



Relationship of Fire Discovery Times on the Timeliness of Aerial Firefighting Support

Optionally-Piloted Helicopters – Filling the Gap & Moving the Needle

Background: Since 1930 when aviation was first employed on fires in a direct attack role, support to ground firefighters has been limited to daylight hours¹ when visibility permits visual flight operations. Historically, this has limited aerial fire support to an average of 8 hours per day².

Issue: Traditional night and daytime visibility limitations on the use of aircraft for initial, extended attack, logistics support, emergency extraction, etc. result in lengthy periods when the fire is left unthreatened and firefighters unsupported. This issue also has potential to consequences on the number of large fires occurring each year.

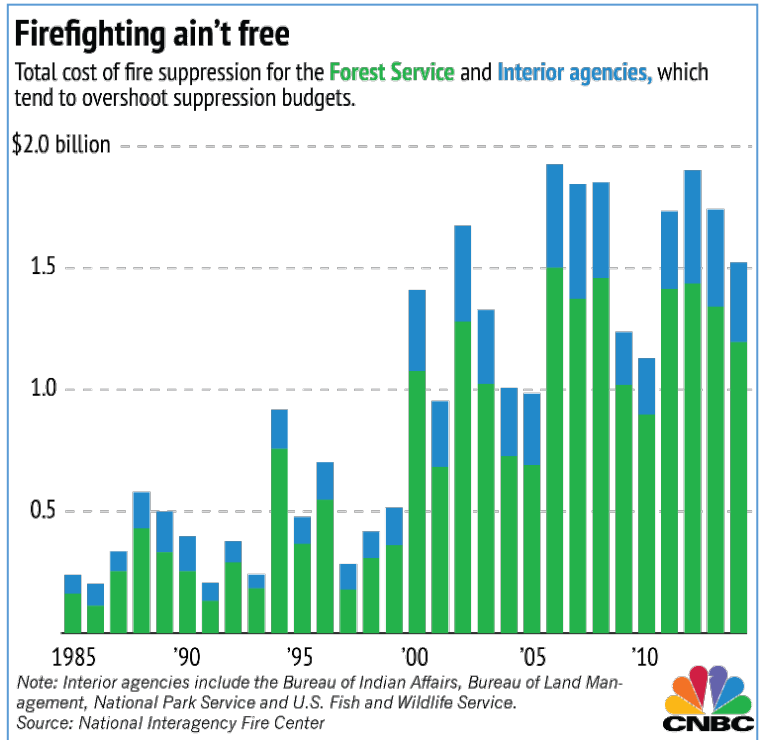
Fire Discovery Times and Consequences: Wildfires, particularly those caused by lightning strikes often occur outside the traditional hours of aerial firefighting support. This can also increase the time between the fire start and its eventual discovery. Fires discovered outside traditional air support hours can have varying consequences. Those that occur in the early morning hours before traditional air operations launch receive generally have less time to wait for air support than those discovered shortly after air operations cease at the end of the day. Those starts that occur and are discovered closely following the daily cessation of air operations can have over 12 hours to burn and grow without air interdiction. An examination of fire discovery times for 2015 through data through July, 2017 indicates **19%** of fires are discovered outside traditional air support hours. Of these, **66%** are discovered between the end of flight operations and midnight, giving them the greatest opportunity to grow unchecked by initial and



¹USFS has one night flying helicopter under contract, operating in CA.

²Typically, a wildfire pilot flies no more than 6 hours/day. Getting to 8 or beyond requires additional pilots. Traditionally, reduced visibility due to darkness or smoke has been the limiting factor in using aircraft for active attack on wildfires.

extended air attack. Of the approximately 73,000 wildfire ignitions that occur annually, 98% of them are contained within the first 24-hr operational period. [The remaining 2% consume more than 90% of the overall wildfire suppression budgets](#) of Interior and the Forest Service and those costs continue to grow. Although specific data of when these large fires are first discovered isn't currently available, it is likely that some of these large fires start in the periods when traditional aerial firefighting support is unavailable, contributing to their unchecked growth and eventual [large size and cost](#).



Potential Technology Solution: One of the guiding principles of the National Cohesive Wildland Fire Management Strategy is: **“safe aggressive initial attack is often the best suppression strategy to keep unwanted wildfires small and costs down.”** Traditional technologies and methods of aerial firefighting limit the use of aggressive initial attack on a large number of wildland fire starts, often allowing them time to grow and become more costly. However, there is existing technology, developed and deployed by the Department of Defense and twice tested by the Department of the Interior (DOI) that shows great promise toward safely eliminating these large time gaps in active aerial prosecution of wildfires. Optionally-piloted helicopter technology was developed and successfully used by the U.S. Marine Corps in Afghanistan to provide logistic support to forward operating bases in the unmanned configuration, operating successfully in an unmanned configuration for thousands of flight hours. Industry successfully demonstrated this capability in a remotely piloted KMAX helicopter for the DOI and USFS in 2014 and 2015 in representative aerial firefighting missions including: dipping and water drops (spot and line building), multiple load delivery, and emergency extraction. [Each test was successful, safely demonstrating an ability to operate in conditions where manned helicopters are not currently used.](#) This technology solution could serve to “close the gap” in current aerial firefighting coverage may have a [substantive effect on the number of large fires and the total cost and loss related to wildfire each year.](#)

Concept of Operations: Optionally-piloted helicopters would be contracted as part of the current contingent of manned firefighting helicopters. Of the current contingent, 11 conventional KMAX helicopters were on contract in 2017. The technology that enables the helicopters to fly remotely piloted as well as traditionally piloted involves the installation of a kit to the helicopter, **not** the purchase of a new helicopter. During the day and in periods of good visibility when manned fixed and rotary wing aircraft are flying, [these helicopters](#)

would also operate in the manned mode. This avoids having to address complications with or resistance to integrating unmanned aircraft into the manned aerial suppressant/retardant delivery operations. When night fell or daytime visibility was reduced to the point where manned flying was suspended, these aircraft would continue to operate, but in the remotely piloted mode (piloted from the ground), covering the significant night and early morning periods when manned aircraft are unable to support initial and extended attack, logistics, or emergency extraction operations. This has the potential to **triple** the time aerial firefighting assets are supporting wildfire operations.

Costs: Integration of this technology benefits from the \$123M in Department of Defense (DOD) research and development (R&D) funding that was used to develop and refine this capability. It is estimated the necessary R&D needed to complete integration with the wildfire mission is \$10M, roughly 1/10 of the cost of [2016's Pioneer Fire in Idaho](#). Once integrated into the mix of aerial firefighting aircraft, operations costs for optionally piloted helicopters will be largely incremental, based on the expanded usage envelope. From a business perspective, commercial vendors will be able to amortize their costs over significantly more flight hours, which may lead to lower hourly costs. As some of the same helicopters that now fly on fires during the day will be able to fly at night and during the day in reduced visibility, there is no need for additional aircraft/contracts.

Savings: For the last several years, DOI and USFS have spent over \$1.5B annually on suppression alone. Just a 10% reduction in the time/area to contain a fire, resulting from a 3X increase in initial and extended attack coverage hours, would save over \$150M each year. This is far more than is needed to field this revolutionary capability. Having the ability to (1) attack discovered fires quickly and without many hours delay, (2) continue attacking fires during night and reduced visibility periods when the fire is vulnerable, (3) support our ground firefighters with helicopter-borne supply deliveries 24hrs a day, and (4) save the lives of injured firefighters by having a genuine 24hr emergency extraction capability would save additional funds and more importantly, lives.

