



Topic: Aerial Firefighting Use and Effectiveness (AFUE): Preliminary Findings

Date: March 11, 2019

Introduction

The Aerial Firefighting Use and Effectiveness (AFUE) study began in 2012 in response to recommendations in Government Accountability Office (GAO) Report 13-684, and the expectations requiring development of an Aircraft Modernization Strategy for Wildland Fire. The GAO report recommended that the Forest Service expand its efforts to collect information on the performance and effectiveness of the federal firefighting aircraft fleet.

The goal of the AFUE study is to develop and implement processes, technology, evaluation criteria, and performance measures to quantify and measure the effective use of large airtankers, very large airtankers, helicopters, and water scoopers, supporting resource deployment, operational application decisions, and future aircraft fleet management.

These results will inform improvements in training, mission selection and execution, and fleet planning, leading to overall improvement in aviation cost effectiveness and the potential realization of future fire suppression cost savings.

Data Collection

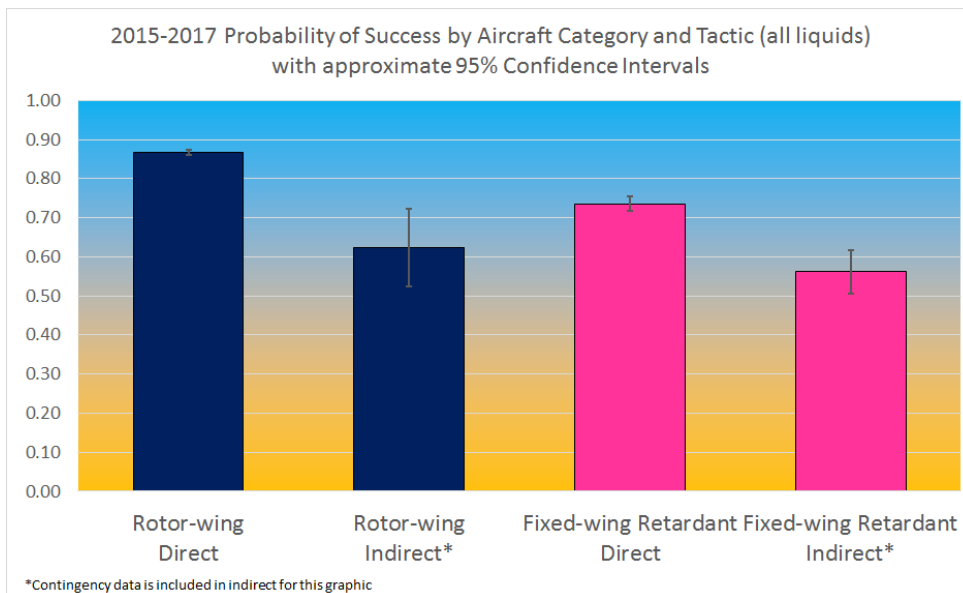
The AFUE study provides key information to define and track performance metrics for wildland fire aerial suppression aircraft.

- Between 2012 and 2015, the Agency established AFUE study protocols and worked with airtanker vendors to install data collectors on contracted aircraft. Testing began for data viability and confidence, with live data collection starting in 2015.
- Three modules of four trained firefighters each, support the AFUE study, collecting ground and aerial data throughout the Nation during the fire year.
- Fires are chosen for observation by a targeted sampling methodology. All AFUE missions are coordinated through Geographic Area Coordination Centers, local dispatch centers, and the on-scene local Incident Command System.
- AFUE collects data on aircraft retardant drop locations and information including: objectives and outcomes for each retardant/water drop; terrain, slope, fuel type; fire spread characteristics; weather conditions and other environmental factors that may influence retardant drop effectiveness.
- AFUE's analysis methodology employs data mining, predictive modeling, hypothesis testing, and emerging statistical tools to reveal complex relationships in the data, and predict effects of future decision-making.
- The initial findings from data gathered between 2015 and 2017, highlight how AFUE wildfire suppression response assesses the objectives, outcomes, performance, effectiveness, and probability of success to document an aircraft's contributions to fire suppression.
- In documenting objectives, conditions and outcomes, AFUE data can identify and track the performance of specific aircraft types, and provide the ability to assess the influences operational missions and environmental factors had on retardant drop performance.
- AFUE data gathering is very intensive and complex, and involves collecting qualitative and quantitative information throughout the lifecycle of individual fires.
- Data analysts work to understand connections between fire management decisions and actions; their relation to environmental conditions and outcomes; assessing if performance in meeting objectives can be measured; and the causes for success or failure can be understood.



Preliminary Findings

- Rotor-wing aircraft data indicates an 87% probability of success in direct attack drops, and 62% in indirect attack drops.
- Fixed-wing aircraft data indicates a 74% probability of success in direct attack drops, and 56% in indirect attack drops.
- Rotor-wing and fixed-wing have different mission profiles with a varying degrees of complexity. Both aircraft types fly direct attack missions the majority of the time. (See table below)



* Direct: Any treatment applied directly to burning fuel such as wetting, smothering, or chemically quenching the fire. This includes drops adjacent to the active fire or with limited unburned fuels between the drop and fire edge. Whenever you hear the requestor suggest that the intent of the drops was half in and half out, select direct for tactic.

* Indirect: A method of suppression in which the control line is located some distance away from the fire's active edge. Generally done in the case of a fast-spreading or high-intensity fire and to utilize natural or constructed firebreaks or fuel breaks and favorable breaks in the topography. The intervening fuel is usually backfired; but occasionally the main fire is allowed to burn to the line, depending on conditions.

Next Steps

The preliminary findings are generated in instances where there is sufficient data to report with high confidence. The Forest Service will continue data gathering efforts to enhance sample representation and boost confidence where the sample data is limited. This includes analyzing the data collected during the 2018 field season to determine whether sufficient data is available to report further findings.

A final report and plan will be released once sufficient data has been gathered and analyzed for all aspects of airtanker retardant performance and effectiveness.