



Forest Service
U.S. DEPARTMENT OF AGRICULTURE

Rocky Mountain Research Station Science You Can Use *Tools*

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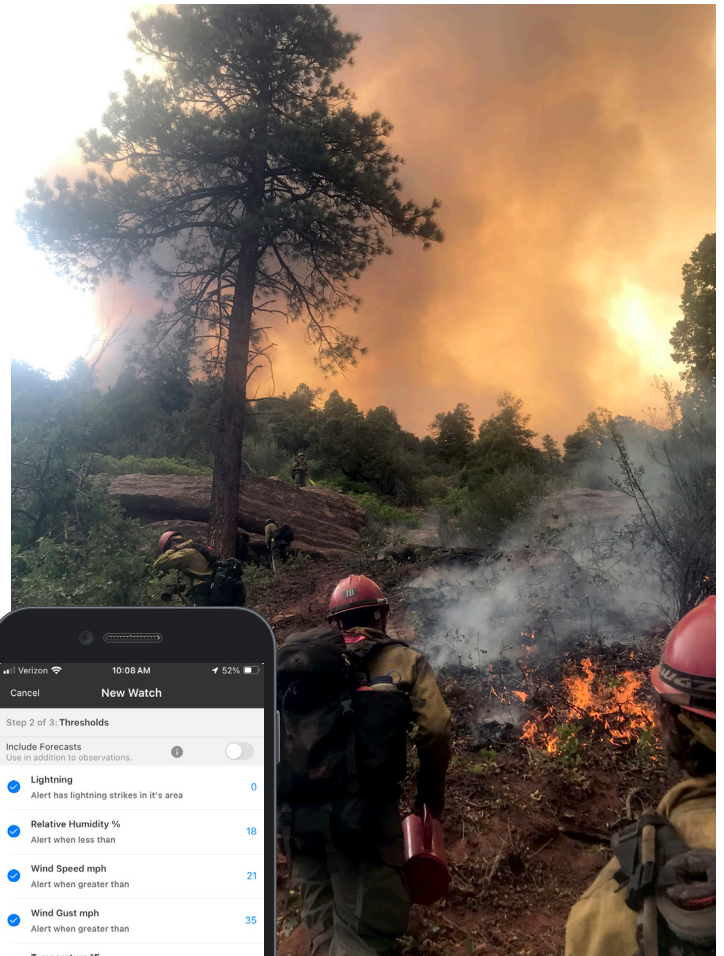
Fire Weather Alert System Mobile App (FWAS): Realtime data could save lives on the fireline

Satellite, radar, and strategically placed Remote Automated Weather Stations (RAWS) are a few of the many technologies used to gather data and predict weather. Yet, some weather events are still unpredictable. A morning forecast for a chance of storms in the afternoon can transform into a major thunderstorm in the middle of an alpine hike.

While inconvenient for your average hiker or boater, major shifts in the weather can be deadly for firefighters. Longer and more intense fire seasons make accurate and timely weather predictions crucial to firefighter safety. To answer this need, the Fire Weather Alert System (FWAS) was developed by Jason Forthofer, Research Mechanical Engineer, and Natalie Wagenbrenner, Research Meteorologist, both from the Rocky Mountain Research Station's Missoula Fire Sciences Laboratory. The FWAS is a mobile app that gathers weather data from many sources into a single convenient space and provides firefighters with individualized, easy-to-use, and timely weather alerts on their phones.

Firefighter Safety & Why We Need Better Data Access

Firefighters' lives have been lost due to rapid shifts in weather that push fires unexpectedly. For example, the 2013 Yarnell Hill fire in Arizona killed 19 Granite Mountain Hotshots who were overrun by the fire partly due to an abrupt shift in the wind speed and direction caused by an incoming thunderstorm. The issue, Forthofer explains, is that firefighters typically get a morning briefing on the day's weather, containing significant uncertainty, and may not receive updates while out in the field. The weather often changes.

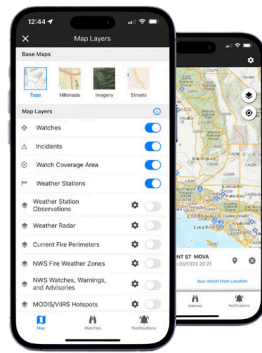


Longer and more intense fire seasons make accurate and timely weather predictions crucial to firefighter safety. The Fire Weather Alert System (FWAS) is a mobile app (left) that gathers weather data from many sources into a single convenient space. It provides firefighters like those performing a

burnout operation (above) with individualized, easy-to-use, and timely weather alerts on their phones. USDA Forest Service photo taken near Durango, Colorado by Cache Gibbons.



There are many different products that firefighters and managers can use to predict the weather and its effect on fire behavior. The products range from National Weather Service alerts and forecasts, Remote Automated Weather Stations (RAWS), Automated Weather Observing Stations (AWOS) at airports, Next Generation Weather Radar (NEXRAD), and the High Resolution Rapid Refresh (HRRR) forecast model from National Oceanic and Atmospheric Administration (NOAA), among many others. While some of these data are available on a phone, much of the data are more easily accessed on a computer, a luxury firefighters don't often have in the field. Additionally, it is difficult to navigate between the various products. Each product specializes in different kinds of weather information. Wagenbrenner explains, "The FWAS app is designed to bring it all into one place so that users can quickly view it within one framework." FWAS allows a user to choose what products they want to access, receive alerts based on



their specific location, and view the data in one layered map.

What Is Next?

Right now, the FWAS can give firefighters alerts such as "a cold front is 10 miles away to your West," explained Forthofer. This kind of information might have helped the 14 firefighters who lost their lives in the 1994 South Canyon in Colorado when a dry cold front accelerated the winds. Forthofer and Wagenbrenner hope to continue to add additional weather products and app capabilities. Wagenbrenner explained: "There's still research that needs to be done to be able to accurately detect thunderstorm gust fronts and we're working with the University of Oklahoma and MIT to help develop a system that could do that." Ultimately, Forthofer sees the app "as a framework in which to feed new research from the Missoula Fire Lab and other researchers working in fire and atmospheric science down to the people on the ground to help them make better decisions on fires."

KEY MANAGEMENT CONSIDERATIONS

- The Fire Weather Alert System (FWAS) is a map-based mobile app that allows users (like firefighters and emergency responders) to create custom alerts for dangerous weather situations. The app can be downloaded via [Google Play](#) or the [Apple App Store](#). A Quick Start Guide is available here: <https://usda-fs.wistia.com/medias/xue055cuob>.
- FWAS allows users to set a custom watch area and various weather alerting thresholds (such as "alert when greater than 100 °F"). When a threshold is reached, users receive an alert message.
- As a map-based app, FWAS offers a visualization of different weather products in one convenient space. For example, users can display Red Flag Warning areas or RAWS stations or satellite hotspots (MODIS/VIIRS).
- FWAS can be accessed by firefighters and other emergency managers directly on their phones as long as there is cell service. It can also be used by crews and dispatchers who can relay alerts by radio.

Dr. Rebecca Jones is the author of this Science You Can Use in 5 Minutes.

PROJECT LEADS

Jason Forthofer is a Research Mechanical Engineer for the Rocky Mountain Research Station and has worked at the [Missoula Fire Sciences Laboratory](#) since 2001.

Natalie Wagenbrenner is a Research Meteorologist for the Rocky Mountain Research Station and has worked at the [Missoula Fire Sciences Laboratory](#) since 2013.

MORE ABOUT THE FWAS

Fire Weather Alert System:

<https://firelab.org/project/fire-weather-alert-system>

This is an overview of the mobile app found on the Missoula Fire Sciences Laboratory website.

Fire Tech Series: We Talk to Jason Forthofer of the Missoula Fire Lab:

<https://podcasters.spotify.com/pod/show/the-hotshot-wake-up/episodes/Fire-Tech-Series-We-Talk-to-Jason-Forthofer-of-the-Missoula-Fire-Lab--We-discuss-AI-in-wildfire--working-with-Google--and-the-importance-of-on-the-ground-operational-intel-e2959th>

This Hotshot Wake Up Podcast features lead scientist Jason Forthofer and a discussion about the FWAS mobile app and its value for firefighters.

The Rocky Mountain Research Station is one of seven units within USDA Forest Service Research & Development. RMRS maintains 14 field laboratories throughout a 12-state geography encompassing parts of the Great Basin, Southwest, Rocky Mountains, and the Great Plains. While anchored in the geography of the West, our research is global in scale. RMRS also administers and conducts research on 14 experimental forests, ranges and watersheds and maintains long-term research databases for these areas. Our science improves lives and landscapes. More information about Forest Service research in the Rocky Mountain Region can be found here: <https://www.fs.usda.gov/research/rmrs/>.

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