



Forest Service
U.S. DEPARTMENT OF AGRICULTURE

Rocky Mountain Research Station Science You Can Use *(in 5 minutes)*

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Is This Flight Necessary? A New Framework for Fire Aviation Decision Support That Improves Efficiency Through Analytics

Aircraft play vital roles in managing wildfire, but their use is both costly and inherently risky. On average, USDA Forest Service aviation costs represent 30 percent of annual firefighting expenditures. And despite improvements in airworthiness and safety in the last decade, aviation-related accidents represented the highest category of federal firefighter fatalities. To improve strategic risk management of firefighting aircraft, Rocky Mountain Research Station (RMRS) ecologist Crystal Stonesifer and colleagues have recently developed and published a decision support system called the Aviation Use Summary (AUS). The AUS provides a shared understanding for firefighters, fire managers, and fire leadership through near real-time automated mapping of aircraft actions (such as retardant drops) and a structured, repeatable check-in and planning process.

In aviation, a fundamental risk management practice is to ask, “Is this flight necessary?” This question may

be straightforward during initial attack with a clear objective of containing the fire. It becomes more complicated when managing a large, long-duration fire with multiple, possibly competing, objectives. Alignment of management decisions is further challenged because responsibility for large wildfire management is often shared by multiple agencies and across several administrative levels. A key goal of the AUS is to help ensure consistency between tactical and strategic objectives so that risk-informed decision-making can be common practice. This work builds on over 10 years of RMRS research characterizing use and efficiency of aircraft in fire suppression to help understand operational effectiveness, improve wildfire response, and minimize unnecessary firefighter exposure.

The AUS has been applied since 2017 on over 70 different fires, forests, and regions throughout the Western United States. The tool utilizes aircraft tracking data, existing geospatial datasets, and



Aircraft play a vital role in fighting wildfire, but their use is both expensive and inherently risky. The Aviation Use Summary (AUS) is a new RMRS tool that utilizes aircraft event tracking data, existing geospatial datasets, and emerging analytics to guide decision makers through a strategic risk management process. USDA Forest Service photo of 2017 Ventura Fire by Kari Greer.



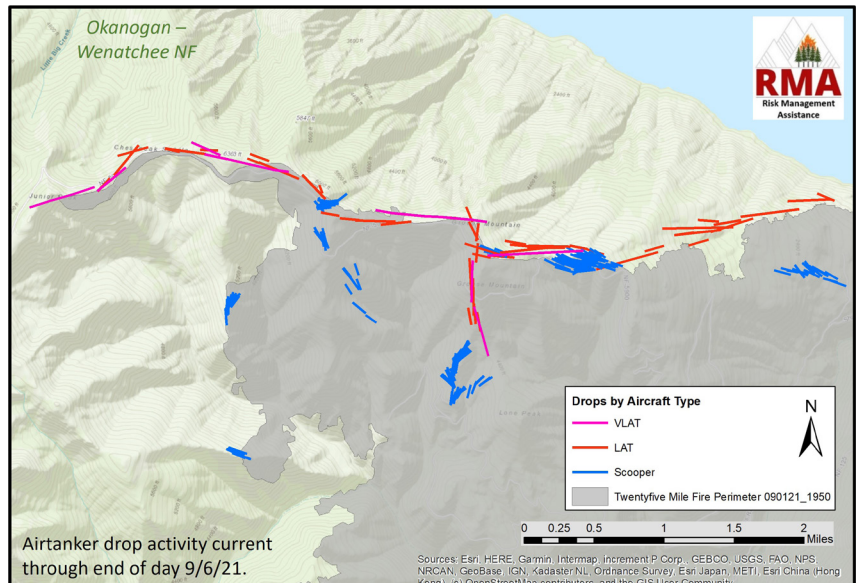
supporting analytics, such as Potential Control Locations, to summarize aircraft use and guide decision makers through a strategic risk management process. Analysts at RMRS manually develop the AUS based on specific requests, and it is typically produced as a slide deck with relevant information including charts, maps, and summary graphics. According to Stonesifer, “The AUS is a communications equalizer because it summarizes information in a way that is easily understood by anyone—not just somebody who is highly knowledgeable about aircraft use or fire suppression operations. This facilitates important conversations between land managers and operators about objectives, related risks, and potential outcomes.” Through this work, the researchers aim to rephrase the question “Is this flight necessary?” to “How does this flight support the strategy?” to support decision makers, enhance learning, and improve accountability.

FURTHER READING

Stonesifer, C.S.; Calkin, D.E.; Thompson, M.P.; Belval, E.J. 2021. [Is this flight necessary? The Aviation Use Summary \(AUS\): A framework for strategic, risk-informed aviation decision support](#). *Forests*. 12 (8): 1078.

Stonesifer, C.S.; Calkin, D.E.; Thompson, M.P.; Stockmann, K.D. 2016. [Fighting fire in the heat of the day: An analysis of operational and environmental conditions of use for large airtankers in United States fire suppression](#). *International Journal of Wildland Fire*. 25: 520–533.

Calkin, D.E.; O'Connor, C.D.; Thompson, M.P.; Stratton, R. 2021. [Strategic wildfire response decision support and the risk management assistance program](#). *Forests*. 12(10): 1407.



The Aviation Use Summary uses aircraft tracking data as shown in this airtanker drop activity map from 9/7/2021 on the Twenty-five Mile Fire, which highlights how the Incident Management Team was focused on containing the fire along a key ridge to prevent it from impacting resources near the lake. This example illustrates how this information can be a useful tool in communicating key actions to the public. USDA Forest Service graphic courtesy of Crystal Stonesifer.

KEY MANAGEMENT CONSIDERATIONS

- Aviation costs for the Forest Service accounted for 30 percent on average of total annual firefighting expenditures between 2011 and 2020, and aviation-related accidents represented the highest category of federal firefighter fatalities during that same period.
- The Aviation Use Summary (AUS) is a framework for a decision support system that bridges the gap between tactical aviators, incident managers, land managers, and fire leadership through near real-time mapping of actions and a structured, repeatable check-in and planning process.
- The AUS, which is manually developed by RMRS analysts by request, has been in use since 2017 on over 70 different fires, forests, and regions throughout the Western United States.
- This framework provides analytical insights that facilitate important conversations between land managers and operators about objectives, related risks, and potential outcomes.

PROJECT LEAD

Crystal Stonesifer is an ecologist at Rocky Mountain Research Station in Missoula, MT. She is a member of the [Wildfire Risk Management Science Team](#) in the Human Dimensions Program and specializes in wildfire resource use, economics, and risk.

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/rmrs/>.

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