond to fires with the best operational safety standards in mind.

Recently, the national government in Spain established a National Accreditation on the Role of Wildland Firefighters. With this accreditation, wildland fire fighting will be recognized as a profession with defined

job descriptions, set working hours, and operational models. This milestone came after years of requests from the national firefighting community and finally was recognized after the catastrophic fires in Spain in 2022. Previously in Spain, wildland firefighters were considered forest workers, quite often seasonal, and underpaid for their efforts. This new recognition brings hope to the goal of seeing wildland fire fighting at least at the same level as urban first responders. Additionally, this accreditation will help build skills and capabilities for wildland firefighters to best respond to the evolving threat of wildfire across Spain and Europe in general.

Countries facing growing wildfire threats need to have recognition systems for wildland firefighters, not only for operational safety but to make sure they receive



proper support. In all countries, there are issues such as firefighter mental health and exposure to toxins that cause diseases like those experienced by miners; the impact of these issues on the lives of firefighters and their families must be considered.

Wildland fire fighting also needs to be designated as a year-round job, as firefighting seasons need to be followed by fire resilience seasons. Too often, so-called seasonal firefighters are relied on to deal with what is wrongly assumed to be a short-term risk. We know that wildfire is now a year-round threat in many places and that training must be actively maintained. Firefighters who maintain a year-round focus on wildfire can ensure more resilient landscapes through preventative work in quieter times and better response when smoke is in the air. Wildland fire fighting is a whole-year job.

It is important, though, that support for the professionalism of wildland firefighters comes from the public first and then from local and national governments, whereas agencies can maintain the valuable connection of firefighters to their communities and the goals of local land management. We should also view professional wildland fire fighting through the lens of rural job development and community resilience. This issue is as important in the United States as it is around the globe. There are local lessons from countries in Europe, Latin America, and Southern Africa that can help advance this effort.

Finally, in May, the 8th International Wildland Fire Conference in the city of Porto, Portugal, will bring wildfire practitioners and researchers together from around the globe to share knowledge and address pressing needs in local governance around wildfire preparedness and response. This quadrennial event is the premier global wildland fire conference and provides unique international reach for our community. I'm happy to say that our association is an institutional partner for the event, helping to advance promotional and advertising opportunities about the conference to our diverse and international membership.

Additionally, our association provided expert advice on conference topic development and in the selection of speakers who support the conference themes. We're proud to play this role because we believe in the value of this event and in the collaboration of international voices and experiences. We will bring our perspectives to this great discussion and learn from the views of others as we all advance our community. After Porto, our association will help advance the post-show recommendations, ensuring that the great words

spoken there are put into action everywhere.

My first exposure to this conference was in 2007 when it was hosted in Seville, Spain; that was the start of a trip that changed my life, as it was when my friend Russ Johnson, a former Type 1 incident commander working for ESRI told me, "Hey, you should come to the United States." Life-changing events happen when we meet.

The nature of wildfire is changing globally, and we need to ensure that our firefighters have the professional support required as we ask them to put their lives in danger on our behalf. This June is the 10-year anniversary of the tragic Yarnell Hill Fire that took the lives of 19 members of the Granite Mountain Hotshots as they were overrun by fire in shifting wind conditions. I think improved technology can bring great value to providing a safer environment for firefighter operations, individual tracking, and advanced situational awareness.

As we enter high wildfire danger in the global north, lessons from the 8th International Wildland Fire Conference will deepen the advocacy we all can do as a global wildfire community to ensure a safer environment for all.

Be safe out there.

ABOUT THE AUTHOR



Joaquin Ramirez Cisneros is a wildland fire technologist who has been working for the last 25 years to bridge the gap between scientists and end users. In 2013, Ramirez moved to San Diego from Spain, and now works with agencies worldwide trying to convert the best science into actionable tools. Ramirez is the creator of several of the most advanced fire behavior software model implementations and decision support systems, including the Wildfire Analyst and fResponse software tools. Since 2011, Ramirez has co-ordinated the first European M.S. in Forest Fires (www.masterfuegoforestal.es) with Prof. Rodriguez Francisco y Silva (UCO) and Prof. Domingo Molina (UdL). Ramirez is a founder and active member of the Pau Costa Foundation. He earned his PhD in remote sensing and GIS at the University of Leon in 2003, an M.S. in forestry from the University of Lleida, and his B.S. in forest engineering from the Polytechnical University of Madrid, Spain.

THE THINGS THEY CARRIED

Ode to a hotshot crew

BY NICOLE PEPAJ

The things they carried were based on weight. A wildland firefighter's pack weighs 45 pounds fully kitted out. Sawyer's packs weigh more. They contain all the necessary tools used to fight brush fires: fuses for backfiring; extra parachute cord; headlamps and spare radio batteries; two days' worth of rations; and above all, our fire shelters.

We all carried our Incident Response Pocket Guides in our helmet webbing; they contained complete instructions for how to be a firefighter. We used that thing all the time.

I carried the chainsaw once on a PT hike; it weighs about 35 pounds plus cigs, wedges, saw pack, and felling tool. I don't remember if I went very fast; all I recall is that I went all the way.

Waylon carried a Jetboil strapped to the webbing of his fire pack, so he could have coffee and ramen noodles on the line.

James carried extra food and water, because he knew some rookie wasn't going to have enough, while Engleka stripped his MREs of useless stuff like chewing gum and crackers to only carry the main ration packets and cut down on pack weight. James Rule was our squaddie, after all, everyone's older brother.

Will carried a hunting poncho for the rain. I took it once and wore it in a storm, then hid it from him for days. It started a war that went on all season, and he called me an inappropriate name when I finally gave it back out of guilt.

Barkhouse carried postcards from all the ranger districts we'd visit. He sent them to his girlfriend listing the names we called him. I can only remember a few: Don Birdhouse; Dave Bitchhouse III; Dick Butthouse; Bark Doghouse; Damn Whorehouse on 3rd.. He carried

a lamb with a broken leg to our EMT once. Joe, one of our squaddies, teased that he looked like Jesus coming down the mountain.

Tim Arrington carried the medkit, since he went to college. All the biologists end up working fire. It requires a GED and pays more.

Matt Brask carried the belt weather kit; they had him sling it in the snow once to see if the ground was still wet, and he actually did it. He also carried the monkey-paw, I recall, which is this little handrake we use to clean chaff off the handline. Don't diss it or they'll make you carry it.

Chris Cole carried the kuth notebook, containing a record of all the dumb stuff we did on the crew. I got kuthed 27 times in my first month.

Sherrick carried his cellphone in a plastic baggie on project work. His little brother Dylan carried his IRPG in his back pocket so he could flip it out in a pinch and give his bro the answers when he was doing his squad boss training. He also carried a Pulaski he'd named "The Pooper Scooper," carved it into the hickory hilt with a dremel. Caroll carried one too, but his was named "Optimus Prime."

Amanda carried a Leatherman she'd been given for 10 years of distinguished service. It was nice to know that if you worked 10 years you'd get a multitool. Maybe after 20 you'd get a pay raise. If anything, they should have given Amanda her own crew but seeing as we all followed her lead anyway, in many ways they probably did.

I carried a Swiss Army knife that my dad gave me when I was six. He said every kid ought to have a knife. My crewmembers teased that they'd had one of those in boy



scouts. I dropped it in the Snake River by accident and was very distraught. But I realized that if I lost it in the river, the river wanted something to remember me by.

Wabo carried a slingshot he used to hunt voles on the line. I never saw him use it, but he claimed that's what it was for. I've heard that we used to be able to carry guns on the line until a legendary crew boss held his firefighters at gunpoint in a cave during a burnover. He saved their lives, and as a result, no more firearms.

Cy didn't carry a tent, so I thought it was OK for me to not carry one either. I got caught in a rainstorm on Rirey Ridge and the whole crew laughed. After I dried off, I did too.

Willie "Bing-Bong" Bingman carried an emergency bivvy that rolled up to the size of his fist. I remembered this when I joined a new crew years later, and everyone with bulky tents stared in awe of my ingenious sleeping system.

Matt Workman carried extra chewing tobacco. I don't think I ever saw him without a dip in. He said he'd sell it for markup at firecamp to the inmate crews but I'll bet that was baloney. I saw him cut a tree down with a boy-axe once for kicks, so I know he wasn't bs-ing.

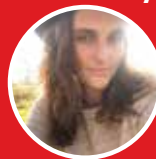
Bitz carried dairy shakes that came with select MREs Those things were currency on the line.

Justin Engleka carried an apple fritter he'd gotten when we were on per diem and it was day 11 of a 14-day roll. Some ruthless bastard stole it and he went around interrogating the entire crew for its whereabouts. I confess this here and now, after carrying it on my chest for almost 10 years. It was me. I did it. I took Engleka's apple fritter.

I lost touch with all of them after we dispersed, went to different crews, scattered across the country.

James Rule carried us all.

ABOUT THE AUTHOR



Nicole Pepaj is a wildland firefighter with a hotshot crew in the U.S. Forest Service. Pepaj has a degree in journalism from Santa Monica College. Her article is reminiscent of the 1990 collection of short stories, *The Things they Carried*, by Tim O'Brien, about a platoon of U.S. soldiers in Vietnam.

"Cut Line in Less Time!"



Super P Pro 40



Hoe 40



Chingadara 40



Bigfoot 40



Designed by Professional Wildland Fire Captain.

Proprietary Steel Formation Holds Sharpened Edge Longer and Resists Chipping. Universal Neck Allows for all Parts of Tool to be Fully Replaceable and Interchangeable.

MORE PRODUCTS AVAILABLE AT:

JRFIRETOOLS.COM

P.O. Box 1617 • Cedar Ridge, CA. 95924 • (530) 272-1444



Pounder II 40



Scalper 48



McLeod 48



Wire Fire Broom 52



SITUATION REPORT

CANADA

MOVING WATER

RESEARCH INFORMS AIRTANKER PROGRAM

BY COLIN MCFAYDEN AND JASON ROBINSON

Managing wildland fire in Canada is a large and growing challenge. In Canada's vast boreal forest, fire – high intensity crown fire – is a natural part of the ecosystem, quickly burning large tracks of land in spectacular fashion, often regenerating unhealthy forest. Across Canada, lightning starts thousands of fires each year, and those fires constitute most of the area burned. But as in many other regions, there is a requirement to balance the need for fire's natural role with the critical need to protect people, property, and resources from fire's unwanted consequences.

In many instances, it's a priority for fire managers to suppress and control wildland fires, preferably when the fires are small. There are many situations where conventional ground suppression tactics (firefighters with pumps and hose) cannot succeed alone and must be supported by aerial suppression resources. In many cases, fixed wing airtankers are the first and sometimes last line of defence in these extreme fires.

There are several variations of fixed and rotary wing airtankers available to fire managers across Canada, such as ground-loaded chemical retardant tankers, skimmer airtankers (commonly known as waterbombers) and helicopters equipped with buckets or tank systems. In eastern Canada, an abundance of lakes makes waterbombers the preferred option as they are favoured for their quick turnaround time and

operational flexibility. Waterbombers skim the water's surface to pick up and then drop water onto the fire's edge to reduce fire intensity and slow fire progression so ground crews can safely and effectively work the edge.

There are situations where the available resources simply cannot deliver enough water to successfully address every threat, for example, the 2018 fire season in eastern Ontario. On a single day in July, a high-intensity fire made a run toward a community and all nine of the province's heavy CL-415 airtankers worked that fire at the same time, dropping more than two million litres of water (~77,000 cubic feet). That fire was not declared under control for 10 more days and was not extinguished for another month. That fire was just one of at least 90 fires burning in Ontario that day. While the decision to redirect the entire fleet of



A CL-415 dropping along the fire's edge, ensuring safe conditions for incoming Fire Rangers.

A CL-415 knocking down an intense portion of a fire in northern Ontario. Photos courtesy of Ontario Ministry of Natural Resources and Forestry.

SITUATION REPORT

CANADA

heavy waterbombers to this one fire seemed to pay off, it was not without risk, as it significantly limited the ability to respond to any new fires or to support existing fires.

It's very rare for all of Ontario's heavy waterbombers to be used on a single fire. Waterbombers are normally widely dispersed, following the fire hazard, across Ontario's 107 million hectares. This approach of distributing waterbombers enables fire managers to support initial attack over broad geographic areas. However, as the wildland fire environment changes, there have been more cases of these hard-to-fight and threatening fires requiring more airtanker support. Analysis suggests that these situations will increase in frequency, and far more air and ground resources will be needed to maintain the current level of protection.

More recently, Ontario began to supplement its airtanker capacity with contracted belly tanked helicopters for lower-intensity fires that do not need the full punch of the heavy waterbombers. The different aircraft provide more options with varying operating costs, safety considerations, and training requirements. The additional capacity however also comes with new challenges for daily decision making, namely, where to deploy the mix of airtankers, and which type of airtanker to dispatch.

In 2017, the Canadian Forest Service and Ontario's Ministry of Natural Resources and Forestry began collaborating to develop new methodologies to inform and support fire managers challenged with these decision-making problems. This isn't uncharted territory; work on airtanker effectiveness in Canada dates back at least to the early 1960s, not long after the idea of waterbombing first took hold (also in Ontario around 1944). This current research is focusing on the first principles needed to understand and compare airtanker effectiveness – the size and concentration of a drop and what that drop will mean in context of the change in fire behaviour. The research included a novel means to measure water drop patterns at high spatial resolution using infrared scanning technology. One of the early results of this research program will be the publication of the *Reference Guide to the Drop Effectiveness of Skimmer*

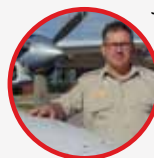
and Rotary Wing Airtankers. This guide is intended to provide a systematic and objective method for the relative comparison of the water drop effectiveness of both fixed- and rotary-wing airtankers commonly used in the North American boreal regions.

This recent work only skims the surface of the information needed to support the challenging strategic and tactical questions facing airtanker operations as the wildland fire environment and wildland fire management become increasingly challenging.

ABOUT THE AUTHORS



Colin McFayden is the Forest Fire Research Knowledge Exchange Program lead for the Great Lakes Forestry Center of the Canadian Forest Service (CFS). McFayden spent the last few decades with the Ontario government working his way up from the field as a fire ranger, to leading the wildland fire science program. With a recent move to the CFS in 2022, McFayden's current focus is to support Canada's WildFireSat mission as lead of the knowledge exchange program for operational implementation (WildFireSat is the world's first purpose-built operational satellite system for monitoring wildfires). From space to the forest floor, all aspects of the interaction of science and fire management are of keen interest.



Jason Robinson is the aerial fire operations co-ordinator for the Ontario Ministry of Natural Resources and Forestry, Aviation and Forest Fire Emergency Services. Originally from the northern town of Red Rock, Ontario, Robinson has spent the last three decades protecting the people of Ontario from wildland fire. Robinson is a nationally certified air attack officer with more than 500 fires under his belt before he moved into a leadership role overseeing Ontario's Aerial Fire Operations Unit. Robinson is committed to seeking ways to improve safety, effectiveness, and efficiencies in aerial fire operations in Canada and with its partners. This work is his passion, and he is a tireless advocate for innovation.

NOT BUSINESS AS USUAL

NEW PROJECTS, POLICIES, AND PERSONNEL AIM TO PREVENT WILDFIRE DISASTERS

BY GAVRIIL XANTHOPOULOS, EMMANOUELA ZEYGOLI, AND KONSTANTINOS KAOUKIS

In 2018, Greece faced an unprecedented wildfire disaster in East Attica, with 102 fire fatalities. Three years later, in 2021, the country experienced a devastating fire season characterized by the largest wildfire on record, which burned more than 50,000 hectares and stopped at the sea. These disasters happened at a time during which the firefighting mechanism had more resources than ever before.

While the 2018 fatalities occurred within two to three hours in a single fire due to extreme fire weather conditions, the disaster of 2021 revealed many weaknesses regarding the firefighting organization and serious deficiencies in the forest fire management policies of the country. The main shortcoming was an extreme emphasis on fire suppression while fire prevention had been neglected, regarding attention and funding. One exception was that in the spring of 2021, the General Secretariat of Civil Protection secured 25 million Euros for an urgent forest fuel management program, mainly in areas where forest vegetation had been heavily affected by wind and snow damage caused by two recent serious winter storms. The project, titled DRYADS, after the nymphs of the forest in ancient Greek mythology, was carried out with the supervision of the Hellenic Republic Asset Development Fund (HRADF) in 21 wildland-urban interface (WUI) areas. The program started rather late, in June, and continued through the main part of the fire season. The Forest Service was largely ignored.

In September 2021, after the fire season disaster, the government established a new Ministry of Climate Crisis and Civil Protection (MCCCP). The General Secretariat of Civil Protection was moved from the Ministry of Citizen Protection to the new ministry. The government also

decided to change the structure of the Forest Service back to a vertically structured organizational chart, as it had been organized until the end of the 1990s. The decentralized structure that was tried for about 20 years, with the local Fire Service offices belonging to the seven decentralized regional administrations of the country under the Ministry of Interior, and the headquarters being a general direction in the Ministry of Environment and Energy (MEE), had shown many weaknesses and had caused many ineffectiveness problems. The restructured Forest Service now belongs to the MEE.

After an effort to identify the existing weaknesses, the new minister of MCCCP tried to introduce changes that will help Greece avoid future wildfire disasters. Among these, was an increased emphasis on fire prevention, in parallel with strengthening fire suppression further. By April 2022, the MCCCP, in co-operation with the Ministry of Environment and Energy, initiated a forest fire prevention program called ANTI-NERO. The program put an emphasis on forest fuels treatments. The MEE relayed the management of the works to the Hellenic Republic Asset Development Fund in co-operation with the Forest Service, applying fire prevention studies that had been prepared by the local Forest Service offices in the last few years but had not been applied due to lack of funding. Despite these studies, the works started relatively late and, in most cases, continued during the fire season. The treatments were applied by private contractors. In November 2022 the Hellenic Republic Asset Development Fund announced that it had completed clearing 8,000 hectares of forests (understorey removal) and woodlands in 40 locations across the country, maintained or built 12,000 kilometres of forest

SITUATION REPORT

GREECE

roads and maintained or created 1,600 kilometres of fire breaks, at a cost of 39.5 million Euro from the European Recovery Fund.

Fire suppression was also strengthened in 2022, with an increase in aerial firefighting capacity through the addition of 15 Air Tractor AT-802F planes contracted for the summer for patrol and initial attack, as well as four Bell 214 helicopters offered by a private donor. However, the most important step was the recognition that the Fire Service needed specialized firefighters for forest fire fighting. After the end of the 2021 fire season the government promised to hire 500 new firefighters who would be dedicated to forest fire suppression.

Beating the usually slow bureaucratic procedures, these new personnel were hired by June. Following the earlier example of the Forest Service “forest commandos” that had operated in the 1990s, they formed a special unit of the Fire Service with the acronym EMODE (standing for Special Forest Firefighting Units in Greek), and with minimal training were sent to the fire fronts. After the 2022 fire season, the training continued. However, the Forest Service, with its aging and dwindling personnel, has still not received the 500 new foresters that it was promised even before the 2021 fire season.

Also, in the first months of 2022, the Ministry of Climate Crisis and Civil Protection acted to legalize the use of fire in fire fighting, in the form of backfire (or suppression fire) and of burning out, for the first time in Greece. By June, a committee of experts had also drafted guidelines outlining the procedure to be followed when using fire. This is a major step forward that improves the capacity for effective indirect attack, making it more likely that fuel-treated areas will be used effectively to stop high intensity fires. The current setting provides that the use of fire will be done by the EMODE.

Aside from the use of fire as a suppression tool, fire is still not used in fuels management and wildfire prevention in Greece. However, since 2021, a pilot project on prescribed

burning for fuel management is being conducted on the island of Chios in Greece. WWF Greece works with the Institute of Mediterranean Forest Ecosystems and the Volunteer group OMIKRON to demonstrate the feasibility of introducing prescribed burning for the first time in the country and to suggest needed policy changes and guidelines.

Currently, as the 2023 fire season approaches, the ANTI-NERO program continues as ANTI-NERO2. Funding comes from the European Recovery Fund and the national budget. As the procedure has been streamlined, the works are to be completed by April 2023, which is important for maximum utilization. Currently, a review of the whole procedure is needed, including effectiveness, efficiency, environmental issues, and future planning.

Another current development is that in Greece, as in much of the European Union, it gradually becomes evident that the well-known methods of linear fuel isolation (fuelbreaks and firebreaks) have shown their limits. The intensity of the fires today calls for new, innovative fuel management approaches leading to what has been termed Fire-Smart Territories (FSTs) characterized by improved resilience to catastrophic fires. The FST approach considers all the territory including managed forests, wildland, agricultural and pastoral lands, and all the humans collectively living there. Its main pillar is involving local communities



Canopy thinning and shrub understory removal in a young *Pinus halepensis* forest stand in Attica, Greece. Photo courtesy of ILVERDE.

SITUATION REPORT

GREECE

ABOUT THE AUTHORS

as a crucial factor to prevent and control destructive wildfires, going away from the current top-down approach and promoting the productive use of the land while maintaining fuels at safe levels.

The European Commission has clearly identified climate change as a subject of vital importance and has set territory resilience as a key target. This target has become the focus of many European projects. One such recently started project, with 15 partners around the Mediterranean, is called ResAlliance and aims to facilitate information and knowledge flow and increase the awareness, understanding and capacity of farmers and foresters on landscape resilience in Mediterranean countries. The project is co-ordinated by the European Forest Institute and includes two Greek partners. One of the first activities in Greece in this direction was the organization of a workshop on Prevention and Management of Agroforestry Fires in light of climate change on Nov. 10, 2022, at the Institute of Mediterranean Forest Ecosystems in Athens. The important point about this workshop was the representation at a high level of three ministries, the Ministry of Climate Crisis and Civil Protection, the Ministry of Environment and Energy, and the Ministry of Rural Development and Food, offering the opportunity to start an effort to promote the necessary co-operation among them for the development of Fire-Smart Territories.

In the last year or so, Greece has tried to move away from the business-as-usual approach of the past, seeking to tackle the forest fires issue more effectively. The problem is far from solved, but at least there is hope that future steps will be rational, scientifically supported, and will help avoid future disasters.



Creation of firebreaks in Attica, Greece. Photo courtesy of ILVERDE.



Dr. Gavriil Xanthopoulos holds a B.Sc. degree in forestry from the Aristotelian University of Thessaloniki, Greece, and M.Sc. and PhD degrees in Forestry with specialization in forest fire science from the University of Montana, United States. He has been active in European forest fire research for more than 30 years. He has participated in more than 25 research projects and has produced numerous scientific publications. He also has extensive experience in forest fire management training and post-graduate university teaching. He has served the Greek state many times with his expertise by participating in forest fire related committees, consultations and studies or as technical advisor to ministries. He has also offered his services quite often to the European Union. He currently serves as research director on forest fires and is head of the Forest Fire Laboratory at the Institute of Mediterranean Forest Ecosystems of the Hellenic Agricultural Organization “Dimitra”.



Emmanouela Zevgoli is a graduate student in development and environmental planning, infrastructure and natural risks prevention at the Agricultural University of Athens, Greece. She holds an integrated master in agronomy and soil science from the Agricultural University of Athens with her thesis involving use of remote sensing and field measurements for burn severity assessment. Her research interests include satellite remote sensing methods applications in the field of forest fires (fire severity assessment, mapping of fire effects, etc.), wildfire behavior, risk management and fire prevention. Her M.Sc. thesis focuses on assessment of operational fuel management projects recently applied in the area of Attica, Greece.



Konstantinos Kaoukis is a forester with basic studies at the department of forestry, School of Agricultural Technology, TEI, Messolonghi, and postgraduate studies (M.Sc.) in the management of natural and anthropogenic disasters at the Department of Geography of Harokopio University in Athens. He belongs to the permanent staff of the Institute of Mediterranean Forest Ecosystems of the Hellenic Agricultural Organization, DIMITRA, where he has been working as a specialist scientist in support of research programs since 1996. He has participated in numerous national and European research projects and in a large number of international and Greek publications, both in scientific journals and in important conferences. Along this work line he has built significant knowledge, capacity and experience in capturing and analyzing spatial and geographic data (GIS). His research interests include, natural hazards and disasters, use of modern technologies in natural disasters management, territorial analysis of disasters and their social and economic effects, forest fire and flood risk assessment and mitigation, planning emergency and rehabilitation works in areas affected by natural disasters.



SUPPRESSING WILDFIRES. SUPPORTING FIREFIGHTERS.

For over 50 years Aero-Flite has partnered with agencies on forest fire missions across the US.

The Future of Aerial Firefighting: The Dash 8-400AT

Fast, fuel efficient and tactically flexible. Setting the standard for Next Generation aircraft with OEM support to keep the firefighter flying for decades.

Photo: Alexandre Dubath

aerofliteinc.com

Protecting Our World



TAKING STOCK

VEGETATION AND CLIMATE CHANGE PRESENT CHALLENGES

BY NIEVES FERNANDEZ-ANEZ AND FRIDA VERMINA PLATHNER

According to the World Meteorological Organization, the last eight years are on track to be the eight hottest on the books. The MetOffice predicts that 2023 will be one of the hottest years on record. This increase in temperature has been predicted for fire seasons for the last several years. However, if we look back at the data, in July 2022 the surface air temperature anomaly in comparison with the average between 1991 and 2020 was lower in the Scandinavian peninsula; this contrasts with the temperature increase that was observed for other months in that year (June and August included).

The Scandinavian peninsula presents several difficulties when predicting fire behaviour due to the variability of vegetation types, involving three main fire scenarios. First, heather and grass are predominant fire carriers on the west coast; these fuels are sensitive to moisture content, easily losing water and becoming fire prone when rainfall is reduced. These fuel types constitute the largest hazard to health and the built environment in Sweden and Norway, with a spike in injuries and damage during winter and spring. Rainfalls are frequent at the coast of both countries while the interior is drier. In recent years, northern countries have become wetter with more precipitation, but at the same time, the periods without precipitation have been longer in Norway and parts of Sweden, providing longer dry periods that can trigger fires in vegetation. These dry periods are more common during winter and spring, and these months are the most dangerous regarding fires in heather and grass.

Mature conifer production forest is the main stand type in the border between both countries, as well as the entire inland of Sweden. The general lack of ladder fuels makes crown fires in this region rare; instead, the fire is carried by the continuous cover of feather mosses. Northern and mid-boreal forests are more sensitive to summer weather compared to southern/nemo-boreal forests due to a more closed canopy in the south, shielding the surface fuel moisture from evaporating. This means there could be some divergence between future fire regimes in the Nordic region, even with similar changes in climate.

Finally, the North is known by the peat forming its soil structure. Zombie fires (smouldering fires, essentially flameless forms of combustion) inside the Arctic circle are attracting attention nowadays as a clear representation of the new scenarios caused by climate change.

One of the main forest fire-related activities that needs to be mentioned is prescribed fire, with significant differences between Sweden and Norway. In Sweden, prescribed fires are mainly carried out by large forestry companies for environmental certification and by the county administrative boards, however anyone is allowed to perform burning activities with the permission of the landowner, unless a local fire ban has been invoked (typically when FWI exceeds 17). Norway has implemented new policies controlling prescribed fire; firefighters, stakeholders and researchers work together to ensure that prescribed burns take place in a safe way and that there are no out-of-control fires.



NATIONAL FIRE FIGHTER CORP.



WILDLAND GEAR & PPE

YOUR WILDLAND FIRE
EQUIPMENT EXPERTS



FEATURED PRODUCTS

True North Wildland Pant
TNG 189160

True North FireFly
Wildland Medic
TNG FRF8510

Indian Chief
Dual Bag Fire Pump
IND 190351

**VISIT OR
CALL FOR INFO:**

NATIONALFIREFIGHTER.COM OR 800-423-8347

SITUATION REPORT

SCANDINAVIAN PENINSULA



Although a thick layer of organic soil beneath the moss/litter is prevalent, deep fuel consumption from secondary combustion is often hindered by the high moisture content of the soil. Photo by Frida Vermina Plathner.

Norway is known for having good forest fire preparedness. Local farmers and volunteers are an invaluable resource in the forest fire context. The fire season is framed by a general campfire ban from April 15 to Sept. 15, when it's illegal to light campfires or barbecues in or near forests or other open land. Norway does not have specific resources for forest fires, but the Norwegian Directorate for Civil Protection is responsible for a management support group formed by 13 fire chiefs that can be contacted to support the use of a helicopter when it is needed. On the equipment side, Norway does not own helicopters for fire fighting, but has an agreement with a private helicopter company. Normally, a helicopter is centrally located in the eastern part of Norway, and the number of helicopters can be increased, as well as their locations. In contrast, after the 2014 and 2018 high-profile fires in Sweden overwhelmed suppression capacities, national efforts have been made to take prevention actions, including a program for helicopter and fixed-wing suppression support as well as updates in the Swedish Civil Protection Act that demand co-operation between rescue services at the level of command and control; this has led to more prompt requests for aerial support when weather conditions are unfavorable. Yet, despite increased capacity at national and regional levels, concern is growing over the shortage of part-time rescue personnel in rural areas.

Sweden and Norway are starting to face new

challenges that are expected to worsen in the coming years but are learning from recent incidents. There is a significant need for specific support and resources focused exclusively on forest fires that so far has not been implemented.

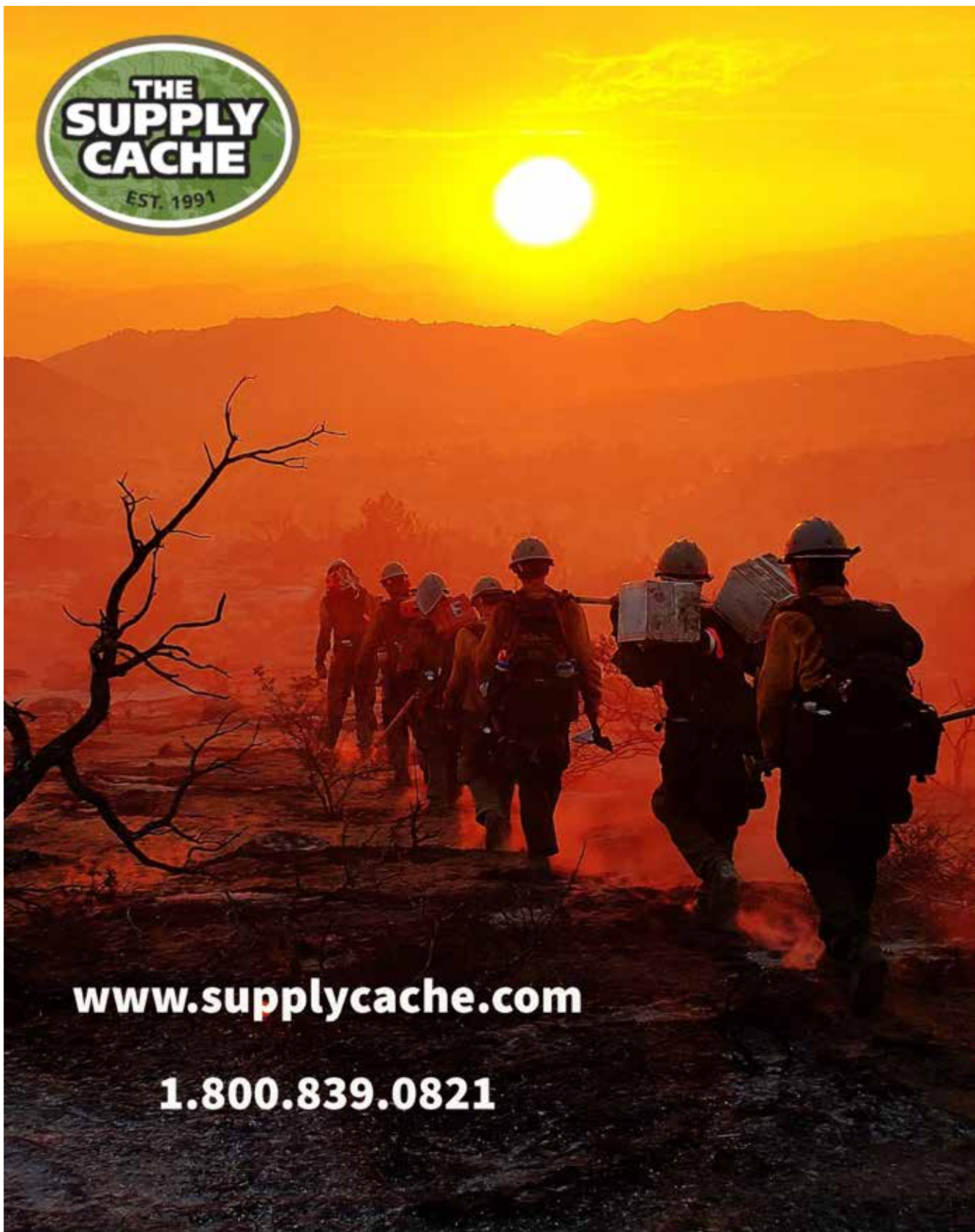
ABOUT THE AUTHORS



Nieves Fernandez-Anez has been an associate professor at the Western Norway University of Applied Sciences since 2018. Before that, she did her PhD at Universidad Politecnica de Madrid and worked as a postdoctoral researcher at Imperial College, London. Her research interests are focused on the study of flammability and fire behaviour of organic materials, both in their natural form and transformed to reutilise them. Currently, she leads a project focused on the prediction of spread of wildfires in Scandinavian vegetation, and a working group on modelling fire behaviour in the WUI, both funded by the Norwegian Research Council. Fernandez-Anez also leads a working group on the COST Action Firelinks.



Frida Vermina Plathner is with the Department of Fire Technology, RISE Research Institutes of Sweden. Her research interests are wildfire behaviour in boreal Europe, fuel modelling, and forest and garden features as passive wildfire protection systems. She is currently doing her postdoc on Swedish forest fuels for the Swedish Civil Contingency Agency.



www.supplycache.com

1.800.839.0821

WE'VE GOT YOUR CREW'S BACK!
Quality... Inventory... Price... Service.

RISKMANAGEMENT

POLICIES AND CO-OPERATION REQUIRE ENHANCEMENT

BY TESSA OLIVER

The number and intensity of unwanted wildland fires in South and Southern Africa has increased significantly in the past several years. Many of these fires have been either major or catastrophic, and have resulted in deaths, loss of livestock, negative impacts on the environment, and economic costs.

The worst wildfires recorded to date swept through parts of Southern Cape in June 2017. The town of Knysna and its surrounding areas were severely affected by these devastating fires. Sadly, seven people were killed, more than 1,000 structures were destroyed, and 500 houses were damaged in this event. Thousands

of people were evacuated, with 1,533 families and 134 businesses being negatively affected, and critical infrastructure such as power lines were damaged or destroyed.

Wildfire management in South Africa has traditionally been heavily dependent on fire suppression, which is extremely costly; this has meant that firefighting resources (teams, aerial resources) are moved across fire prone provinces during South Africa's two opposing fire seasons in the north and south. However, unseasonal fires influenced heavily by factors such as changing climate patterns and increased fuel loads have become increasingly significant, and are forcing a relook at wildfire management across the country.

Increasing the number of prescribed burns for fuel reduction and ecosystem maintenance will become more necessary and critical to try to minimise the risk of disaster wildfires in future, but many organisations lack the capacity or experienced or qualified personnel to confidently plan and execute prescribed burns.

Although fires are necessary for ecological processes to function properly, they pose a threat to human lives, livelihoods and possessions. More and more people, assets and infrastructure are placed on the boundary or interface between

Wildland fires in South Africa often burn into agricultural lands, causing huge financial losses. Photos by Tessa Oliver.



SITUATION REPORT

SOUTH AFRICA

developed land and fire-prone vegetation (wildland-urban interface or WUI) where they are exposed to wildfires and potential risk of loss or harm.

Climate change has become a key factor in increasing the risk and extent of wildfires. Research shows that changes in climate create warmer, drier conditions in many areas across the globe. Increased incidences of drought, reduced precipitation, higher temperatures and a longer fire season are boosting increases in wildfire risk. This risk also includes factors such as wind, soil moisture, and the presence of trees, shrubs, and other potential fuel (many of which have increased due to excluding fire from landscapes). Increased invasions of alien plants, the growth and spread of which are compounded by climate change, add to the biomass of natural ecosystems and increase and aggravate the intensity and heat of fires, making it more difficult and unsafe to control.

South Africa has two different fire seasons and much of the natural vegetation across the country requires fires to maintain the ecosystems in good condition.

Scientists have studied fire ecology in South Africa for many decades and have looked at fire ecology, behaviour and fire regimes in the major vegetation types – grasslands, savanna or woodland, and fynbos – and have arranged them into three main groups:

- 1) Fire-dependent, which requires fires at the right intervals to regenerate the vegetation (all grassland types, moist and arid woodland, fynbos and Renosterveld).
- 2) Fire-independent, which may burn from time to time but does not require fires for regeneration (sparse arid woodland, thicket, Nama and Succulent Karoo).
- 3) Fire-sensitive, which are adversely affected by fires and can take many years to recover (grassy Nama Karoo, forest).



Haemanthus sanguineus, a fire adapted species, flowering 10 days after a fynbos fire.

Fires are inevitable in the fire-dependent group, so the key to reducing fire risk is to actively manage the fuels to minimise the risk of wildfires in the WUI.

Fires rarely occur in the fire-independent group because there is too little fuel to sustain a fire except in high rainfall years, so fuel loads only need to be managed to reduce the fire hazard during the dry season after such high rainfall periods.

The fire-sensitive group also rarely experiences fires but may need fuel load reduction at times.

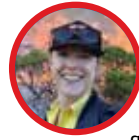
In the Northern part of the country, which has a summer rainfall season, fires usually occur in the dry winter months (May through October), whereas in the South, most fires occur in hot dry summers (December to March) and usually not in the cool, wet winter months.

To address this, South African policy and legislation recognises that wildfires are necessary but can

SITUATION REPORT

SOUTH AFRICA

be damaging, and promotes the formation of fire protection associations (partnerships between fire management authorities and land owners or lessees) to manage fires and prevent damaging wildfires. Landowners have, in the past, been completely reliant on authorities, such as the fire brigade services (many of which are not fully functional in South Africa) during wildfire events. Many people are not aware that they are able to do many things around their homes and properties, often at little cost, to minimise the risk of wildfires damaging their assets. These simple tasks would ease the burden on fire services during wildfire events and also reduce the risk of fires spreading across properties. Associations provide information and assistance to individuals and communities. There is much that can be done to reduce the damage caused by wildfires by taking ownership of the risk and taking action to reduce and minimize the risk.



ABOUT THE AUTHOR

After studying humanities at the Universities of Stellenbosch and Cape Town for five years and a stint as a photographer, Tessa Oliver's career path went into a biological direction. Her knowledge of the local flora, picked up from her parents, who were botanists, landed her a job with CapeNature at its scientific services section, managing its biodiversity database. Since then, Oliver has worked for the Agricultural Research Council, the South African National Biodiversity Institute and various non-profit organisations. Oliver's work has been varied, but always encompassing something that involves uplifting the environment and the people within it. Oliver organised the 2011 International Wildfire Conference in Sun City and from 2012 until 2018 c-ordinated the US\$3.5million GEF Fynbos Fire project and until 2020 implemented fire risk reduction projects for the South African Insurance Association. In 2019, Oliver completed a PGD in environmental management through the School of Public Leadership at Stellenbosch University. Oliver is a director of the Association for Wildland Firefighting in South Africa and a director on the Fynbos Forum NPC, and runs a DFFE-funded Groen Sebenza project that places and mentors interns in working environments. Oliver is currently manager of the Western Cape Fire Protection Association, which represents fire protection associations in the province on provincial and national committees and platforms.

You Fight Fires. We Fight for You.

As a federal wildland firefighter you could face:

- Manslaughter Charges
- Administrative & Criminal Investigations
- Personal Capacity Lawsuits

Professional liability insurance with FEDS Protection starts at less than \$300, and up to half of the cost is reimbursed by the USFS.



Contact us today to get protected.

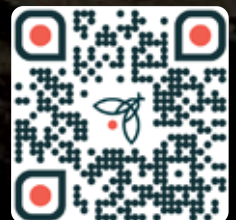
(866) 955-FEDS | feds@fedsprotection.com
fedsprotection.com

THEY ALWAYS HAVE BOOTS

Why not a map?



Fast, easy, and free.
Built for firefighters.
www.fireai.io



PRECIPITATION AND TEMPERATURE

CLIMATE CHANGE IMPACTS THE FIRE LANDSCAPE

BY MINGCHUN SHI, CONG GAO, AND XINYAN HUANG

The forest coverage rate in China stands at 24.02 per cent, having jumped from 8.6 per cent in 1949 (see figure 1, page 25). Wildfire, as a major natural disaster, has been recorded since the beginning of Chinese culture. Today, most wildfires in China are ignited by humans and clustered in the subtropical region, with interannual variation modulated by precipitation changes in the East Asia monsoon system. On the other hand, wildfires in northeast China are mainly dominated by temperature. Thus, we will discuss these two major fire regimes in China.

The boreal forests, mainly distributed in the northeast and northwest corners of China, are the most frequent lightning fire regions with the largest burned areas. Wildfires in boreal forests mostly occur in snow-free seasons, mainly in the late spring to summer. Between 2010 and 2022, a total of 658 lightning fires were recorded, with a burned area of 21,125 km² in the Greater Khingan Mountain forest of northeast China. Owing to strict regulations on human activities in this region, the anthropogenic wildfire ignitions in northeast China have been minimized, which is different from the anthropogenic-ignition dominated subtropical region. As a result, the proportion of lightning fires among all fire types in northeast China increased to 92.7 per cent between 2010 and 2022 from 38.1 per cent between 1966 and 2009. The lightning fire season has extended, and both the frequency and burned area are rising, which is attributable to a warming-induced increase in

evaporation and fuel dryness. Wildfires in the boreal forests have burned humus and litterfall in the surface layer of soil, where the carbon storage is much larger than that of living forests. These boreal wildfires largely contribute to the role shift from carbon sink to carbon source.

Trends and variations of lightning fire frequencies in the boreal forest of northeast China are modulated by fuel aridity associated with local temperature, which has been closely connected with AMO (Atlantic multidecadal oscillation). The trend of wildfire frequency in the boreal forest of northwest China is nonsignificant because the increased precipitation has mitigated the drying trend associated with rapid regional warming. Furthermore, years with high-



Humus layers and litterfall combustion in the Greater Khingan Mountain forest. Photo by Chunming Shi.

SITUATION REPORT

CHINA

frequency wildfires have been observed, coinciding with La Niña events. The boreal forests in northwest China have adapted to the frequent surface fire by growing a thicker bark at the tree base (see photo, page 26).

Increased lightning activity is projected with warming. In the northern high latitudes, the warming rate has been much faster than the global average. Warming has elevated the fuel aridity, shortened the snow cover period, and prolonged the fire season. Together with the increased proportion of the long continuing lightning, all these changes will increase wildfire risk in the boreal forests. To predict and prevent lightning fires, studies are urgently needed on the characteristic of igniting lightning and climate conditions susceptible to ignition.

WILDFIRE IN SOUTHWEST CHINA

Southwest China is another major fire-prone area. The incidence and intensity of wildfires have escalated in recent years, leading to considerable ecological and economic damage. Wildfires in southwest China mainly occurred in the dry season from winter to early spring. Notably, in March 2019, a wildfire in Xichang, Sichuan province, resulted in the tragic loss of 30 firefighters. The frequent wildfires in the spring of 2019 in southwest China were attributed to the lowest precipitation and warmer weather, that is, 1.6 C warmer than the historical average since 1960. Moreover, another 19 firefighters lost their lives in the same region in March 2020. The Yunnan province in southwest China also suffers from a high incidence of wildfires. The wildfire ignition there is susceptible to both climatic and anthropogenic factors, mainly daily minimum relative humidity and closeness to agricultural activities.

TRENDS AND PROJECTIONS

After the 1987 Black Dragon fire in Northeast China (193 deaths), the Chinese government introduced measures to prevent and manage wildfires. New policies have been applied, such as improving early warning systems, conducting prescribed burning (see the Q4, 2022 issue of *Wildfire*), increasing firefighting resources, and fostering fire prevention and education. Largely attributed to these efforts, the observed annual wildfire frequency has generally decreased after reaching a peak in 2008 (see figure 2, page 26), although the fire risk was projected to increase. More frequent incidences of heatwaves and long-lasting droughts associated with fast warming have altered spatial and seasonal patterns of wildfires. The 2022 record-breaking high temperature and mega-drought along the watershed of the Yangtze River caused unprecedented wildfire outbreaks in August, during which abundant precipitation and high vegetation moisture usually prohibited fire occurrence.

The warming-drying trend and lightning frequency increase are prominent in northeastern China. With a persistent positive Atlantic multidecadal oscillation



Figure 1: Forest distribution in China. Image courtesy of Lei Shi.

SITUATION REPORT

CHINA

phase and fuel accumulation due to strict forest conservation policies, lightning fires in the boreal forest of northeastern China will become more frequent if warming continues. Higher fuel aridity will favor violent combustion and hence a larger burned area. However, prompt extinguishment, owing to earlier fire detection and firefighting arrival, complicates the burned area prediction.

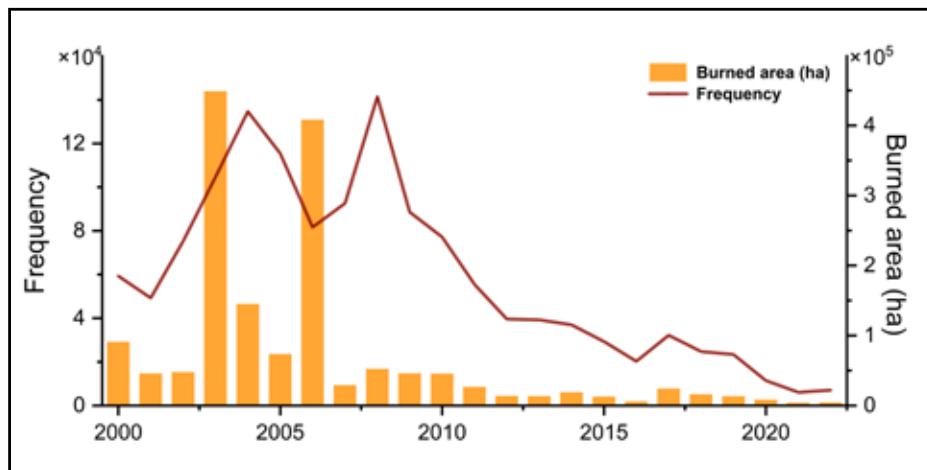


Figure 2: Annual forest fire frequency and burned area in China, 2000 to 2022. Image courtesy of Cong Gao. Data sources: China Forestry Statistical Yearbook and Ministry of Emergency Management of China.

Further restricting human ignition will not help to reduce wildfires in northeastern China, but this policy is vital for wildfire prevention in subtropical China, where most wildfires are human-ignited. The probability of extreme climate events has largely increased with warming. Specifically, the combination of a heatwave and monsoon failure could be much more frequent in the wet season, or late monsoon precipitation arrival would prevail in subtropical China. The worsened fire weather favoring fire ignition and spread could let the human ignition restriction in vain. Studies showed that forests in northeastern and central-northern China are projected to suffer an increased wildfire probability, and regions with intense fire occurrence will shift from south to central-north China by 2060.



Trees in the boreal forests of the Kanas Lake national natural reserve have developed adaption and protection mechanisms against surface fire damage by thickening tree bark at the base. Photo courtesy of Chunming Shi.

ABOUT THE AUTHORS



Chunming Shi is an associate professor at Beijing Normal University, conducting broad studies on forest and wildfire ecology.



Cong Gao is a PhD student at the University of Hong Kong, focusing on wildfire and climate change.



Xinyan Huang is an assistant professor at The Hong Kong Polytechnic University and a board member of IAWF. His research focuses on peatland fire and AI-driven wildfire forecast.



8TH INTERNATIONAL WILDLAND FIRE CONFERENCE

GOVERNANCE PRINCIPLES:

Towards an International
Framework

Porto | Portugal
May 16-19th, 2023

Come to Porto - Portugal from 16 to 19 May 2023

Your knowledge, insights, and thoughts will be matter to help your nation and all nations to be better prepared to build fire resilient landscape and societies!

Be part of the 8th International Wildland Fire Conference!

The 8th IWFC offers a unique opportunity to profile your organisation and showcase your technical and service solutions with over 1.000 wildfire professionals from around the world.

Organised by AGIF - Agência para a Gestão Integrada de Fogos Rurais and the ILC- International Liaison Committee - this is the most important global conference and exhibition that brings together thought leaders, decision makers, leading researchers, and business representatives from the wildland fire sector.

Register and check the Programme and Voices of the Conference at:

www.wildfire2023.pt
info@wildfire2023.pt



LOCAL ORGANIZER



INTERNATIONAL LIAISON COMMITTEE FOR THE IWFC



GETTING TO THE ROOT OF PEAT FIRES

RESEARCHERS PROPOSE INCREASED COLLABORATION

BY MOHD ZAHIRASRI MOHD TOHIR AND DAYANG NUR SAKINAH MUSA

Peat fires in Malaysia have been an issue for several years, causing widespread destruction and threatening the environment and public health. The situation remains a major concern for policymakers, experts, and the general public.

In recent years, policymakers have implemented several measures to address the peat soil fire issue in Malaysia including the establishment of task forces, the development of early warning systems, and the deployment of firefighting resources. Additionally, efforts have been made to promote sustainable land use practices and reduce the risk of fires. However, challenges still need to be overcome to effectively implement these policies and address the root causes of the problem.

The Malaysian government introduced a national campaign in 2009 called the Peatland Fire Prevention Programme to promote sustainable land use practices and reduce the risk of peat fires. The program focuses on preventing fires by addressing the root causes of the problem, such as unsustainable land use practices, deforestation, and agricultural expansion. The program also aims to strengthen co-ordination and collaboration among various agencies and stakeholders, including the government, NGOs, and local communities, to prevent and respond to wildfires. Raja Musa Forest Reserve is an example of a recovering degraded area due to fire, and it has been reported that the peat condition has improved over the years through a rehabilitation effort.

PEAT FIRE ISSUES IN 2023

Weather events such as droughts and heatwaves can significantly impact the risk of peat soil fires in Malaysia. While it is difficult to predict exact weather patterns for 2023, experts suggest that climate change will continue to impact weather events, potentially leading to more severe droughts and heatwaves and, thus, a higher risk of peat fires. The government has implemented various strategies and measures to mitigate these risks and promote the wellbeing of the people. As of now, the government has been assisted local communities with monitoring and suppression. As an example, an initiative and innovation challenge to suppress peat fire, the X-Fire Challenge Finals competition, was held in 2022 and an invention by The Fire and Rescue Department of Malaysia won the competition (see photo page 29). The invented tool is able to spray water on the surface fire and flood the underground fire simultaneously which it is crucial to suppress underground burning during peat fires. The government has also invested in the health sector,



SITUATION REPORT

MALAYSIA

focusing on adapting to climate change. While the drought outlook for Malaysia in 2023 needs to be clarified, the country is taking steps to cope with the potential impacts of climate change on its economy, environment, and society.

RESEARCHERS' EFFORTS IN PEAT FIRE MITIGATION

Malaysia's peat soil fire issue is complex and multifaceted, with several challenges that must be addressed simultaneously. One of the biggest challenges is the need to address the root causes of the problem, including unsustainable land use practices, deforestation, and agricultural expansion. Additionally, there is a need to develop effective early warning systems, co-ordinate firefighting efforts, and invest in resources and personnel. This has prompted several researchers from Malaysia's Universiti Putra Malaysia (UPM), to venture into the research topic of peat fires. One of the current projects at UPM is the APT (Asia Pacific Telecommunity) NET-PEAT which is funded by the government of Japan. The project focuses on deploying Internet-of-things-based solutions at vulnerable peat swamp forests for fire monitoring (see photo 3). Another project is the fundamental study of peat fire suppression; this is an important topic to be studied because peat fires are difficult to extinguish.

The peat soil fire issue in Malaysia remains a significant concern for policymakers, experts, and the public. While there have been positive developments, more needs to be done to address the root causes of the problem and invest in effective measures to prevent and respond to wildfires. A collaboration between the government and researchers to achieve sustainable peatland resources and reduce peat fires should be enhanced. It is essential to prioritise this issue and work toward sustainable solutions that can protect the environment, public health, and livelihoods.

ABOUT THE AUTHORS

Mohd Zahirasri Mohd Tohir is a senior lecturer at the department of chemical and environmental engineering, Universiti Putra Malaysia, and the head of the Safety Engineering Interest Group (SEIG) fire safety division. He is a fire scientist who focuses on the research of fire safety engineering and peat fires. Contact Zahir at zahirasri@upm.edu.my.

Dayang Nur Sakinah Musa is a PhD student at the department of chemical and environmental engineering, Universiti Putra Malaysia; she studies smouldering peat fire and suppression strategies in peat swamp forests. Contact Dayang at m.dayangnursakinah@gmail.com



A demonstration of the award-winning invention by the Fire and Rescue Department of Selangor in the X-Fire challenge 2022. The invented tool sprays water on the surface fire and simultaneously floods the underground fire; it is crucial to suppress the underground fire during peat fires. Photo by Dayang Nur Sakinah Musa.



A recovering area of frequent peat fires in the Raja Musa Forest Reserve in Malaysia. Photo by Dayang Nur Sakinah Musa.

THE NEED TO BE PROACTIVE

ACCURATELY PREDICTING FIRE SEASON SEVERITY FROM ANALYSIS OF HISTORIC FIRE CLIMATOLOGY

BY ANDY ACKLAND AND MUSA KILINC

Climate change is increasing the severity of bushfire seasons across the globe. There is a growing need for fire managers to be more proactive and less reactive in planning for severe bushfires.

Recent trends in bushfires are concerning. Victoria, Australia, has had 5.8 million hectares burned by bushfires since 2002-03; of that, four million hectares were burned in three events of 1.2 million hectares or greater.

While it is important to look forward and better understand the effects of climate change on bushfire risk and fire management, much can be learned and applied from looking back and comprehensively analysing historic fire climatology.

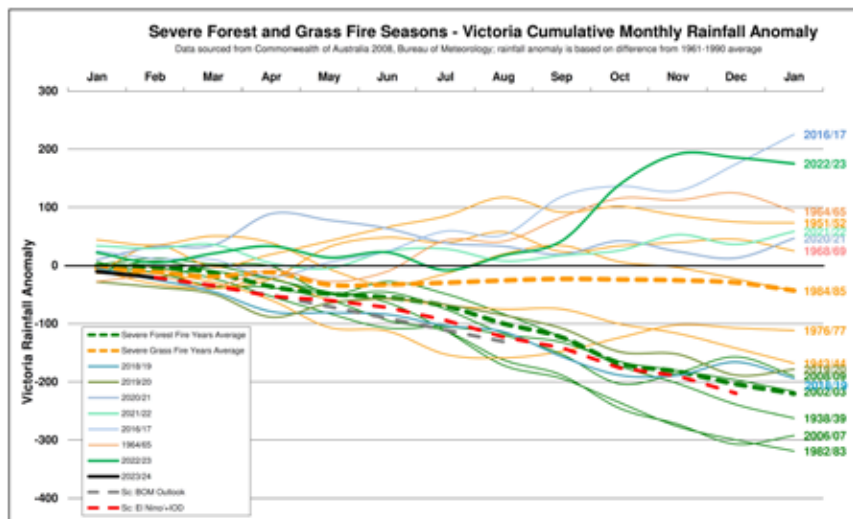
In Victoria, Andy Ackland developed a fire climatology analysis system that has been operationally applied to seasonal preparedness planning since 2007. This system compiles details of bushfire house loss, fatalities, and area burned, along with monthly rainfall and climate patterns for every bushfire season back to 1900. The system provides a powerful platform for investigating rainfall and climate patterns associated with Victoria's worst seasons. Linear plots (locally termed spaghetti plots) provide a simple means of comparing to analogue years, such as those that have similar climate drivers such as El Nino.

A single state-wide indicator, called Victorian cumulative monthly rainfall anomaly, tracks the severity of drought leading into the fire season. While a simplistic measure,

this area-averaged rainfall anomaly has proven to be particularly effective because it is most driven by Victoria's highest rainfall areas, which contain the state's most bushfire-prone rugged eucalypt forests.

The system reveals that all of Victoria's worst bushfire seasons (including 2019-20, 2008-09, 2006-07, 1982-83 and 1938-39) followed a period of severe cumulative

The patterns of monthly cumulative rainfall anomaly compared across all historic fire seasons back to 1900 via so-called spaghetti plots.



MOVING THE LEGEND FORWARD



The next-gen MARK-3® Watson Edition. 30% lighter.
20% smaller. The evolution of the iconic MARK-3® series.

[LEARN MORE VISIT WATERAX.COM](https://www.waterax.com)

WATERAX 
WE MOVE WATER

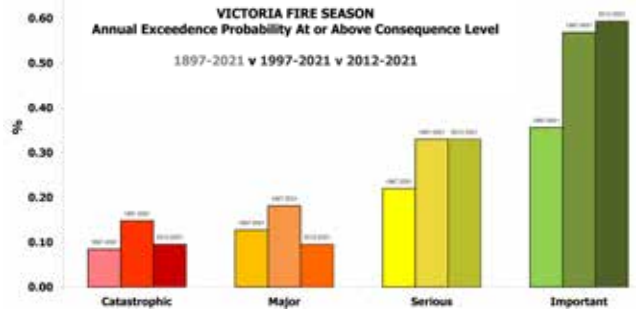
SITUATION REPORT

AUSTRALIA

Fire Season	Oct
1967-68	-251
2006-07	-245
1962-63	-236
2008-09	-203
2018-19	-168
1997-98	-168
2002-03	-165
1994-95	-150
1965-66	-149
2019-20	-148

Since 1950, 10 seasons have been around -150 or drier by Oct

- 5 Catastrophic (50%)
- 0 Major
- 2 Serious (87.5% chance of Serious or worse)
- 3 Important (100% chance of Important or worse)
- 0 No Impact



The frequency (annual probability) of a severe season (100 houses burned and/or three fatalities) has increased to 33 per cent.

Such a simple state-wide rainfall indicator is powerful – virtually all seasons that have a deficit of -150 millimetres by October go on to have severe bushfires, with 50 per cent of resulting seasons having catastrophic consequence.

rainfall deficit commencing the autumn prior to the fire season. Virtually all seasons with a January-to-October anomaly beyond -150 millimetres go on to have severe bushfires.

This system allows accurate identification of a concerning rainfall pattern as early as the autumn prior; this was the case ahead of the catastrophic 2008-09 Black Saturday and 2019-20 Black Summer seasons, with such analysis prompting early seasonal preparedness planning and communications.

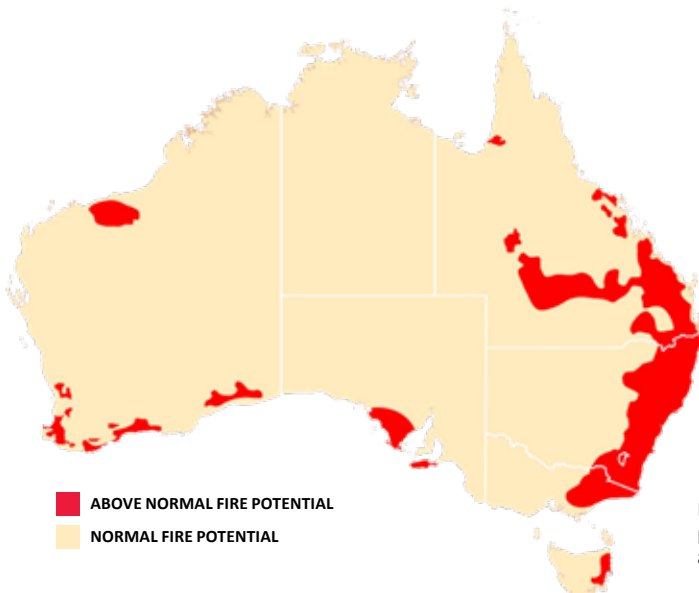
The system also enables accurate early prediction of lower-severity bushfire seasons (such as 2021-22 and 2022-23) from tracking climate drivers that give rise to wetter (positive) cumulative rainfall anomaly, such as the combination of La Niña and negative Indian Ocean Dipole.

Furthermore, the system reveals some recent concerning changes in patterns of rainfall anomaly and bushfire season severity.

The chance of having a serious season (or worse) has changed from 22 per cent annual exceedance probability or AEP (approximately five times a decade) to 33 per cent AEP (approximately 2-3 years). In other words, there's now a 33 per cent chance any season will be at least severe (three fatalities and/or 100 houses).

The chance of getting at least an important season (up to 30 houses lost or a single fatality) has increased to 57 per cent from 36 per cent. In other words, there's now a 57 per cent chance in any season there will be up to 30 homes lost and/or one fatality.

Development of this fire climatology analysis system has not just been for scientific and analytical purposes, but also to ensure it is clear, simple, and useful for



Fire climatology analysis informed accurate predictions of above-normal fire potential in eastern Victoria for the 2019-20 Black Summer season from as early as August 2019 (left); subsequent burned areas (right).

ALWAYS READY

FOR THE FIGHT!



**CERTIFIED FOR
WILDLAND
FIREFIGHTING**

- > Superior Footholds
- > Rugged Durability
- > Flame and Heat Resistant Sole

NFPA 1977-2022
ASTM F2982-2018

**MISSOULA
2.1**

HAIX® North America Inc.
2320 Fortune Drive, Suite 120
Lexington KY 40509
Toll free 866-344-HAIX (4249)

www.haixusa.com

SITUATION REPORT

AUSTRALIA



Significant fire behaviour that occurred on the Tambo 35 Barmouth Spur – Marthavale fire on Dec., 30, 2019, during the 2019-2020 Black Summer season in Victoria, Australia. Spot fires can be seen forming in front of the intense convection column. Photo by Dale Appleton.

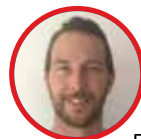
operational staff involved in fire season preparedness planning. Each year, fire managers face difficult, multi-million-dollar investment decisions regarding preparedness planning for the next fire season. Decisions typically need to be made in July and August for fire seasons that typically peak in January and February in Victoria – six to seven months ahead. There can be significant implications, particularly if fire agencies are under-resourced leading into a major fire season, but also if over-resourced for a low-severity season. This system has led to accurate prediction of fire season severity virtually every year since 2007. Senior operational staff now regularly ask for the system’s data to help inform their preparedness decisions.

Referring to analysis of historical fire climatology alongside analysis of regional rainfall, fuel conditions, and fire occurrence has enabled accurate prediction of above-average, average- or below-average Victorian bushfire potential every year for the past seven years in Australia’s quarterly National Seasonal Bushfire Outlook, co-ordinated by the Australasian Fire Authorities Council. There has been found to be strong statistical predictive power in referring to patterns from similar historic seasons, particularly those climate drivers that give rise to very wet or very dry seasons.

Climate change is clearly increasing the threat

of bushfires across the globe. A comprehensive understanding of our historic fire climate can form a powerful reference or foundation for understanding future change. There is predictive power in historical fire climate analysis, but it is important to contextualise this in a shifting climate – recent trends seem to be showing concerning persistence, with fire climate patterns from the earlier 1900s showing less relevance in a warming world.

ABOUT THE AUTHORS



Andy Ackland and Musa Kilinc are predictive services specialists with the Country Fire Authority, Victoria, Australia. Ackland has worked as a predictive services specialist within the Country Fire Authority in Victoria since October 2020. Before that, since 2008, Ackland worked in the Victorian Department of Environment, Land, Water and Planning where he led development of bushfire risk modelling capability using PHOENIX Rapid-fire bushfire simulator. Ackland is an experienced fire behaviour analyst, with deployments to South Australia, Tasmania as well as British Columbia, Canada, in 2009 and 2015.



Kilinc joined the Country Fire Authority in 2015 as a predictive services specialist. Since joining CFA, Kilinc has supported the development of bushfire simulator capability and development. He has conducted various research investigations with colleagues looking into ignitability and the development of fire spread models. Kilinc has also contributed to the evaluation of fire behaviour models and is a strong advocate in science translation. Kilinc works as a fire behaviour analyst at the state and incident level control centres during the summer period and supports capability development of FBANs in Victoria.



WILDFIRE COMMUNITY PREPAREDNESS DAY SATURDAY, MAY 6, 2023

THERE'S SO MUCH MORE YOU CAN DO
IN A DAY TO IMPROVE WILDFIRE SAFETY
THAN YOU EVER IMAGINED.

Wildfires are causing more damage across the United States than ever before. But there are steps you can take to reduce your risk, protect your family, and help your neighborhood survive. The National Fire Protection Association® (NFPA®) and State Farm® have teamed up to help you get ready by sponsoring Wildfire Community Preparedness Day on May 6, 2023.

Learn how easy it is for you to participate! Whether you work on projects around your home or in your neighborhood, your efforts can make a difference in the outcome of a wildfire event.

LEARN MORE ABOUT GETTING YOUR COMMUNITY INVOLVED TODAY!

Visit here to learn more:
nfpa.org/wildfireprepdlay

Sponsored by



WAY DOWN SOUTH

UNITED KINGDOM PROVIDES WILDFIRE TRAINING AND EQUIPMENT TO FALKLAND ISLANDS

BY ROB GAZZARD

The Falkland Islands are a British Oversea Territory lying deep in the South Atlantic, just 427 miles from Cape Horn at the southern tip of South America. Along the 52nd parallel, Falkland Islands residents face fierce Southern Ocean storms, powerful winds, and increasingly, wildfire. As part of my work with the United Kingdom Department for Environment, Food, & Rural Affairs (Defra), I collaborated with the Falkland Islands government to develop and implement a programme to understand the wildfire challenge on the islands. This was necessary as the Falkland Islands – an archipelago the size of Northern Ireland with a civilian population more than 3,500 – is mostly covered in shallow and deep peat that stores millions of tonnes of carbon and has experienced an increasing number of wildfire incidents due to drying conditions from climate change.

Defra's involvement began in 2022. After several months of video conferences that shrunk the globe and taught us about the challenges faced across the Falkland Islands government environment and

its agricultural and fire departments, a deployment programme was agreed upon and funded by Defra.

The programme sought to deliver three objectives. Firstly, develop a co-designed programme of accredited and awareness level training to improve wildfire resilience in terms of prevention and response. Secondly, to understand the present challenge of land management and changes in habitats. Finally, to trial new wildfire suppression equipment provided to the Falkland Islands Fire and Rescue Service (FIFRS), by Defra to enhance firefighters' already impressive skills, increase capabilities, and provide training to use the equipment safely and effectively.

Working with Andy Elliott (@WildfireTaC), the Forestry Commission's contractor and co-creator of our vegetation fire training, we developed, in advance, a series of awareness development presentations and possible workshops, as well as training manuals. These are based on the United Kingdom's first accredited training for wildfire incidents and prescribed fire operations.



Safety and wildfire awareness training with United Kingdom's Royal Air Force and Falkland Islands Fire and Rescue Service. Photos by Rob Gazzard.

**WHEN THE
WORLD
DEMANDS
MORE,**

**AIR TRACTOR
DELIVERS.**



**AIR TRACTOR DELIVERS THE
PERFORMANCE, EFFICIENCY, AND
PRECISION THIS JOB DEMANDS.**

IT'S TIME YOU DEMAND MORE.

After travelling 19 hours to the Falkland Islands – from RAF Brize Norton in England and briefly stopping at Cape Verde off the coast of Senegal in West Africa to refuel – we arrived to the islands’ summer of blue skies, sunshine and little of the powerful winds that typically buffet the islands. Our arrival was at Mount Pleasant Complex, a large military base that is home to several thousand personnel on East Falkland. After being met by our host at the FIFRS, we were taken to our hotel on a road along the rugged eastern coastline to the City of Stanley, the home of 95 per cent of the 3,500 civilian Falkland Islanders, to recover from the flight.

Over the next few weeks, we were orientated around East and West Falklands to learn about landscapes and habitats, as well as the land management practices that sustain some of the islanders. It became very clear that the islands were becoming extremely dry, that rainfall was significantly decreasing, and many of the thousands of ponds scattered across the island were now completely empty. The 500,000 sheep grazing the islands in farm settlements were additionally impacting the limited vegetation species types.

Wildfire suppression efforts outside of Stanley (which is known as the camp), are extremely difficult given that surrounding fires could not be addressed immediately and sometimes several days after ignition, resulting in ground fires deep in the peat; this limits the tactics available to the FIFRS, despite their extreme hard work. Whilst attending a visit to inspect a recent wildfire, we came across an area still alight. This provided an excellent opportunity to demonstrate all the wildfire suppression equipment we planned to trial in front of our hosts, showing them the safe and effective techniques that can be used.

We also undertook a visit to one of the Falklands most westerly islands, Weddell, which is the size of a small county back in the U.K., using the local taxi service – the Falkland Island Government Air Service’s small Britt-Norman Islander planes. The visit provided an excellent opportunity to observe some innovative restoration work of the deep peat habitats and see the land managers and firefighters’ challenges first hand.

After several meetings with the Falkland Islands government and many environmental non-government organisations, we provided awareness training for more than 40 firefighters from FIFRS as well as the

U.K.’s Royal Air Force. Using a presentation developed from the Forestry Commission accredited training, we were able to introduce the firefighters to safe working practices and inform them of new tactics and operations. Using the demonstration equipment, we then undertook live fire training at the Falkland Island’s Defence Force firing ranges.

The final few days concluded with meetings with key stakeholders, attending an excellent presentation provided by one of the leading U.K. peat scientists, Susan Page, and planning a future vegetation fire programme to further increase the resilience with colleagues from across the Falkland Islands government.

This might have been one of the furthest-south deployments undertaken by the Forestry Commission, just some 600 miles from Antarctica. Our thanks to all the Forestry Commission staff who supported our deployment, colleagues in the Falkland Islands government’s environmental, agricultural and fire departments, as well as Defra’s British Overseas Territory biodiversity team. The deployment would not have been possible without the support of the Foreign, Commonwealth and Development Office, as well as the Royal Air Force. The fire services and residents of the Falkland Islands are now more aware and equipped to manage their evolving risk to wildfire and we look forward to returning soon to provide accredited training to land managers and firefighters. We gained a better understanding about the impacts of climate change and how shifting weather patterns can drive wildfire risk in places you wouldn’t expect.

ABOUT THE AUTHOR



Rob Gazzard is the Forestry Commission’s advisor on contingency planning and wildfire in the policy advice team and is seconded to Defra for domestic and international wildfire advice. Since 1999, Gazzard has attended more than 10 large wildfire incidents in the South of England, undertaken training and operational response globally, including North America (Oregon and California) and Europe (Spain and Portugal), as well as a sabbatical to Australia. Gazzard was team leader of the U.K.’s first official international wildfire deployment using a bilateral agreement to Greece in 2018 and first British Overseas Territory deployment in 2023. Gazzard was also programme leader for the U.K. first accredited vegetation fire training modules.

 **TheFireStore**



Airpower® XR1 PRO
is now
QUAD CERTIFIED!

Maximum protection quad-certified for
EMS, Technical Rescue, and Wildland
firefighting

- ▲ Safety toe
- ▲ Puncture resistant
- ▲ Slip-resistant sole
- ▲ Built-in arch support
- ▲ HAIX® lacing System
- ▲ Secura Liner® and CROSSTECH® protected
- ▲ Waterproof, breathable, bacteria, chemical,
and bloodborne pathogen-resistant

Shop now at
TheFireStore.com



TheFireStore.com | **EVERYTHING BUT THE TRUCK** |   

THE IGNITION

A FIREFIGHTER'S JOURNEY TO FINDING CALM IN CHAOS

BY BEQUI LIVINGSTON

I'll never forget that fateful day during the summer of 2013 – you know, one of those memorable events that seem to be forever seared into your psyche; you can recall every vivid detail – where you were; who you were with; and what you were wearing. It was as if time stood still, and for a moment it did.

It was Sunday, June 30, 2013. I had just come home from competing in a senior Olympics track and field meet. It was a hot summer day, as are most June days in New Mexico, with a cloudless bright blue sky and, although I was tired, I was upbeat having done well in the competition. I was resting in the living room while my husband was watching the news and both my young adult children were doing whatever young adults do on weekends. I remember that it was late afternoon when my work cell phone rang, which wasn't unusual since as a wildland fire first responder, I was on call 24/7/365, especially in the middle of wildland fire season in the southwest. When I answered, my fire director was on the other end. It was unusual for him to call me direct. He said, "There's been an incident on a wildfire in Arizona and we can't get a hold of one of the crews." Of course, even though this was not uncommon in this job, it took me by surprise. "I'll let you know when I hear anything," he said. I could hear the concern in his voice, the uncertainty of the whereabouts of those firefighters under his command, here in the U.S. Forest Service, Southwestern Region.

It couldn't have been 10 minutes when my phone rang again, and this time, those dreaded words: "They're gone, they're all gone; the whole crew is gone." Time stood still. As we always do as first responders, I immediately jumped into fight mode, the adrenaline and cortisol pulsing through my veins, my heart

beating vigorously, ready to jump into action. "It was the Granite Mountain Hotshot crew from Prescott (AZ) on the Yarnell Hill fire," he said. "They were in a burn-over and the entire crew is dead, and I need you to assist in putting together an accident investigation team." The concern in his voice faded to great sadness and heartbreak.

I sprang into action since this incident was also on my watch as the (US Forest Service) regional wildland fire operations health and safety specialist. Any wildfire related injury, accident, incident, illness, or fatality was my responsibility to cover. Even though this tragic incident was not under our jurisdiction, I felt a sense of duty to do everything in my power to support everyone involved. I started my wildland fire career in 1979, as one of the few female firefighters at the time, and worked up the ranks to leadership, eventually landing this job, where I truly felt I could make a difference in the lives, health, safety, and wellness of wildland firefighters and other first responders.

However, I didn't recognize the tremendous toll this job took on my personal health and wellbeing. All those years I had dedicated to teaching and coaching others how to practice self-care, especially during chaos or cumulative stress, caught up to me at age 58. Looking back to that single event in 2013, I realize that it was just the beginning – the ignition – to the unraveling of my life, which resulted in my diagnosis of complex post-traumatic stress in January 2016. My emotional, mental, physical, and spiritual bucket (or fuel load) was overflowing, and the Yarnell Hill tragedy appeared to be a catalyst and last drop in my emotional bucket. Yet, I held on, ignoring the red flags, distracting myself through busyness and

working out, until it no longer worked. It all came crashing down in December 2015, after a series of personal crises after Yarnell Hill. It was as if the universe took me upside the head with a 2x4 saying, “Enough already! It’s time to take care of yourself.”

What had started as smoldering embers was now a raging inferno, and I was desperate to find validation and normalization for what I was experiencing, and to feel safe again. My life as I had known it was unrecognizable. This former elite athlete, personal fitness trainer, integrative health coach, college professor, and wildfire leader had been incinerated to ashes. This place was foreign territory for me to navigate, especially on my own, and it was terrifying. For decades, I had been the strong one, the rock, teaching everyone else about health, wellness, and self-care, even teaching workshops about dealing with traumatic stress. And now, I had become the student and had to find strength and courage in a completely different way.

I was being challenged to find my own sense of calm in my new reality of total chaos, the chaos of complex post-traumatic stress (CPTS), complicated grief (CG), Hashimoto’s Thyroiditis, anxiety, and depression. Ironically, as we now know with PTS and CPTS, the tools and modalities that may have worked before no longer worked for me. The friends, family members and members of the wildfire community who used to be there for me and had my back, had all but disappeared into the sunset and I found myself feeling completely alone; this, too, was gut-wrenching. Sadly, in the wildfire community, along with other emergency first responders, the incidence of PTS and CPTS have skyrocketed, yet traumatic stress continues to be in the backwoods of conversation.

In August 2018 I was forced to retire after more than 30 years in service to first responders, Mother Earth

and all her inhabitants; this was primarily due to my CPTS and inability to work in such a stressful, trauma filled and demanding environment. As it turns out, it was a blessing because it provided me the time and dedication to focus on my health and wellbeing and embark on my personal healing journey.

I had done such a great job all my life of suppressing my grief, trauma, and dark emotions rather than allowing them to happen naturally and organically. As I now see it, the cumulative stress from unhealed childhood trauma and wildland fire trauma over the decades was just too much for my sensitive nervous



system and soul to endure. Like my overburdened and stressed nervous system, the decades of forest fuel buildup and mismanagement – and not allowing wildfire to burn naturally and organically – has led to a very injured and vulnerable ecosystem that is now a tinder box just waiting for the next ignition source to complete the cycle of life.

Yet, I have learned so much these past seven years and despite the suffering, I would not change it. I truly believe that the universe took me upside the head, forcing me onto this healing journey because, knowing my stubbornness, I would not have done it on my own. I’ve learned that in most cases it takes a crisis to finally come to terms and heal our wounds. Whether a chronic illness, mental health condition, divorce, addictions, or other traumatic event, we often do not choose this path on our own. I liken it to the grace of God: there are just too many synchronicities and weird, unexplainable events that have happened and have no real explanation, that have really opened my eyes and caused me to believe in something much greater than myself.

I have also come to realize that CPTS and PTS are not disorders, they are not diseases, and they do

not require a label; they are simply injuries to the sensitive nervous system, which was designed specifically to keep us safe and from harm. As first responders, our nervous systems have been on overdrive for years, if not decades. And with that, comes a plethora of issues that manifest physically, emotionally, mentally, and spiritually. Along with my CPTS, I was diagnosed with Hashimoto's Thyroiditis, an auto-immune disorder through which the thyroid gland attacks itself. I see this as another injury caused by traumatic stress and toxicity endured for decades. Understanding what I now know about the thyroid gland, no wonder this happened after a lifetime of suppressing my voice and not speaking my truth. If truth be told, not many people wanted to hear what I had to say, starting with my father. Sadly, this is commonplace in many childhoods, particularly among first responders and women. Sadly, this is where many of these traumatic stress events start – in childhood.

I also recognize that as a wildland firefighter, I was subjected to numerous toxins during my career. As wildland firefighters, we do not wear breathing apparatus (like structural firefighters), only an occasional bandana to keep out the big chunks, as I refer to the particulate matter that we continuously inhale. I liken wildland fire fighting to being as close to war as you can come: we are fighting a battle with an enemy over which we have no control. Oftentimes, while on the fireline, you can't see or hear the enemy until it comes roaring down upon you with incredible power and velocity. We work hours, days, weeks, and months without adequate rest, while our stress hormones continue to flood our bodies, keeping us in a state of survival stress. And now, with so many fires in the wildland urban interface (where the houses and wildlands coexist), as firefighters, we have no idea what we are inhaling – the toxins and the chemicals. Our lungs ache and burn, our throats scratchy and sore, our eyes watery and bloodshot, and our bodies achy and exhausted. We also know that so many of our illnesses and diseases originate at the cellular level and need to be addressed at the cellular level to truly get to the root cause. Epigenetics teaches us that we are all genetically predisposed to some illnesses, yet those same genes require some event to turn the gene to the on position before it manifests into something worse. Yet, here we are as wildland firefighters providing the perfect storm for our genes

to respond – traumatic stress and toxins.

When I was diagnosed, most of my friends, family and wildland community disappeared, other than a handful of friends who were dealing with their own traumatic stress and could relate. At the time, it was gut-wrenching, because I needed support desperately. I reached out to many of the wildland fire supporters, only to not hear a word, be invalidated, or not get what I needed. I even begged my own agency to help me file worker's compensation and get help, yet no one would help me. I now recognize that at the time, my agency and wildland community had no idea how to support me. Even though they talked the talk, my pleas for help fell on deaf ears. Even my temporary supervisor wanted to put me on a performance improvement plan. What the heck?! I now see that most people do not have the capacity to hold safe and sacred space for those of us dealing with trauma and grief; it's too scary for most people and I think they think it may be contagious. People are so afraid of feeling their feelings, especially all the dark emotions that come with our job. The fear, grief, anxiety, despair, hopelessness, and helplessness are terrifying. Yet, my friends, I'll share one of my favorite quotes: "The only way out is through!" – through the darkness of feeling all your feelings that accompany the grief and the trauma. We are not taught or encouraged to feel our feelings, allowing grief and trauma to surface. Instead, we are told to pull up our bootstraps, and to toughen up. "There's no place for crying in wildland fire" I was once told by a fire boss after witnessing the remains of a fox den that had been incinerated by a wildfire. By not dealing with our emotions, we are circumventing our greatest gift and key to healing. As we know, all first responders, like veterans, deal with traumatic stress and grief. We learn to compartmentalize our stuff, to turn a blind eye and hold back our tears. But please believe me when I say this: Your trauma and grief will catch up to you. It may not be until you are on your death bed, but it will happen. I know.

What concerns me is that everyone seems to be jumping on the mental health and trauma bandwagon. Trauma and post-traumatic stress have become buzz words, and for good reasons. In the United States, federal wildland agencies have developed a behavioral health program, along with myriad committees, sub-committees, and other

initiatives. Don't get me wrong; it's about time this happened. But where were these initiatives when I needed help and support along with my friends and former colleagues who were suffering? I know that to truly understand traumatic stress and grief, and to be a true healer, you must have experienced it yourself. You don't learn this stuff from books or college courses; you learn it only through experiential learning. Only then can you walk the walk and talk the talk. As I love to say, don't tell me how to tie my fire boot laces until you've walked a mile on the fireline in my footsteps.

Through these past seven years of my healing journey, I have been through four inpatient programs, all of which supposedly specialized in PTS(D), three psychiatrists, two psychologists, 11 therapists, and 23 medications – all of which re-traumatized me and to the tune of about \$450,000 out of my own pocket. I have tried most of the professed trauma therapies, including eye movement desensitization and reprocessing, cognitive behavior therapy, dialectical behavior therapy, trans-cranial magnetic stimulation, and Gestalt therapy, along with numerous other modalities, none of which helped, and perplexed all the so-called specialists to the point that they would shame me for not being fixed. It wasn't until I met my current trauma therapist and started doing very deep, internal healing techniques, at my pace, that I started to heal. This is because my amazing trauma therapist had experienced her own healing journey through complex trauma and grief and found her way through, after years of her own work. This therapist validates me, provides empathy, and hope along with holding safe and sacred space. She never judges me, shames me, or tells me how I need to heal. She sees and hears me, and she loves me just the way I am in all my brokenness, and keeps me safe. She has been guiding me to find my own medicine. For her, I will always be grateful.

I DIDN'T KNOW, WHAT I DIDN'T KNOW, UNTIL I KNEW

BY BEQUI LIVINGSTON

I know what it feels like to have your body ravaged by neurogenic tremors, curled up, in a ball, on the floor, shaking uncontrollably.

I know what it feels like to wake up, in the middle of the night, sweating profusely and terrified from your night terrors.

I know what it feels like to experience sensory overprocessing, known as hypervigilance, where every sound, sight, and smell activates overwhelming sensations.

I know what it feels like to be in a constant fog; nothing makes sense, you can't make decisions and your pre-frontal cortex (cognitive thinking brain) goes offline.

I know what it feels like to be so depressed that you have no hope of making it through; hopelessness and despair become your constant companion.

I know what it feels like to feel completely alone; no one seems to hear a word you cry, and no one sees the frightened little girl you have regressed into.

I know what it feels like to constantly live in a world of flashbacks, emotional and visual. The simplest words from others, events and experiences cause myriad overwhelming emotions and pictures from the past.

I know what it feels like to be in a constant state of fight, flight, freeze and shut-down, the nervous system having both the gas and brake pedals on at the same time, oscillating between them like a Bambi bucket on a helicopter long-line.

I know what it feels like to have friends, family and co-workers turn their backs, because they just don't have the capacity to hold safe and sacred space for your pain.

And I know what it feels like to have suicidal ideations, every day for two years straight. You wake up in despair, not knowing how you're going to make it through another day, just wanting to end it all.

I also know that this too shall pass, that my nervous system will heal and my heart along with it. And although I may continue to heal for the rest of my life, this too can be a blessing.

I also found great healing through somatic (body-based) practices, especially trauma sensitive yoga and wisdom healing qigong. Because our sensitive nervous systems are so overwhelmed and injured, much of our unhealed trauma and grief gets stored throughout our bodies, in our muscles, fascia, organs, bones, and cells. Until we start to do somatic movement that help to release that stored energy, we will continue to deal with chronic illness and other related issues. I had been an elite athlete for most of my life, running every day and lifting weights. I now see that it was my safety net, my release valve for all my trauma and grief. However, the obsession became debilitating over time and in 2016, I could no longer run and could barely walk. I had started doing yoga in the 1980s at a local athletic club where I was the assistant manager in the off season, but at the time, I thought yoga was too woo-woo for me. Then in March 2015, a couple of years after the Yarnell Hill fire, my dear friend and I attended trauma sensitive yoga training for first responders. Ironically, she and I had just completed the initial Yarnell Hill staff ride for our national fire operations health and safety committee, of which we were both members. The yoga training was held at the Sedona Yoga Festival which was hosted by one of my good friends and former wildland firefighter with PTS. The session was awesome, yet I did not truly understand the benefits of yoga and somatic movement until a few years later when it became my lifeline. After my retirement in August 2018, my nervous system was still so injured I desperately needed a gentle, and safe somatic practice. I was invited to a local yoga studio whose owner was trauma informed, having a family of military veterans and first responders. It was here that I finally felt safe to do yoga and fall apart on the mat as needed. I started coming to yoga classes daily, and sometimes twice a day because my neurogenic tremors (trauma induced) were so bad, and I needed a safe place to unwind.

It was here that I started to meet the other yoga instructors and learn their trauma stories and started to trust people again. With trauma, two of the biggest things that are essential to healing are feeling safe, and to trust – and this was huge for me. It was here, in the yoga studio that my trauma and grief from my injured nervous system started to unwind and I started to finally feel some relief. It was magical and became my medicine. This inspired me to sink

my energy into learning as much about traumatic stress, trauma sensitive yoga and other modalities that might be beneficial, and I started working to becoming an expert in the field. I found my purpose again – something entirely different from what I ever expected to see myself doing. I wanted to do whatever I could to help others heal through their trauma and grief, to help them become informed and find their own medicine in a safe and nurturing environment, surrounded by healers and peers, like me, who have done their own deep healing work and know what it feels like to have PTS or CPTS. I wanted to ensure that no one experiences what I experienced after my CPTS unraveling – the heartbreak, the rejection, the betrayal, and abandonment that opened the childhood wounds that so many of us carry. I want to provide a healing environment in which first responders and others with trauma and grief can heal, surrounded by nature, and supported by their peers, where they feel validated and have hope, to ensure they are seen, heard and feel safe and loved just the way they are. Most importantly, I want to share my experience and story, through writing, teaching, and coaching, so that others may find their way through the darkness, while shining my headlamp until their headlamp is lit again and they know they are not alone.

By sharing my story honestly and authentically, I might spark an ember of hope for anyone dealing with traumatic stress. May this story provide wisdom and hope as well for supporters – families, friends and healers who continue to support their loved ones through this healing journey.



ABOUT THE AUTHOR

Bequi Livingston was the first woman recruited by the New Mexico-based Smokey Bear Hotshots for its elite wildland firefighting crew. She was the Regional Fire Operations Health and Safety Specialist for the U.S. Forest Service in Albuquerque, New Mexico. Livingston is now a certified trauma specialist, trauma sensitive yoga teacher, integrative health coach and personal fitness trainer. Her business, BodySense Wellness, focuses on paying it forward to help wildland firefighters and first responders heal and deal with their traumatic stress.

MITIGATE WILDFIRES MAINTAIN SAFETY

Mother Nature Approved



Clean,
Fast Burns



Produce
Biochar



Return
Carbon To Soil



Go Green,
Make Green



Easy To
Maneuver



Easily
Towable



Scan the QR code
to learn more about
our machines

CharBoss

Managing forest health takes time and money, but the alternative is even more costly to our environment. The new CharBoss, the world's first biochar production system, can help on both fronts and turn unwanted wood waste into valuable, nutrient-rich biochar you can sell or mix into the soil to improve forest health. Go deep into the woods to thin trees, slash piles, clear land, and avoid obstacles to manage forest growth and mitigate wildfire safely. The mobile, self-contained CharBoss is easy to maneuver, eliminates wood waste 40x faster than open burns, and significantly reduces the amount of particulate matter in the air. Developed in cooperation with the US Forest Service, and after a successful debut at the University of Idaho Experimental Forest in January 2023, CharBoss is ready to help trim trees and cut costs to fight climate change.

Contact us for a quote today.

772.220.7303

Sales@AirBurners.com

AirBurners.com



 **AirBurners**

CARING FOR THE LEADER WHEN THE LEADER IS YOU

BY MICHAEL DEGROSKY

Leadership is a holistic discipline. To lead well requires some level of knowledge, understanding and skill around topics ranging from vision and change to empathy and authenticity. One useful framework encourages us to think of the skills of leadership in three broad domains: self-leadership; leadership of others; and organizational leadership. I was slow to adopt the idea of self-leadership and tended to think of it as self-alignment, but I have since embraced the paradigm that people can sustain effective leadership only if they continuously engage in keeping their own acts together personally and professionally – not because I advocate a leader-centric perspective of leadership, but because I know that happier, healthier better-connected leaders are more effective leaders, and the science supports me.

Leadership is influence; people lead by successfully influencing other people. The science around leaders and leadership strongly suggests that people allow themselves to be influenced, in other words to follow, when they perceive a would-be leader as competent and trustworthy. Research also suggests that people form their perceptions of another person's leadership credibility in part by what the would-be leader signals through their behavior and

that follower perceptions make leadership possible.

There are clear links between self-alignment and leadership of others as well as between self-alignment and self-care. When would-be leaders struggle to manage stress, do not sleep well, let their fitness and nutrition slip, or turn to unhealthy coping mechanisms, their social signaling becomes disrupted in ways that unsettle people's confidence in them as leaders: bad relationships get worse; good relationships go sour; leadership is undermined.



Leadership is a privilege and, often, a fulfilling and rewarding experience that provides many intrinsic rewards. However, leadership is also a duty and one which, at times, can feel stressful and overwhelming. In the Status Report section in this issue of *Wildfire*, we see how leaders in wildland fire management confront challenges as they prepare for the core of the fire year. Fire organizations and the people in them expect a lot from their leaders, often too much, and a good leader must be able to shoulder several burdens; prominent among those burdens is anxiety, a growing concern in our increasingly turbulent and complex work world.

According to the Anxiety and Depression Associa-

tion of America, anxiety is a reaction to stress. If you want to know about the relationship between anxiety and leadership, I recommend a Harvard Business Review article titled *Leading Through Anxiety* (<https://hbr.org/2020/05/leading-through-anxiety>) by Morra Aarons-Mele, a leading voice on the subject. Anxiety can serve us well. According to Aarons-Mele, “When channeled thoughtfully, anxiety can motivate us to make our teams more resourceful, productive, and creative. It can break down barriers and create new bonds.”

However, Aarons-Mele also makes clear the dark side of anxiety when she points out that “left unchecked, anxiety distracts us, zaps our energy, and drives us to make poor decisions.” According to Nancy Koehn, a business historian at Harvard whose research focuses on crisis leadership, unchecked anxiety perceived by followers is distracting, destabilizing, destructive, and can create the impression that a would-be leader is defined by doubt and fear, none of which is conducive to giving would-be followers confidence in one’s leadership.

Lately, I have been reading about a personality type that some psychologists call “anxious achievers,” people who perform at very high levels in their work but who can regularly experience anxiety, pressure, worry and self-doubt. I consider myself an anxious achiever and I have known many anxious achievers, including some wildland fire legends. It has been my experience that one need not look far in wildland fire services to find a person whose anxiety drives their hard work, preparation, accomplishments, and reputation. However, I have also seen the dark side of anxious achievement, watching hard-charging leaders use their desire to do a great job as fuel, only to see their decision-making ability and overall leadership effectiveness damaged when their unmanaged anxiety became too much. If you are interested in knowing more about this personality type I recommend a more recent Harvard Business Review article by Aarons-Mele titled *How High Achievers Overcome Their Anxiety* (<https://hbr.org/2023/03/how-high-achievers-overcome-their-anxiety>).

People can sustain effective leadership only if they continuously engage in strengthening and preserving

their leadership capacity, and that requires not only a commitment to continuous learning and self-improvement but also, given the stresses of today’s fire management jobs, a commitment to self-care. At the risk of generalizing, it has been my experience that self-care is not a particularly strong skill for wildland fire professionals. Too often, at best, self-care is given passing attention while developing leaders in our discipline – ironic given the stressors of the work.

The Aarons-Mele articles offer some great advice, including links to resources that can help leaders understand the relationship between anxiety and leadership and how to keep that relationship positive. For leaders in fire management organizations, self-care is not a luxury but an essential building block of sustained, effective leadership. Taking good care of oneself also models good practices for others and signals to them that they can and should take care of themselves as well. Please remember, happier, healthier, and better-connected leaders are more effective leaders.

THERE ARE CLEAR
LINKS BETWEEN OUR
SELF-ALIGNMENT
AND OUR LEADERSHIP
OF OTHERS AS WELL
AS BETWEEN OUR
SELF-ALIGNMENT
AND OUR SELF-CARE.



ABOUT THE AUTHOR

Mike DeGrosky is the former chief of the Fire Protection Bureau for the Montana Department of Natural Resources and Conservation, Forestry Division. He taught for the Department of Leadership Studies at Fort Hays State University for 10 years.

READY FOR WILDFIRES

Our network of authorized dealers is your source for everything WATERAX, including technical expertise.

FIND A WATERAX DEALER NEAR YOU

WATERAX 
WE MOVE WATER