



FireFlyte

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FIGHTING FIRE WITH DATA

EBOOK

HOW LEADING AGENCIES ARE
COMBATING WILDFIRES
THROUGH DATA-DRIVEN
INSIGHTS

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Introduction

In an era where wildfires grow more severe and firefighting seasons extend unpredictably, the need for enhanced efficiency in aerial firefighting operations has become critical.

This white paper examines the transformative role of Additional Telemetry Units (ATUs) and agency-level software like FireFlyte in meeting this need by enabling precise, actionable data collection and insights from aerial firefighting assets.



The scope of our analysis encompasses over 8,500 anonymised fill and drop cycles, facilitated by ATUs across a range of Type 1, 2 and 3 Helicopters across multiple continents.

We delve into the operational and economic metrics captured by these devices - from water and retardant delivery volumes to deployment costs - offering an empirical basis for evaluating the efficiency of different assets in the firefighting fleet.



Setting the stage for insightful discoveries

Through our comprehensive analysis, we uncover the true cost implications of aerial firefighting efforts, challenging traditional assumptions about asset deployment and cost-effectiveness. This white paper not only highlights the key findings from our data but also explores the strategic implications for agencies tasked with the critical mission of wildfire suppression.

Navigating the data landscape

As we proceed, readers can expect to gain insights into:

- The operational tempo and cost-efficiency of different helicopter classes in firefighting missions.
- The strategic balance between asset capabilities and mission requirements.
- The potential for ATU data to inform more effective investment in aerial firefighting resources.



Empowering agencies with data-driven strategy

The insights offered here are designed to provoke thought and action. We aim to empower firefighting agencies with a deeper understanding of how ATU-driven data can refine their operational strategies, ultimately enabling them to achieve more with their current investments.

As the industry transitions to more data-centric operations, FireFlyte is at the forefront, equipping leading agencies with the capability to see beyond flight hours and dollars per gallon to the actual outcomes of their aerial firefighting efforts on a dollar per gallon per hour basis. In conclusion, this white paper invites readers to engage with the data-driven future of firefighting, where every decision is informed by precise, reliable data, and where the efficiency of operations is constantly enhanced by technological advancements.

Enhancing aerial firefighting through data: the critical role of ATUs

In the realm of aerial firefighting, the introduction of Additional Telemetry Units (ATUs) address a pivotal challenge: the absence of precise, actionable data concerning the activities of contracted firefighting fleets. Traditionally, agencies have depended on reported flight hours as a primary metric of activity, a method that falls short in providing insight into the specifics of each mission's execution. ATUs present a solution by offering detailed data that surpasses conventional reporting methods.



ATUs are instrumental in closing the informational divide between firefighting operations and agency oversight. The scarcity of detailed data hinders agencies' ability to evaluate the efficiency and effectiveness of their aerial firefighting investments accurately. This opacity can result in resource allocation and operational planning inefficiencies. Installed on aerial firefighting assets, ATUs are engineered to record critical event data, including precise metrics on water and retardant uplift and discharge, GPS positioning, and event timings, driven by the necessity for heightened real-time operational transparency and accountability.

Models such as the AFDAU-T1, DataVault, and DZMx equip agencies with the ability to peer into the actual undertakings beyond mere flight hours, delivering insights crucial for informed decision-making.

The transition to ATU technology is not just an upgrade; it's a requisite evolution for agencies committed to modernising their aerial firefighting capabilities. The insights gleaned from ATUs are invaluable, enabling a detailed assessment of asset performance, operator efficiency, and mission effectiveness. These insights extend beyond operational metrics, impacting budgetary and operational decisions significantly:

Impact on budgetary and operational decisions

The integration of ATUs enables agencies to optimise their budget allocation by identifying the most cost-effective assets and strategies.

With ATU data, it's possible to:

- **Assess Cost-Effectiveness:** Determine which assets deliver the best value in terms of cost per gallon of water or retardant deployed.
- **Operational Efficiency:** Evaluate the performance of operators and assets to identify areas for improvement or investment.
- **Strategic Deployment:** Make data-driven decisions about asset deployment, focusing on resources where they are most effective, and avoiding overspending on underperforming assets.

In this study, we employed a methodology centred on analysing a subset of anonymised data gathered through ATUs and processed by FireFlyte. This approach allowed us to derive insights on the fleet's overall performance and its implications for firefighting efforts. Conducted with the highest standards of privacy and confidentiality, this analysis aimed to unearth trends and insights to guide firefighting agencies in making strategic, data-informed decisions that resonate with their operational and budgetary frameworks.

The true cost of firefighting efforts

In the mission-critical domain of aerial firefighting, understanding the true cost of operations is essential for agencies tasked with managing expensive and often limited resources. The effectiveness of assets isn't merely measured by their operational capabilities and cost per hour, but also by their cost-effectiveness — a critical aspect that significantly influences budgetary decisions and overall outcomes.

With the integration of ATUs and the detailed data they provide, agencies now have the means to reassess how budgets are allocated based on the actual performance and cost effectiveness of their assets. This capability is a game-changer, enabling a shift from estimations and averages to informed, data-driven decisions.

The analysis of cycle times and efficiency rates across different missions and assets can highlight under-utilised or over-utilised resources, guiding agencies towards a more balanced and cost-effective fleet composition. This insight is crucial in an era where budget constraints are ever-present, and the need for efficient resource deployment is critical.





The strategic implication for firefighting agencies is clear: adopting a data-driven approach to budget allocation and asset deployment can significantly enhance operational efficiency and financial sustainability.

This method allows for:

- Real-time adjustments to deployment strategies based on performance data.
- Investment in assets and technologies that offer the best value for money.
- Improved negotiation leverage in contracting services, armed with precise data on desired outcomes and asset performance.

As agencies contemplate the future of their aerial firefighting fleets, the adoption of ATUs and the insights they provide could be the cornerstone of a strategy that ensures not just operational success but also financial prudence and accountability.

The true cost of firefighting efforts: a data-driven perspective

Classifying aerial firefighting assets

- **Type 1 (Heavy-Lift Helicopters):** Often synonymous with models like the Sikorsky UH-60 Blackhawk or the Boeing CH-47 Chinook, these helicopters are the powerhouses of aerial firefighting. Characterised by their large water or retardant capacity, typically over 2,000 gallons, they are designed for large-scale fire suppression tasks.
- **Type 2 (Medium-Lift Helicopters):** This category includes versatile aircraft such as the Bell 212 or UH-1H Huey, with a capacity range of approximately 300 to 700 gallons. They are crucial for a wide range of operations, offering a balance between lift capacity and manoeuvrability.
- **Type 3 (Light-Lift Helicopters):** Light-lift helicopters, like the Bell 206 or Airbus AS350, usually carry less than 300 gallons. Their agility makes them ideal for rapid response and precision in complex terrain or smaller fire scenarios.

Our in-depth analysis of cycle times—defined as the duration between fills during a series of drops—has unearthed significant insights into the operational dynamics of aerial firefighting assets. We assess these through a series of metrics: cycle counts, median and average durations, standard deviation, and total sum of durations, each revealing different facets of operational tempo and consistency.



Operational consistency and response readiness

- **Type 1 Helicopters:** Exhibiting a median cycle duration of 6.84 minutes across 1,986 cycles, Type 1 assets demonstrate readiness for rapid response, aligning with their role in delivering large payloads efficiently. However, with a standard deviation of around 34.3 minutes, the data points to a high variability in their operations. While they typically complete cycles swiftly, the extended range suggests that some operations may take significantly longer, likely due to the varied mission profiles that include longer distances or challenging conditions.
- **Type 2 Helicopters:** With 3,774 cycles and a slightly higher median cycle duration of 7.13 minutes, Type 2 helicopters maintain a balance between readiness and versatility. With a standard deviation of about 30.8 minutes, this pattern again indicates variability, albeit slightly less than the Type 1 class. The diverse nature of Type 2 missions, which can range from targeted drops in remote areas to sustained operations over extended fire lines, contributes to this range in cycle times.
- **Type 3 Helicopters:** Demonstrating the highest operational consistency with the lowest standard deviation of 25.26 minutes and a median cycle duration of 7.82 minutes over 2,767 cycles, Type 3 helicopters typically engage in initial attack roles. Their shorter and more consistent cycle times suggest a deployment pattern characterised by rapid, frequent engagement, essential in preventing small early-stage fires from escalating.

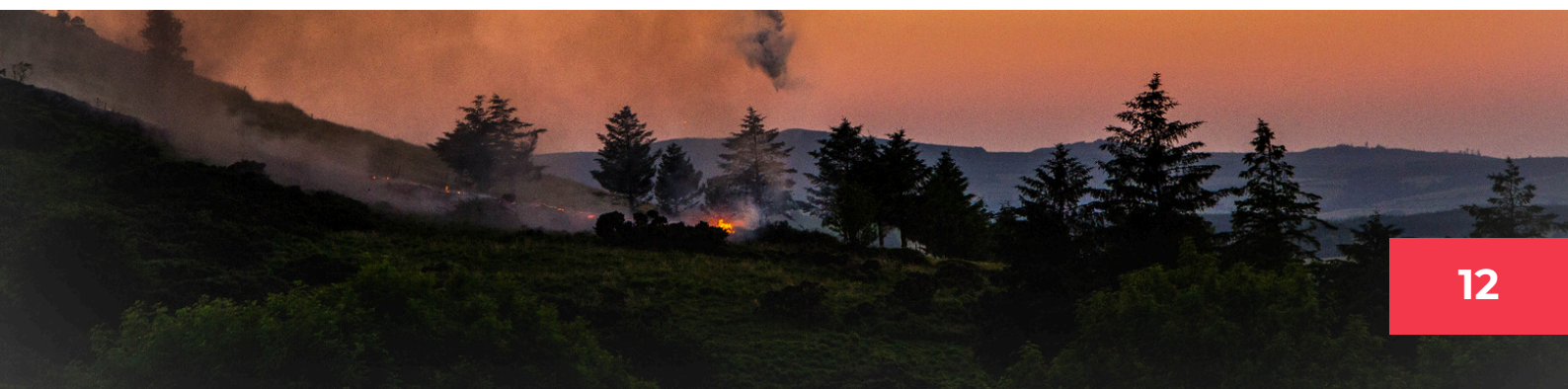


Operational and financial analysis

In reviewing over 8,500 anonymised fill and drop cycles captured by ATU data, we observed that the median operational tempo across all rotary asset types hovers around the 7 to 8-minute mark for cycle durations, indicating a comparable operational pace.

However, the financial and operational analysis uncovers deeper insights:

- The hourly cost associated with each type varies significantly, with the heavier helicopters incurring greater costs. Yet, this is counterbalanced by their ability to deliver larger volumes of water or retardant per drop, often proving to be more cost-effective on a per-gallon basis.
- The value proposition of each helicopter type is nuanced. Type 1 helicopters, despite their higher operational costs, can deliver large payloads that may reduce the need for multiple sorties, effectively leading to a reduction in the cost per gallon of retardant delivered to the fire line.
- Conversely, the Type 3 helicopters while less expensive on an hourly basis, have a higher cost per gallon due to their smaller delivery capacities. However, their agility and speed enable them to provide rapid initial attack capabilities, which can be critical in preventing fires from growing beyond control.





Operational and financial analysis

The insights from ATU data suggest that the most cost-effective use of aerial firefighting assets is not simply a matter of comparing hourly rates. Instead, it requires a comprehensive understanding of how each asset type contributes to the overarching goal of firefighting. This includes considerations such as the size and intensity of the fire, the terrain, and the specific phase of the firefighting operation.

In essence, a diverse fleet that leverages the strengths of each helicopter type is key to a successful and economically sound aerial firefighting strategy. By harnessing the power of data analytics, agencies are better equipped to make informed decisions that not only optimise their operations but also maximise the return on their investment in protecting communities and natural resources.



Innovative investment: adapting to the future of firefighting

As the intensity and duration of wildfires increase globally, firefighting agencies are pressed to re-evaluate the economics of their operations. The viability of traditional rotational models is diminishing, necessitating a shift towards maximising efficiency within prolonged fire seasons.

The advent of ATUs and the comprehensive data they provide signal a new era of firefighting—one where technology and data can dramatically enhance the effectiveness of investments. For agencies, the pathway to future-proofing their operations lies in embracing these innovations, which promise a substantial return on investment through improved operational efficiency and decision-making.

The potential return on investment for adopting ATU technology is multifaceted. Beyond the immediate operational benefits—enhanced accuracy in resource deployment, improved response times, and increased mission effectiveness—lies the long-term strategic advantage. Agencies can leverage this technology to optimise their budgets, ensuring that funds are channeled into assets that yield the highest returns in terms of both firefighting outcomes and financial prudence.



Conclusion: utilising FireFlyte data insights for strategic investment

The ATU data analysis conducted by FireFlyte paints a detailed picture of asset utilisation, offering vital insights into the cost and effectiveness of aerial firefighting strategies. Amidst the changing dynamics of firefighting economics, these insights become the compass for navigating the twin pressures of extended seasons and constrained budgets.

Key findings recap:

- **Volume vs. Frequency:** While larger Type 1 helicopters carry more and may seem costlier, their ability to drop significant volumes in a single sortie presents a strong case for cost-efficiency, especially in large or fast-moving fire situations.
- **Medium and Light Assets:** The medium-sized Type 2 and agile Type 3 helicopters, despite a higher cost per gallon, provide crucial operational flexibility. Their rapid response and precision in difficult terrains or smaller fires underscore the importance of a mixed-asset strategy tailored to diverse mission needs.

Economic implications:

These findings are instrumental for agencies as they confront the need to optimise their resources. Investing in ATU technology enables a data-centric approach to asset management, allowing agencies to discern not only which assets offer the most economical use of funds but also how strategic deployment can lead to enhanced overall effectiveness.

As wildfire scenarios become more complex and demanding, the economic prudence of firefighting operations hinges on the ability to make informed decisions grounded in robust data. The information provided by ATUs empowers agencies to strategically allocate resources, ensuring that investments yield maximum operational value, even as the traditional firefighting landscape evolves.

In the current climate, where doing more with less becomes increasingly imperative, the analysis facilitated by FireFlyte is not just an advantage - it is a necessity. Our commitment to innovation in data analytics positions firefighting agencies to redefine success, turning every operational decision into a calculated step towards more effective and efficient firefighting.

In conclusion, the future of firefighting is clear - data-driven, economically sound, and technologically equipped. The insights gleaned from this analysis are a testament to the power of information in shaping the next era of firefighting, where every investment, every asset, and every drop counts more than ever.

Leveraging FireFlyte for enhanced aerial firefighting strategies

The insights garnered from our data analysis illuminate the path to operational efficiency and fiscal responsibility in aerial firefighting. However, understanding the data is only the first step; applying it strategically is key to transforming these insights into action. This is where FireFlyte excels— providing agencies with real-time, actionable data analysis that is ready to be deployed straight out of the box.

FireFlyte provide agencies with a powerful software platform that seamlessly integrates with over 60 different types of existing tracking devices, transforming the wealth of data they provide into actionable insights.

FireFlyte is not about selling hardware; it's about delivering a sophisticated software solution that works with the equipment you already have. Our platform provides a comprehensive overview of your operations, equipping you with advanced analytics without the need for costly hardware overhauls.

Your trusted partner in aerial firefighting

As the only commercial provider of a country-wide solution for aerial firefighting, FireFlyte has demonstrated its capability and commitment to this critical industry. This partnership underscores our status as leaders in our field and reflects the trust placed in us by firefighting agencies to deliver a service that is both indispensable and unrivalled.



Take the step with FireFlyte

With FireFlyte, agencies can confidently step into a future where every strategic decision is informed by robust analytics. With FireFlyte, you'll harness the power of our platform to glean insights that lead to smarter, more cost-effective operational strategies. The transformation requires no complex set-up or transition—just a willingness to let data guide your path.

- Tap into advanced analytics that interpret data from your current tracking devices.
- Align your operational strategies with proven benchmarks and gain a competitive edge in firefighting efficiency.
- Join forces with a leader in software solutions for aerial firefighting and become part of a global network dedicated to excellence.

Act now: embrace data-driven firefighting with FireFlyte

The next fire season is an opportunity to excel, not a challenge to fear. Reach out to FireFlyte today and discover how immediate access to advanced data analytics can empower your decisions, safeguarding lives, property, and landscapes with unrivalled precision and insight.



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