



National Aerial Firefighting Strategy

2021 – 26





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Abbreviations and acronyms

ADF	Australian Defence Force
ARENA	The National Aerial Firefighting Aircraft Management System
AFAC	The Australasian Fire and Emergency Service Authorities Council
CASA	Civil Aviation Safety Authority
CCOSC	Commissioners and Chief Officers Strategic Committee
CWN	Call When Needed
EMA	Emergency Management Australia
EMPS	Emergency Management Professionalisation Scheme
ISR	Intelligence, Surveillance and Reconnaissance
LAT	Large Air Tanker
NAFC	The National Aerial Firefighting Centre
NRSC	National Resource Sharing Centre
RAAF	Royal Australian Air Force
RRM	Resource to Risk Model
RFS	NSW Rural Fire Service
RPAS	Remotely Piloted Aerial Systems
SEAT	Single Engine Air Tanker
VLAT	Very Large Air Tanker

Summary

Australia has a well-developed aerial firefighting fleet which has evolved on a nationally coordinated basis over nearly two decades. The airframes used by Australian fire agencies have been selected based on their suitability for Australian conditions. The numbers of aircraft available for firefighting operations are significant: over 500 in total, of which around 160 are contracted using national arrangements.

Aerial firefighting is an expensive activity and while it is a key response tool available to fire agencies, it is not the sole answer to the challenging fire environment that Australia poses. Money spent on aerial firefighting cannot be spent on other firefighting activities such as fire trucks or recruitment and training of volunteer and career personnel. States and territories bear the lion's share of the cost of aerial firefighting, with valuable support from the Australian Government, and have appropriately struck a broad balance between spending on aircraft and other resources.

The current division of the fleet between 'nationally contracted' and 'call when needed' serves Australia well and provides significant surge capacity for aerial firefighting. The largest firefighting aircraft, being the most expensive, pose challenges when considering a cost-benefit analysis, especially for smaller states. The ability to share resources through the National Resource Sharing Centre (NRSC), the provision of some additional central funding to support national capability in this area, combined with ongoing co-contribution by the Australian Government to jurisdictional aerial firefighting costs, is considered appropriate.

It is recognised that the current arrangements where the largest firefighting aircraft are often shared with the Northern Hemisphere on a back-to-back leasing basis carry some risk, particularly as fire seasons get longer in the future. However, this is the most cost-effective way for Australia to obtain access to such aircraft and on current budgets, we could afford fewer of them if they were based in Australia year round. Even if more funding was made available, there are concerns in having a large aircraft fleet that in quiet years might see little action with no scope for pilots to maintain their skills by working in the Northern Hemisphere during their fire season. Although an incremental addition to the Large Air Tanker fleet is sensible and recommended as part of this strategy, the balance between domestic capacity (88% of the fleet) and larger, more expensive aircraft leased

from overseas, is considered appropriate for current and reasonably anticipated conditions.

Research should underpin long term aerial firefighting fleet strategies and operational tactics, and this is an area that should be better developed. The new national research entity being established by the Australian Government could usefully prioritise practical research into the effectiveness of a range of aerial firefighting tactics in different weathers, fuels and topography, as well as economic and social research into the financial and community value of aerial firefighting, including direct economic benefits as well as positive environmental outcomes. NAFC will also prioritise some of its funding directly into the cost benefit analysis and the best use of particular aircraft.

Suggestions are often made about adding new types of aircraft to the national fleet. Over the years many types of aircraft have been trialed in Australia and the current fleet reflects those that have been found most suitable to Australian conditions. Small scooping aircraft already make up part of the fleet, and while it is timely for reassessment of available capabilities, any decision to add additional types of aircraft to the fleet would have to be evidence based and follow cost benefit analysis. This said, the strategy identifies a willingness to innovate, test and trial new delivery platforms.

Consideration is being given to the use of ex-military aircraft for fire and emergency aviation. While this may be an attractive solution for some, the significant costs of adaptation, crewing and ongoing care and maintenance must be taken into account. If additional funding is not made available for these purposes, fire agencies will have to make decisions on whether to support ex-military aircraft in line with the same cost benefit analysis terms used for any other type of aircraft acquisition.

Finally, our recent experience highlights a changing climate and more severe natural hazards including fire, but also flood and storm. Aircraft have the flexibility to assist with all natural hazards, depending on type and capability. This strategy seeks to provide flexibility in aircraft use and deployment, to maximise the benefit of the investment, keep communities safe and minimise consequences.

This strategy will be reviewed by the NAFC Strategic Committee annually to ensure it is current and appropriate to changing requirements and demands.

Background

Australia is one of the most fire-prone countries in the world. Fire is endemic to much of the Australian environment. European settlement interrupted existing indigenous fire regimes and uncontrolled fires have, in many areas, been exacerbated by lengthy and severe drought. This threat has been realised particularly in the urban-rural interface, where much of the Australian population lives.

Aerial firefighting has become an integral component of bushfire mitigation and response in Australia. The use of aircraft to assist in the suppression of bushfires in Australia is an efficient and cost effective technique, albeit expensive. Aerial firefighting provides valuable support to firefighters for protection of communities and environmental values.

AFAC formed NAFC in 2003 because of this threat. It brings together the Australian states and territories, with the support of the Australian Government, to provide a national arrangement for the provision of aerial firefighting resources for combating bushfires. At the time, the Australian Government recognised that the costs of maintaining an active aerial firefighting fleet was beyond the resources of the individual states

and territories. Concurrently, the states and territories saw merit in a mechanism that promoted synergies and shared resources. All Australian states and territories participate.

NAFC is now a business unit within AFAC and operates with the NRSC. This reflects that all governments in Australia recognise the importance of having access to a sophisticated aerial firefighting capability to respond to bushfires, protect communities, and support firefighters on the ground. This capability can also be readily shared across jurisdictions. The public profile of aerial firefighting and community and political expectations are significant. These can be best met by adopting a national approach.

Aerial firefighting is seen as a highly visible element to bushfire response, but it is not effective in isolation. While aerial firefighting remains the core focus of NAFC, it now operates with the NRSC. NAFC is also conscious that aerial support it is no longer exclusive to aerial firefighting and states and territories are also identifying opportunities for aircraft to support other emergency management operations, particularly flood and storm response.



Introduction

This National Aerial Firefighting Strategy considers aerial firefighting in Australia from a national perspective. It provides a baseline of the overall effects and outcomes that we are seeking to achieve across the nation and describes the resources identified to deliver those effects. The strategy also identifies the desired effects and outcomes from aerial firefighting in Australia towards 2030 and examines the resources required and options for delivery.

This strategy addresses the recommendations from the 2020 Royal Commission into National Natural Disaster Arrangements that in part, made specific recommendations regarding aerial firefighting. The resources identified in this strategy, while state and territory based, may be available should circumstances allow to be shared across the country. This is achieved by the NRSC, through the NAFC Resource Management Agreement, at the direction of the Commissioners and Chief Officers Strategic Committee (CCOSC).

This strategy has a five-year time horizon from 2021 and is driven by the needs and demands of states and territories. To achieve synergies and efficiencies, identifying and contracting appropriate resources is coordinated nationally through NAFC. Aviation resources procured through NAFC are then operationally managed by the state and territory fire agencies. When they are requested and deployed interstate, the NRSC coordinates their redeployment and maintains national situational awareness.

NAFC and the NRSC are, in-effect, the collective effort of states and territories supported by the Australian Government. NAFC is overseen and tasked by a Strategic Committee, which is a sub-committee of the AFAC Board, and the NRSC is overseen and tasked by CCOSC. Both the NAFC Strategic Committee and CCOSC are based on state and territory representation.

This strategy provides the foundation for applying both state and territory and allocated Australian Government funding to appropriate and available aerial assets and capabilities, to best support the protection of life, property and the environment, and minimising the overall loss from bushfire. The totality of what can be afforded by states and territories will vary on an annual basis and is dependent on government and agency assessments of risk.

This strategy will also assist industry providers to invest in areas that agencies through NAFC consider are the highest priorities, while assisting in managing the expectations of community and governments,

including appreciating the capability limitations of aerial firefighting. Future capability requirements will continue to evolve with changing bushfire risk, technological advancements and the available funding from states, territories and the Australian Government. This strategy will require further development as future requirements are clarified and refined. The NAFC Strategic Committee has identified the need for a mid-term review in late 2023.

While this strategy is focused on bushfire, it is acknowledged that aircraft can multi-task and many assets identified and potentially engaged for aerial firefighting could also be available for other tasking and in response to other hazards.

This strategy reflects the broader emergency management approach adopted by the Australian Government. The following principles for emergency management are relevant to this strategy (refer to the *Australian Emergency Management Arrangements*, AIDR 2019).

Principles of emergency management:

- > Primacy of life
- > Comprehensive
- > Collaborative
- > Coordinated
- > Flexible
- > Risk based
- > Shared responsibility
- > Resilience
- > Communication
- > Integrated
- > Continual improvement

In addition, the NAFC Framework has identified the following goals:

- > Promoting safety
- > Procuring capability
- > Support to operations
- > Specialist advice and informing expectations
- > Governance and business planning
- > Promoting research and development

Strategic intent

The strategic intent and purpose of this strategy is to maximise the potential benefit of aerial firefighting, to keep communities safe, and to minimise loss from fire. Seven objectives are identified, reflecting the desired outcome of aerial firefighting in Australia:

1. Needs are driven by states and territories, leveraging synergies between jurisdictions.
2. Investment in aerial firefighting resources is based on risk, desired effects, and evaluation of results, including research.
3. A mix of capability types exists to meet current and future needs.
4. A culture of safety, collaboration and cooperation is maintained between states and territories together with the Australian Government through NAFC and AFAC.

5. Acquisition of services and aircraft is transparent and based on achieving best value for the use of public funds.
6. Supporting systems maximise availability and efficacy of the desired aerial firefighting effect.
7. Seeking partnerships with industry and Australian business.

These aerial firefighting objectives need to be considered in the context of broader community safety and land management objectives.

This strategy seeks to answer three key questions regarding aerial firefighting capability:

- > What do we currently have?
- > What do we need?
- > How are we going to acquire what we need?



Risk management

Australasian fire services work in an escalating risk environment. Fire management is being affected by climate change. Increased frequency, distribution and intensity of drought and severe weather is resulting in more fuels that are available for burning. Globally, fire seasons are getting longer and more severe. In some areas the fire season is increasingly a year-long campaign. There has been a confluence of fire seasons in the Northern and Southern Hemispheres, which may compromise the cross-season sharing of resources in the future. This applies to both aerial firefighting and ground-based forest firefighting.

With the changing climate in both the Northern and Southern Hemispheres extending fire seasons, the demand on aerial assets is also extending. For those aircraft that are sourced from North America, there is the potential that availability for aircraft to be deployed to Australia may be reduced. While this has not been a factor for commercial contracts to date, it is a consideration that is likely to increase in coming years. Further, longer fire seasons from 4-5 months to 6-8 months means a change in the cost benefit ratio between leasing and owning.

Other considerations include:

- > Unit costs are likely to increase (at least in the short to medium term) as international demand for resources increases, the value of the AUD fluctuates, aircraft costs increase and insurance premiums rise.
- > Some aircraft models are ageing, with costs and availability limiting renewal of capabilities.
- > There have been concerns about an ageing demographic of pilot and maintenance workforce (although this may change with current world events).

There have been significant demographic and social changes. Communities are more urbanised and the interface between fuels and vulnerable houses and communities is becoming more at risk with far greater consequences from the inevitable bushfire.

In the face of changing fuel, vegetation, and vulnerabilities, ground firefighting strategies are often challenged. Firefighters are striving to meet the expectations of the community, governments, and the media. As a result, the situations where aerial assets can provide effective support are increasing, and with them, community expectations. Meeting these expectations is a risk. Aerial firefighting has grown from 'just another tool in the toolbox' to a point where the community expect firefighting aircraft over every fire (especially 'their' fire).

Fire managers are now also air managers. There is increased scrutiny of decisions around resource allocation and task deployments. In an environment where there may be many fires caused by lightning that are burning concurrently, there is increased emphasis on rapid initial attack and rapid escalation of the weight of attack.

At a tactical level over the fireground, there is significant risk regarding air space management due to convergence of aircraft at low level and the extant environment conditions including smoke, turbulence due to the hot weather, potentially steep terrain, and multiple aircraft all operating over a going fire. This is becoming a further challenge as the performance capabilities of aircraft (jet and rotary) become more varied. This is an issue which has been discussed by jurisdictions with the Civil Aviation Safety Authority (CASA). Furthermore, aerial firefighting suppressant drops can lead to tree limbs falling, which have injured firefighters.

Aerial firefighting presents fundamental risk management dilemmas for states and territories. No single jurisdiction can afford to maintain all the required aerial resources, at all times, to meet all scenarios. Aerial resourcing requirements will vary between states and territories, depending on the predicted season and the predicted risk in specific areas within jurisdictions. This has led to a convergence of NAFC and NRSC functions, to ensure maximum national aerial firefighting situational awareness and the most effective arrangements for resource sharing.

During any single fire season, it is highly likely that risk factors will lead to Commissioners and Chief Officers wanting to redeploy assets within jurisdictions and potentially redeploy assets across jurisdictional borders. Aerial assets offer the greatest flexibility to redeploy both within and across jurisdictions. LATs and strategic mapping aircraft can operate in more than one jurisdiction on the same day. All cross-border deployments are dependent on concurrence of respective commissioners and chief officers and will be made within the context of a CCOSC meeting. NAFC and the NRSC is well placed to assist with facilitating this aircraft movement and maintaining situational awareness.

The increase in funding in 2020 by the Australian Government was justified in part on the development of a national resource to risk model. The intent is to deliver a decision support tool focused for aviation and other resources, increasing efficacy and analysis of resource allocation across aerial assets, and for this approach to be extended to other resources including firefighters and equipment.

Specific risk considerations:

- > **Safety.** Safety must remain the highest priority for fire agencies and operators. Loss of life and injury are not acceptable in firefighting and emergency response operations. Aerial firefighting is a high-risk activity and requires an enduring focus on training, compliance, and risk mitigation. NAFC intends to continue working with States and Territories to influence the maintenance and bolstering of safety systems, ensuring that risks are properly controlled.
- > **Night operations.** Operating aerial firefighting aircraft at night (particularly evening and early morning), increases the potential utility of the airframes while also operating the aircraft when generally fires are most benign. While not always the case, increased humidity overnight generally reduces fire intensity and speed of spread. This provides an optimal opportunity to employ aircraft to maximum effect if they can safely operate at night. Initial trials have been conducted in VIC with a fledging capability established, however this requires ongoing commitment and further engagement before it becomes fully operational. It is also dependent on platforms being night vision capable with crews that are night vision qualified. Operating approvals are complex and risks increase when flying at night.

Night operations includes more than fire bombing. It also includes surveillance for going fires and following lightning strikes, aerial ignition for back burns and during the conduct of prescribed burns, and firefighter insertion and extraction as required during firefighter operations.
- > **COVID-19.** The likelihood of COVID-19 restrictions extending for some time will impact on aircraft and aircrew availability together with operating procedures. Aircraft are likely to be operated from more fixed bases using a ‘spoke and wheel’ approach, with less ‘nomadic’ deployments jurisdictions. Furthermore, additional aircraft may be required to supplement the reduction in available ground firefighters should COVID-19 restrictions limit their availability.

- > **Coordinated aerial firefighting.** Integrated and coordinated aerial firefighting, as part of an overall fire control strategy, cohesive with ground attack considerations, with competent tasking and supervision of aerial missions, requires good communications with ground resources and incident management.
- > **Succession planning.** As with all firefighting roles, there is an ongoing need to upskill and provide experience to younger personnel to ensure effective capability succession planning. This requires more experienced personnel to step back and mentor, to ensure opportunities exist for newer staff to gain competency, currency, and experience.
- > **Culture.** The culture of fire agency personnel in fire management roles can be a significant barrier to growing the capability and progression. Because of the extensive training, safety implications and, attraction of firefighting, it has been promoted as an exclusive element of firefighting, which can inhibit inclusion and diversity.

Greater use of volunteers in aerial firefighting roles will expand the available pool of expertise and ensure that staff are not multi-roled to the extent that their aerial firefighting qualifications and expertise is unavailable because they are required in other functions such as incident management.

01

Current aerial firefighting capability



Aerial firefighting capabilities

Aerial firefighting exists to support the same objectives as ground firefighting: protection of life, property, and the environment. In some situations, a consideration is to seek individual resources that can deliver multiple roles. When examining operational capability to meet identified requirements, achieving efficiencies and economies of scale which benefit both fire agencies and service providers should be considered.

Aircraft can be of limited benefit in conditions that are often experienced during bushfires, such as high winds, heavy smoke and low visibility. Further, not all aircraft are effective in all situations. It is important to have a mix of specialised aircraft available, and to match appropriate aircraft to required tasks and desired operational 'effect'. Direct suppression of bushfires by aircraft is rarely effective on its own and is inhibited by terrain, tree canopy, and where ground firefighters generally cannot fully extinguish a fire.

Aerial firefighting provides a range of effects and flexibility with the potential to control bushfires faster and more efficiently through:

- > **Aerial detection.** To identify fire starts early and alert available responders, both in the air and on the ground. Achieved through:
 - » satellites
 - » conventional rotary wing and fixed wing aircraft conducting aerial firefighting
 - » technology-aided airborne platforms
 - » commercial and recreational flights calling in new sightings
 - » medium/large remotely piloted aerial systems (RPAS).
- > **Aerial coordination.** Coordinating the response of appropriate assets both in the air and on the ground. This could include coordinating or relaying radio communications. Designated aircraft are also required so specialist crew can identify the best location for drops; coordinate air traffic; lead LATs and coordinate the air effort with ground resources. Achieved through rotary wing and fixed wing.
- > **Aerial intelligence gathering.** Reporting and recording fire activity from the air including using line scanning, remote sensing, videos and FLIR, and where available, strategic fire spread mapping, which plays a critical role in updating authorities and informing public warnings and messaging. Aerially acquired intelligence is fast and provides unique perspectives, strategic overview, and rapid tactical information. There is the potential to place a camera or sensor on every aircraft and create a national system to receive, process, store, and distribute

information products. Video streaming is already occurring on a range of VIC aircraft. Achieved through:

- » satellites
 - » conventional rotary wing and fixed wing aircraft
 - » technology-aided airborne platforms
 - » RPAS.
- > **Aerial attack.** Undertaking direct initial attack of fire starts or going fires from the air, ideally to arrive early to suppress a fire while it is small, containing the spread until ground resources arrive. Aircraft provide speed and weight of attack that is so important for initial response to incipient bushfires. This is when the greatest returns on investment are gained from aerial firefighting. Initial attack of new and emerging fires is one of the most difficult and critical components of bushfire management. Pre-determined air attack, where aircraft are automatically dispatched at the first report of a fire, are readily employed in SA, NSW and VIC and these operations need to be integrated across available airbases. Aerial assets need to be well distributed, according to risk with robust systems in place assuring readiness and rapid response. Aircraft can play a key role in suppressing bushfires during extended attack, by reducing fire intensity and rate of spread until ground personnel can reach the fire or in support of ground personnel already on the fire. Achieved through rotary wing and fixed wing, including LATs.
 - > **Aerial containment.** Laying retardant on the flanks of the fire to limit the fire spread. Employing an aerial fleet that effectively builds or reinforces line, supporting control and containment strategies is important. This is just as relevant during fuel reduction as back burning and suppression operations. Achieved through rotary wing and fixed wing, including LATs.
 - > **Aerial protection.** Prior to and during a running fire, laying retardant, water, foam or gel to protect specific assets and infrastructure such as homes, communications, bridges and other resources of value to local communities, as well as ecological assets. The effectiveness of aerial protection often depends on timing. Laying retardant days before a fire approaches is likely to reduce its effectiveness. Achieved through rotary wing and fixed wing, including LATs.
 - > **Aerial transportation.** Specialist insertion of firefighters into remote, difficult, or inaccessible areas through rappel of winching, or general transporting of firefighting crews from incident to incident or home base to incident. This also includes transportation of stores such as retardant supplies or base camp caches. Achieved through:
 - » rotary wing by landing or hovering close to ground
 - » rotary wing rappel or winch
 - » fixed or rotary wing aircraft (for base to base).

- > **Aerial ignition.** Generally used during going bushfires to ignite backburns or in prescribed burning operations to initiate planned fire in less accessible areas. Achieved through aerial ignition systems operated out of rotary wing or fixed wing aircraft including RPAS.
- > **Search and rescue.** During fire operations but more generally for all hazards, using elements of the national aerial fleet, particularly rotary wing, to assist with search and rescue operations, particularly during flooding, storm, and tidal surges. This highlights the flexibility of aircraft and the merits of having a portion of the fleet available throughout the year.

While the fleet is contracted on the basis of aerial firefighting tasking, our recent experience highlights a changing climate and more severe natural hazards including fire, but also flood and storm. Aircraft have the flexibility to assist with all natural hazards, depending on type and capability. This strategy seeks to provide flexibility in aircraft use and deployment to maximise the benefit of the investment, keep communities safe, and minimise consequences. Apart from the fire specific tasking identified above, these aircraft can be tasked for a range of other tasking including fodder drop, agricultural spraying, and relocation of individual community members.

Characteristics and benefits of the current NAFC fleet

The current NAFC fleet can be characterised by aircraft type. This includes:

- > **Type 1 Rotary Wing High Volume** (Heavy, capable of meeting the specified high-volume delivery performance scenario of 100,000 litres in 90 min). These include aircraft such as the Erickson Airplane and Chinook. These aircraft are ideally suited to local operations as their transit times are relatively slow and their fuel consumption is high (although they maintain a large volume tank up to 9,000lt).
- > **Type 1 Rotary Wing** (Heavy, 2,650 litres or greater). These include aircraft such as Sikorsky S61N and Blackhawk. Some of these aircraft have improved transit characteristics (higher cruise speed and lower fuel consumption than the Type 1 High Volume).
- > **Type 2 Rotary Wing** (Medium, 1,135 – 2,649 litres). These include aircraft such as the Bell 212/412, AS365s and BKs. They may undertake a firebombing role with intermediate capacity, with some tasked to roles such as crew insertion, particularly by winch/rappel.
- > **Type 3 Rotary Wing** (Light, 380 – 1,134 litres). These include aircraft such as the Eurocopter Squirrel and will often be the first line of aerial attack for new fire starts in their local area. They may undertake other roles such as crew transport and aerial supervision/reconnaissance, including some fitted advanced intelligence gathering equipment.

- > **Type 4 Fixed Wing** (SEAT, Single Engine Air Tankers, 2,270 litres or greater). These include aircraft such as the Air Tractor AT802F including its 'Fireboss' scooping variant.
- > **LAT/VLAT Fixed Wing** (Large and Very Large Air Tanker, 6,813 – 35,582 litres). These include aircraft such as the VLAT DC-10, Boeing 737, C130, Bombardier Q400 and Avro RJ85.
- > **Conventional Fixed Wing.** These include aircraft such as the Cessna 182T and are used for fire spotting, utility personnel, and aerial supervision.
- > **Technology Aided Conventional Fixed Wing and Rotary Wing.** These include aircraft such as the Learjet 35A and Squirrels fitted with advanced intelligence gathering equipment, used for roles such as remote heat sensing and mapping, surveillance, and reconnaissance.

Benefits

The application of aerial firefighting presents opportunities and benefits to firefighting agencies including:

- > Faster response to many fires, particularly those ignited and burning in areas where it may be difficult or dangerous to access from the ground.
- > Depending on the role and size of the aircraft, a weight and speed of attack not readily matched by ground-based capability.
- > The ability to concentrate and prioritise resources according to risk.
- > Greater information and transparency on current aircraft deployments and availability.
- > Improved operational safety, by reduced risk to ground firefighters by decreasing or minimising the need for firefighters on the ground to access more dangerous areas of the fire ground.
- > A 'helicopter view' or overview of the situation, including the use of technology which can integrate ground-based systems for information gathering and analysis.
- > Aircraft, with or without various technologies, provide real time intelligence on fire status and are often able to communicate with ground crews to achieve immediate effect on ground suppression actions.
- > Flexibility and mobility not afforded by ground-based firefighting resources.
- > Support for prescribed burning, potentially reducing the size of ground resources required to contain planned burns.
- > Aerial firefighting capability enables ground operations and often, when synchronised with ground resources, has the effect of being a capability multiplier.

Each of these benefits can broadly translate into lives, assets, and environmental protection and therefore a positive economic, social, and environmental benefit.

Fleet age

While some aircraft listed reflect a contemporary fleet, others are aged airframes. Fleet modernisation and renewal is an important consideration for fleet sustainability and reliability. NAFC has a role in promoting the use of the most modern and available aircraft. The *2020 Air Transport Safety Bureau report for the Royal Commission into National Disaster Arrangements* identified the average age of an Australian VH-registered aerial firefighting aircraft was 23 years and the average age of a foreign-registered aircraft was 35 years. This is a global issue and not unique to Australia that should be taken into account when considering the acquisition or contracting of aircraft. Fleet age impacts on maintenance requirements and risk, and in turn presents a cost pressure through operators for states and territories in maintaining capability with an aging aerial fleet.

Multi-faceted, multi-role availability

The greater the opportunity to multi-role aircraft, the greater the potential flexibility of that airframe. There are also opportunities to spread the fixed costs of providing aerial assets by providing the ability to respond to natural hazards and emergencies other than bushfire. Winching is a required capability in some jurisdictions and this capability can be multi-rolled across hazards.

Australia currently lacks a ‘public use category’ for aerial firefighting that allows the re-purposing of highly capable ex-defence aircraft. This category exists in the USA and has proven highly valuable for the re-tasking of ex-defence aircraft. Without availability of this category of aerial firefighting use, ex-defence aircraft that could be multi-tasked for aerial firefighting, transportation, and other utility tasking, will operate with severe limitations, restricting their viability, effectiveness, and operational efficacy.

Aircraft involved in active suppression deliver:

- > **Water.** Drawn from dams or loaded on the ground, water is an immediate suppressant suitable for active fire. Delivered from the air, water alone is the least effective, unless large volumes can be delivered quickly, as the volume of the drop is reduced through evaporation.
- > **Water mixed with Class A foam.** A surfactant foaming agent is used to ‘expand’ the volume of the drop and wetting agents to assist in moisture remaining on the surface of vegetation longer

than it otherwise would. This is also an immediate suppressant designed for active fire.

- > **Gel.** Water with an added agent to improve drop characteristics and coating of ground fuel.
- > **Fire retardant.** Consists of a slurry of fertilisers (ammonium and diammonium sulphate and ammonium phosphate) mixed with thickeners (guar gum) and corrosion inhibitors (for aircraft safety). Fire retardant slows the spread of fire and may reduce its intensity. This is accomplished by chemical reactions that reduce the flammability of fuels or delay their combustion. This is effective when the retardant is dry and is not reliant on a ‘wet drop’. Effectiveness of the retardant line dissipates over time. Currently the only fire retardant approved for aircraft use in Australia is that certified by the US Department of Agriculture. This requires large quantities to be imported from North America and stored locally to support effective fire response.
- > **Incendiary devices.** These devices are generally used during prescribed burning operations to initiate planned fire in less accessible areas, or during going bushfires to ignite backburns.

Aircraft involved in active firefighting are filled either by:

- > pump and hose from an on-site storage at the airfield or from a tanker directly into the tank on the aircraft
- > a suspended bucket that is dropped into an available water supply; or via a snorkel
- > skimming over the surface of a lake, dam or the sea and scooping water directly into the tank.

Contracted aircraft

Aircraft are contracted through NAFC to benefit from specialist contracting skills and knowledge, a national consideration of requirements and availability, and the best possible price by assessing offers across a national forum. NAFC contracts around 165 services annually with services co-funded by the states and territories and the Australian Government. The 2021 contracted services are listed at **Appendix A**.

Call when needed (CWN)

Apart from aircraft that are purchased or formally contracted through NAFC, other aircraft are identified for CWN operations. This provides an important second tier, surge capacity for states and territories with additional flexibility, while reducing the ongoing financial liability of contracted aircraft. These aircraft are overwhelmingly owned and operated by Australian businesses and in total more than 500 aircraft provided by over 150 operators are available for firefighting across Australia.

While CWN aircraft are more expensive per hour to use, because operators need to compensate for the fact that they are not guaranteed any work under CWN arrangements, they make up an important part of national capacity. This strategy envisages reliance on CWN arrangements into the future and work will continue to be done to create nationally consistent CWN standards and arrangements to optimise their efficiency.

Resource sharing

What has become increasingly evident on the ground and in the air is the potential for, and the benefits from, sharing resources across jurisdictions. The *NAFC Resource Management Agreement* provides the legal framework to achieve aerial firefighting resource sharing. The NRSC provides the facility and function to arrange and monitor resource sharing, maintaining national situational awareness of interstate resource sharing. CCOSC is the decision making forum where resource sharing is considered across jurisdictions although release it is dependent on respective commissioners and chief officers of the liable jurisdiction that has contracted or owns the asset.

To date all aircraft have been assigned to a state or territory in line with the co-contribution commitment which has been part of the *NAFC Resource Management Agreement* since its inception. The 2020 Royal Commission into National Natural Disaster Arrangements introduced the notion that national assets, particularly LATs and Type 1 Rotary Wing, be tasked according to 'greatest need' and their deployment and application would be considered on a national rather than jurisdictional basis. This is considered subsequently.

In April 2020 CCOSC resolved that it would take on responsibility for overseeing resource sharing of aviation assets as well as ground resources. CCOSC has endorsed an interim standard operating procedure for management of aircraft resource sharing requests.

Through the NRSC, a state or territory can request redeployment of an aircraft from elsewhere in Australia on a temporary basis (after which it returns to its home base), or by way of transfer until the end of the aircraft's contracted period of service (for example, if it was no longer required in its original location). The requesting jurisdiction is liable for the costs involved including charges for the aircraft while it is redeployed. The NRSC assists with identifying aircraft services that could be made available for redeployment, in the event that a state or territory is requesting assistance and no aircraft is currently on offer.

If one or more states or territories has identified a need for additional aircraft support and no offers are forthcoming, or where more than one state or territory wishes to request the redeployment of an available aircraft service and there is disagreement about where it should be prioritised, CCOSC's aviation sub-committee will consider and if it cannot reach agreement, elevate to the full CCOSC for resolution.

Effective resource sharing underpins most efficient use of Australian aerial firefighting capacity and further development is anticipated to normalise the sharing of assets when they are not required in their base state or territory. Development of infrastructure for loading and maintenance of aircraft is another important consideration to facilitate their movement around the country.

Land management agencies

The particular needs of land management agencies, especially public land agencies, must be recognised, and the positive impacts of aerial firefighting on environmental and heritage values need to be costed. Aircraft are often a vital input to public land prescribed burning programs. Helicopters in particular can travel to areas of high cultural or environmental values where there is no road access and foot access would take many hours. By doing so, firefighters can be transported to these locations and tasked to protect important sites that might otherwise be lost owing to their remoteness.

Human resource

The aerial firefighting fleet is supported by a range of specialist personnel operating in the following roles:

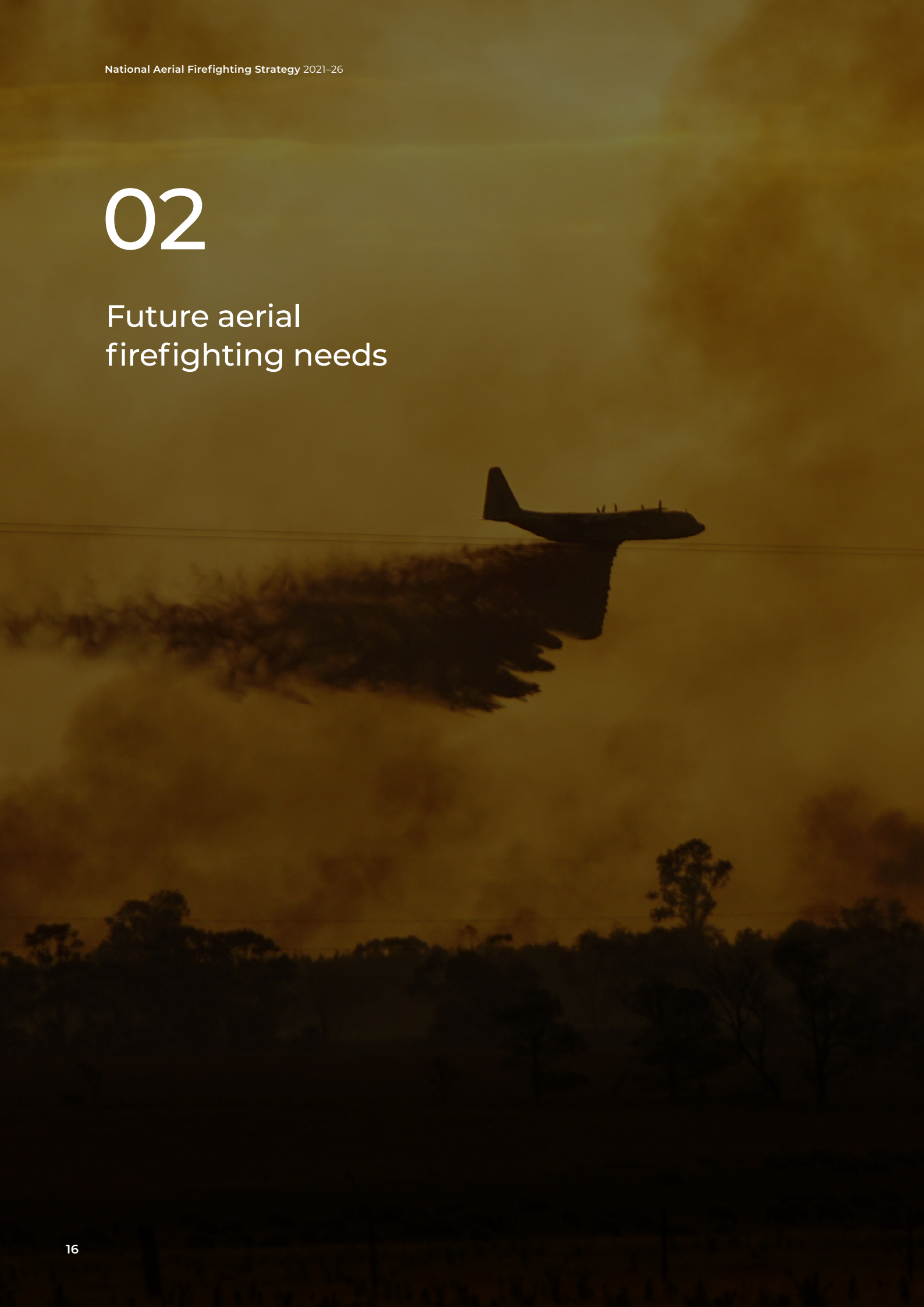
- > Air Base Operator
- > Aviation Radio Operator
- > Air Observer
- > Air Attack Supervisor
- > Aerial Incendiary Equipment Operator
- > Incendiary Operations Supervisor
- > Air Base Manager
- > Aircraft Officer
- > Air Operations Manager
- > State Air Desk Operator
- > State Air Operations Coordinator
- > Helicopter aircrew roles
- > Agency Specialist helicopter functions
- > Remotely piloted aerial system roles
- > Winch operator.

These competencies were reviewed and revised in 2020 and approved by the Australian Industry and Skills Committee in December 2020.

The number of trained personnel is a state and territory responsibility. Progressively this will be reviewed on a national basis to ensure there are sufficient qualified and current personnel to support interstate and international aerial firefighting operations.

02

Future aerial firefighting needs



The 2020 Royal Commission into National Natural Disaster Arrangements made the following recommendation:

Recommendation 8.1 A sovereign aerial firefighting capability

Australian, state and territory governments should develop an Australian-based and registered national aerial firefighting capability, to be tasked according to greatest national need. This capability should include:

1. *a modest, very large air tanker/large air tanker, and Type-1 helicopter capability, including supporting infrastructure, aircrew and aviation support personnel, and*
2. *any other aerial firefighting capabilities (eg Light Detection and Ranging (LiDAR), line-scanning, transport, and logistics) that would benefit from a nationally coordinated approach.*

The NAFC Strategic Committee together with CCOSC and AFAC National Council are of the view that the existing aerial firefighting capabilities co-funded between the Australian Government and states and territories are coordinated very well nationally through the existing arrangements:

- > required capabilities are identified and consulted across jurisdictions and contracted nationally through NAFC
- > standing charges for agreed services are co-funded between states and territories and the Australian Government
- > these aerial resources are managed by states and territories responsible for their operational use and states and territories carry the cost and risk of their operational employment
- > interstate resource sharing of aircraft is coordinated through CCOSC and national situational awareness is maintained through the NRSC.

The NAFC Strategic Committee together with CCOSC and AFAC National Council considered the notion of establishing a national fleet of aerial firefighting aircraft maintained either through NAFC, the Australian Government or located and operated by states and territories on behalf of the Australian Government.

Aerial firefighting in Australia has been led, maintained, and coordinated by states and territories for over 50 years. While the introduction of federal funding in 2003 was welcome and was crucial to the establishment of NAFC and improved national coordination and contracting, introducing a federally coordinated aerial firefighting fleet has been assessed as introducing an unnecessary additional jurisdiction into a technically demanding and operationally unforgiving environment. The advantages are not apparent and the NAFC Strategic

Committee, CCOSC and the AFAC National Council do not see the operation of a national fleet as beneficial to aerial firefighting in Australia. Furthermore, establishing a national fleet of aircraft, whether gifted ex-defence aircraft or purchased from overseas, is a significant undertaking which will duplicate arrangements already in place to varying degrees in states and territories.

Whether aerial firefighting resources are operated in states or territories or federally, the operating requirements of CASA are unchanged and the challenges of identifying priorities for aerial firefighting resource sharing remain. This continues to be a responsibility of CCOSC, which has delegated to an aerial subgroup to coordinate aerial firefighting resource sharing decision making. Any issues that cannot be resolved by this aerial subgroup will be elevated to the entire CCOSC and the guidance in place for all other interstate resource sharing will be applied in this instance. The NRSC will maintain national situational awareness and with NAFC support, facilitate interstate deployments.

In 2021 The NAFC Strategic Committee together with CCOSC and AFAC National Council reviewed the aerial firefighting resources that are required across Australia. It concluded that there is already a significant Australian-based and registered national aerial firefighting capability totaling 81% of the current aerial firefighting fleet currently contracted through NAFC, 132 of the 163 contracted services. A further 12 services or 7% are Australian owned but overseas registered services. 19 services or 12% of the contracted fleet are overseas owned and registered. A table depicting Australian and overseas owned and registered aircraft engaged through NAFC is at **Appendix B**.

The 2020 Royal Commission into National Natural Disaster Arrangements advocated for a greater 'sovereign fleet' without being specific about what was meant by this term. The NAFC Strategic Committee together with CCOSC and AFAC National Council considers that 88% of the currently contracted fleet being Australian owned and operated reflects good sovereign fleet capability in Australia, albeit largely contracted in support of fire agencies. It is conscious that apart from the NSW owned LAT (as at 2020), the larger fixed wing LAT and Type 1 Rotary Wing aircraft are currently all acquired from overseas to operate over the Australian summer. It is this element of 'sovereign fleet' that the NAFC Strategic Committee has further reconsidered as part of this strategy and is considered below in two sections; LAT then Type 1 Rotary Wing. Maintaining sufficient LAT and Type 1 Rotary Wing in Australia to ensure availability during an early start to the Australian fire season or during an extended fire season is critical and can also assist with significant prescribed burning programs during autumn and spring.

LAT

LATs have been shared over the alternate summers of North America and Australia since they commenced operations in Australia in 2015. A relatively small number of aircraft that are operated in North America deploy to Australia each year. While this has been both effective and efficient, longer summers and associated fire seasons in both North America and Australia has raised concern that this mutually beneficial international sharing of resources may come under increasing stress. Benefits include better utilisation of airframes, arguably meaning that costs for leasing in Australia are at a reduced rate to that of North America, together with maintenance of aircrew currency and skills, being engaged in aerial firefighting throughout the year. Piloting these aircraft is a perishable skill if currency is not maintained and ongoing engagement in Australia during the ‘northern winter’ mitigates this skill erosion.

The NAFC Strategic Committee can confirm that to date (February 2021) all contracts for LAT aircraft that have been in place to deploy to Australia from North America over the last 20 years have been honoured. What has been problematic is additional availability of aircraft outside existing contracts either early or mid-season during the Australian fire season. Even so, the NAFC Strategic Committee, conscious of the lengthening fire seasons, consider some mitigation to ensure assured availability to LAT capability throughout the year in Australia is warranted.

What is not readily available over the Australian summer is the potential to increase the number of LATs, as these aircraft are either still engaged supporting North American fire agencies or are generally completing deep servicing over the North American winter. Therefore, what Australian fire agencies identify and contract as the requirement for overseas resources some eight months ahead of the Australian fire season is likely to be the overseas aircraft available for deployment in Australia that summer.

Because of this, maintaining sufficient LATs in Australia to ensure availability during an early start to the Australian fire season or during an extended fire season is critical and can also assist with significant prescribed burning programs during autumn and spring.

The NAFC Strategic Committee together with CCOSC and AFAC National Council reviewed the requirements for LATs across Australia for the next five years. It arrived at the following assessment for the Australian fire season:

>	QLD	1 x LAT	Sep-Nov	Co-funded by QLD and Australian Governments
>	NSW	3 x LAT	Oct-Mar	2 x LAT Co-funded by NSW and Australian Governments 1 x LAT owned by NSW Government
>	VIC	2 x LAT	Dec- Feb	Co-funded by VIC and Australian Governments
		1 x LAT	Aug-May	Currently unfunded National LAT

SA and ACT have indicated they have the facilities to host a LAT, but not an immediate operational need to engage a LAT over summer. SA indicated this may arise over the coming five years. TAS indicates that it has facilities to host LAT use but would not anticipate a LAT based in TAS over the next five years.

It is also considered that 2 LATs need to reside in Australia throughout the year to ensure there is coverage of early start or late finish fire seasons and unanticipated fire events throughout the year, effectively contributing to national capability.

NSW maintaining state owned aircraft does contribute to sovereign fleet capability. NSW maintaining a core capability as state owned aircraft (as at 2020), ensuring a level of availability not only for that state, but for all states and territories depending on operational need.

Type 1 Rotary Wing

Type 1 (High Volume) Rotary Wing were the first overseas aircraft deployed to Australia from North America and this arrangement has been in place for over 20 years. As with LAT aircraft, this arrangement has been both effective and efficient, however longer summers and associated fire seasons in both North American and Australia has raised concern that this mutually beneficial international sharing of resources may come under increasing stress. Benefits include better utilisation of airframes, arguably leading to costs for leasing in Australia are at a reduced rate to that of North America, and maintenance of aircrew currency and skills through being engaged in aerial firefighting throughout the year. Piloting these aircraft is a perishable skill if currency is not maintained and ongoing engagement in Australia during the ‘northern winter’ mitigates this skill erosion.

While other industry sectors such as mining are also drawing on these aircraft for their own purposes, the NAFC Strategic Committee can confirm that to date (February 2021) all contracts for Type 1 Rotary Wing aircraft have been honoured over the last 20 years, although additional availability of aircraft outside existing contracts has been problematic early or mid-season during the Australian fire season. In recent years eight Type 1 Rotary Wing (high volume) have been imported for the Australian summer.

Even so, the NAFC Strategic Committee, conscious of the lengthening fire seasons anticipated because of climate change, consider some mitigation to ensure assured availability to Type 1 Rotary Wing capability throughout the year in Australia is warranted.

The NAFC Strategic Committee together with CCOSC and AFAC National Council reviewed the requirements for Type 1 High Volume across Australia for the next five years. The current distribution for the 2020-21 fire season is as follows:

>	NSW	2 x Type 1 High Volume	Nov-Feb	Co-funded by NSW and Australian Governments
>	VIC	4 x Type 1 High Volume	Nov-Mar	Co-funded by VIC and Australian Governments
>	SA	1 x Type 1 High Volume	Dec-Mar	Co-funded by SA and Australian Governments
>	WA	1 x Type 1 High Volume	Dec-Apr	Co-funded by WA and Australian Governments

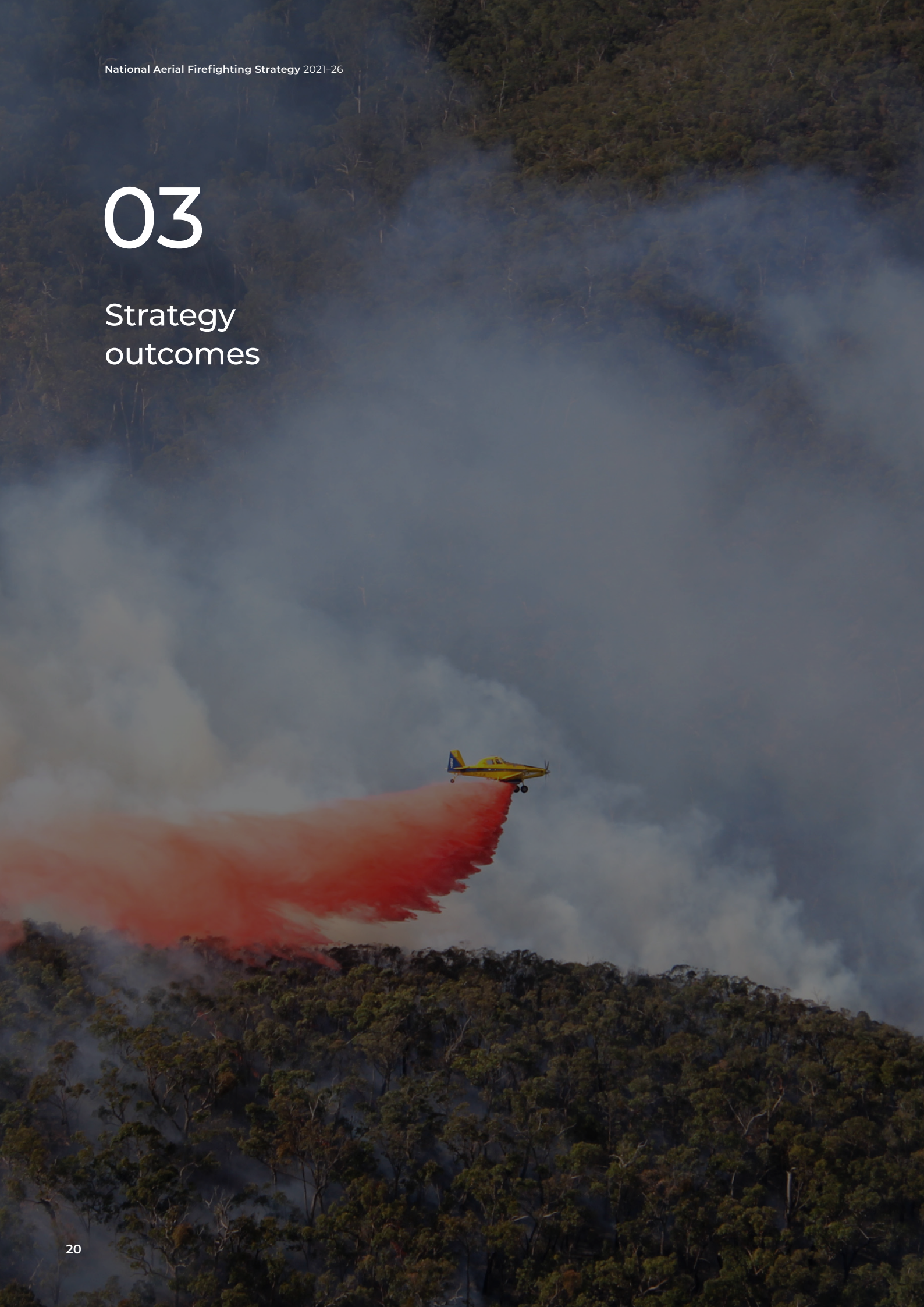
While it has been done, sharing Type 1 Rotary Wing aircraft across jurisdictions on a national scale is not as straightforward as with LATs. Rotary Wing transit is relatively slow and once deployed, they cannot return to their ‘home’ jurisdiction quickly, in significant contrast to fixed wing LAT. Because of this, the NAFC Strategic Committee, CCOSC and the AFAC National Council consider that Type 1 Rotary Wing are best located and operated within jurisdictions. While cross border operations are effective and viable between SA, VIC, NSW, QLD and even TAS, such deployments need to be well planned, require a significant logistical tail and are most effective cross-border rather than full interstate deployments.

The requirement for Type 1 Rotary Wing is likely to adjust in the coming years because Type 1 Rotary Wing include both Type 1 (2650lt or greater)) and Type 1 High Volume (able to carry 100,000lt over 90 minutes). The smaller tank size generally reflects a more modern aircraft with faster cruising speeds and reduced fuel consumption.

The NAFC Strategic Committee is aware that an increasing number of ex-defence rotary wing aircraft are becoming available, that could readily be converted to Type 1 Rotary Wing aerial firefighting aircraft. Alternatively, overseas ex-defence rotary wing could also become available. This option is considered further in Part 3.

03

Strategy outcomes



Maintain the existing state/territory and Australian Government financial allocations and existing fleet capabilities

There is a high degree of comfort within the NAFC Strategic Committee, CCOSC and AFAC National Council that the existing allocation of resources from both state and territory governments and the Australian Government is appropriate and forms the basis of the operational resources required across Australia over the next five years. This has evolved and been refined progressively as well as stress tested over the 2019–20 fire season. While there is always the opportunity for more aerial firefighting resources, experience in North America has highlighted that additional aerial resources do not exclude the likelihood of ongoing major bushfire losses.

In the context of this strategy, the existing allocations which are co-funded by the states and territories and the Australian Government are considered appropriate. They can be supplemented by the call when needed resources that become available locally in each jurisdiction over the course of any summer and these resources are contracted solely through the resources of states and territories.

The 2020–21 (as at February 2021) aerial firefighting resources that are co-funded by states and territories and the Australian Government are at **Appendix A**. What has been identified is an increase in all year LAT capability; a progressive increase in Type 1 Rotary Wing and an increase in intelligence, surveillance, and reconnaissance to mitigate the single source provider currently in place.

Purchase a second LAT that increases national LAT capability

With the agreement of the NSW Government, the NAFC Strategic Committee, CCOSC and AFAC National Council agreed that the NSW owned 737 LAT should be considered as contributing to national capability and sovereign fleet. NSW has indicated, and recent experience has reflected, that this LAT would be made available interstate if the operational conditions warranted interstate deployment.

The location of a second national LAT remains open, and could vary each summer, although its basing arrangements would need to be agreed. In 2020–21 a designated national LAT, which was leased for three months, was located in WA due to the relatively benign fire season on the east coast and the ability for that

aircraft to follow severe weather patterns as they cross from west to east across Australia. For a second LAT to remain in country throughout the year, it would require a permanent base, spare parts, and a crew, even though it could be re-positioned across Australia dependent on the assessed risk.

There are three options for the procurement of the second LAT to be made available in Australia throughout the year:

- > **11-month lease** (allowing annual time for deep servicing). An 11-month lease is a viable option and NAFC are aware of options being proposed. This arrangement would require a chief pilot, flight crews, maintenance staff, spare parts, and a hanger base.
- > **Lease to buy.** This proposal would effectively present the aircraft as owned and operated in Australia. The cost of purchasing the aircraft would be amortised over a certain period (perhaps five years), at a greater cost than outright purchase. Such an acquisition would also require a chief pilot, flight crews, maintenance staff, spare parts, and a hanger base.
- > **Outright purchase.** This would purchase the aircraft outright for the cheapest available price. Such an acquisition would also require a chief pilot, flight crews, maintenance staff, spare parts, and a hanger base.

Analysis of these three options is commercial in confidence and NAFC undertakes tender assessments to identify market options. The NAFC Strategic Committee, CCOSC and AFAC National Council recommendation is that the second LAT aircraft be purchased outright by the Australian Government. As NSW has purchased the initial LAT, which is contributing to national sovereign capability, a co-contribution by the Australian Government funding the second LAT is considered appropriate.

The purchase of a LAT also requires the purchase of a lead plane to ensure the LAT can operate independently across Australia. This is a further significant acquisition and is considered in the commercial in confidence analysis.

Subsequent crewing, maintenance and basing costs will need to be carried by states and territories including subsequent operating costs.

Alternative options, which analysis identifies as requiring greater expenditure over the longer term, is that the second LAT be leased annually for 11 months or leased to buy over five years. Because of the importance of maintaining existing capability, this should not be drawn from existing funding allocations and needs to be provided by the Australian Government.

We consider the procurement of a second LAT meets the 2020 Royal Commission into National Natural Disaster Arrangements intent in *Recommendation 8.1 A sovereign*

aerial firefighting capability of ‘a modest, very large air tanker/large air tanker ... capability, including supporting infrastructure, aircrew and aviation support personnel’.

Outcome: A second LAT funded by the Australian Government to reside in Australia year-round.

Basing options

Once the form of aircraft acquisition for a second national LAT and lead plane is resolved, its location also requires analysis. Were the acquisition of the second national LAT the same model as the existing NSW 737 LAT, there is the option of collocating both aircraft in NSW, which could generate significant savings and reduce the requirements for an additional chief pilot, flight crews, maintenance staff, spare parts and a hanger base, depending on the provider chosen. This would, however, only be the case if the same type of aircraft was acquired and operated by the same jurisdictional arrangement. Were this to be decided, savings are detailed in the commercial in confidence consideration.

Alternatively, a company other than the existing NSW provider may be chosen, or a jurisdiction other than NSW may seek to have the second national LAT based in their state, under alternative arrangements. This is likely to require a duplication of the requirements (depending on the provider), for a chief pilot, flight crews, maintenance staff, spare parts, and a hanger base.

NSW has indicated it would be prepared to accept both aircraft based in NSW, but would also accept a second national LAT housed interstate, if the additional costs and acquisition arrangements could be accommodated by another host state and the associated risks accepted by an alternative jurisdiction.

Outcome: The second LAT once acquired, is located either in an alternative state to NSW or collocated in NSW with the existing LAT, dependent on state ability to host and LAT provider arrangements.

Gift ex-defence Type 1 Rotary Wing

Two ADF Black Hawk rotary wing aircraft have been gifted to the NSW RFS and it is expected these will be received by the fire agency in 2021. With the gifting of these aircraft, it is for the state to convert them for aerial firefighting and then be responsible for their operational employment, both for aerial firefighting and utility operations. They may choose to operate these aircraft themselves or contract an aviation company to operate them on the fire agency’s behalf.

Were the Australian Government to progressively gift further ex-defence rotary wing aircraft to state and territory fire agencies as they become available, in a similar fashion

as has been agreed in NSW, this would steadily:

- > overcome the existing limitations of deploying Type 1 Rotary Wing interstate
- > provide the opportunity for state and territory fire agencies to increase their aerial firefighting capability all year round
- > present a co-funding opportunity where the Australian Government gifts the ex-defence airframe, and the state or territory fire agency is responsible for the conversion and operation of the aircraft
- > increase the sovereign fleet capability of Australian aerial firefighting
- > provide the flexibility for state or territory fire agencies to either operate the aircraft themselves or contract a local provider to operate the aircraft
- > present an ongoing aviation industry opportunity to Australian companies progressively converting these aircraft to fire operations.

While the use of these ex-defence aircraft as Type 1 Rotary Wing aerial bombers would be beneficial, their full utility would be gained if CASA authorised them for broader utility use, known as ‘public use category’ in the USA, thereby enabling them to transport crew and logistics on the fireground. This is the requirement of fire services: not only for water bombing but to transport fire crews and logistics on and off the fire ground. The effective use of Black Hawk is contingent on the multi-use of these aircraft and being approved by CASA for these purposes.

NAFC Strategic Committee also understands there are extensive existing spare parts holding with the ADF which could also be progressively made available to fire agencies operating ex-defence aircraft and again, this would enhance sovereign fleet capabilities within Australia. This would of course be dependent on increased availability of ex-defence aircraft and decreased call on the spare parts by the ADF.

The example of the two aircraft gifted to NSW will be followed with care and an assessment can then be made of how cost-effective they are to own and operate. How they might integrate with the fleets of both large and small jurisdictions in Australia will be considered, along with an assessment of the feasibility of sharing these resources across state and territory boundaries.

Outcome: As ADF Black Hawk rotary wing aircraft become available and states and territories seek their use, they are progressively gifted to states and territories by the Australian Government. Subsequent conversion to aerial firefighting would be at the joint cost of the Australian and state and territory governments, and jurisdictions would be responsible for their operational employment. CASA grants utility use to enable the aircraft to be used not only for firebombing but also for utility transportation of crew and logistics.

Intelligence, surveillance and reconnaissance (ISR)

The existing resources for linescan and high-level surveillance are provided through a single supplier in Australia. NSW RFS are developing an in-house capability and having multiple providers is considered an element of national redundancy and resilience. Across other aerial firefighting capabilities there are multiple providers, and this is beneficial from both an economic and national capability perspective.

Outcome: Additional ISR aircraft beyond the existing single provider are in place to reduce the single source risk and maximise the opportunity for multitasking.

Current national aerial firefighting projects that will also assist in achieving this strategy

There are a range of existing national projects, managed through NAFC, that individually and collectively contribute to aerial firefighting in Australia and form part of how this strategy will be achieved, leading to safer communities. These national projects are enablers to national aerial firefighting capability and are actively managed by the NAFC Strategic Committee with oversight by the AFAC Board:

ARENA

In the absence of available commercial systems, NAFC developed ARENA as a national aerial firefighting aircraft management system for supporting the use of aircraft for fire and emergency response. It has been developed and is maintained by NAFC for its member states and territories. Aircraft operators and flight crews are invited to register and to enter data about their organisation, aircraft and flight crew. ARENA now provides a central hub of quality information while improving data availability and interoperability across jurisdictions. It provides assurance around the integrity of administration of high value aviation resources. ARENA includes a range of features and data including:

- > aircraft data and information
- > aircraft and aircrew availability
- > flight tracking
- > electronic invoicing.

Any operator wishing to be engaged in aerial firefighting in Australia is required to use a tracking provider who will deliver tracking data on their behalf to NAFC's contract data integrator. The integrator is responsible for receiving,

combining, and delivering tracking and event data to ARENA and state and territory agencies, in standard formats. ARENA effectively acts as a single access point for tracking and event data relating to aerial firefighting. ARENA enhances aerial firefighting management for internal state and territory operations and is also available to assist with interstate resource sharing.

Outcome: There are a range of ARENA enhancements that are progressively being introduced and the NAFC Strategic Committee oversees their development and implementation. Priorities are dictated by states and territories and NAFC procurement requirements.

LAT infrastructure

Australia is seeing increased investment in base infrastructure and an increased number of aerial firefighting bases. This provides increased flexibility and the ability to operate more aircraft from a wider range of locations. LATs can now operate on a turnkey basis out of all states and territories, except NT. The use of RAAF bases is a further capability enhancement which is welcome and reflects an increased partnership between fire agencies and the ADF.

The NAFC Strategic Committee is supporting the development of LAT infrastructure (water storage, pumps, piping) for mixing, loading, and recording at key locations across Australia to support the use of LATs. The intention is to standardise these nationally as much as possible. Developing and maintaining LAT infrastructure at airbases enhances flexibility of LAT use and ensures states and territories can best support LAT use. Currently LAT infrastructure is in place at:

- > Coffs Harbour, NSW
- > RAAF Richmond, NSW
- > Dubbo, NSW
- > RAN Albatross, NSW
- > RAAF Edinburgh, SA
- > Avalon Airport, VIC
- > East Sale, VIC
- > Albury, NSW/VIC
- > RAAF Pearce, WA
- > Busselton, WA
- > RAAF Canberra, ACT
- > Bundaberg, QLD

With planned infrastructure upgrades at

- > Hobart, TAS
- > Launceston, TAS

Outcome: A network of LAT bases is maintained across Australia to support strategic deployment and operation of LATs across Australia.

National retardant and suppressant logistics management and reporting

Following the 2019-20 summer, it became evident that while ordering and stocking of retardant and suppressant agents is a state and territory responsibility, there needs to be national visibility, and this is best achieved through the NRSC.

The 2020 Royal Commission into National Natural Disaster Arrangements made two recommendations related to this:

Recommendation 8.2 Research and evaluation into aerial firefighting

Australian, state and territory governments should support ongoing research and evaluation into aerial firefighting. This research and evaluation should include:

1. *assessing the specific capability needs of states and territories, and*
2. *exploring the most effective aerial firefighting strategies.*

Recommendation 9.1 Supply chains – government review

Australian, state and territory governments, in consultation with local governments and the private sector, should review supply chain risks, and consider options to ensure supply of essential goods in times of natural disasters.

Supplies of these suppression stocks (retardants, gels and foams) needs to be nationally visible and the resourcing for each jurisdiction requires national coordination. A national cache of retardant and foam stock and production of these products in Australia would avoid the overseas supply concerns that have arisen previously. Visibility of availability in Australia will need to be maintained by the NRSC and options for local production of these products is being pursued with industry in 2021.

While a range of mixing capabilities exist nationally, increasing the potential for greater mobile mixing capability closer to where the fires are to facilitate shorter turnarounds for both effectiveness and efficiency is a priority.

Of concern however, is the intermittent demand for these stocks, which can be large in one year and virtually non-existent in another. It is a challenging commercial proposition which is overcome in North America through a much larger market that can better accommodate significant variations in demand year in and year out.

While purchasing of retardant remains a state and territory responsibility, national visibility and development of national production capability are two objectives identified in this strategy. An ideal solution would be multiple suppliers providing access to multiple

products, although demand in Australia may not support this. NAFC is coordinating with members' trials and evaluations of retardants to identify an Australian produced product that is safe and appropriate for Australian conditions.

Outcome: Retardant and suppressants are manufactured in Australia creating sovereign reliance and stocks are held by states and territories and monitored centrally through the NRSC.

Remotely piloted aerial systems

In 2020, the NAFC Strategic Committee initiated a project to coordinate a multi-agency network to consolidate understanding of RPAS technology and capabilities and identify appropriate applications for RPAS. The project will advance the appropriate use of RPAS and assist states and territories with implementation and integration of RPAS. Jurisdictions are at varying stages of development in their adoption of RPAS and NAFC is currently coordinating national awareness of opportunities to continue developing this capability:

- > for information gathering and communication relay
- > for aerial ignition during prescribed burns
- > considering the adoption of larger/long endurance platforms
- > develop national policy and procedures which can be used in all jurisdictions.

NSW RFS are intending to conduct night aerial firefighting trials with RPAS in 2021.

Further consideration will be given to the use of large military RPAS should they be available for re-tasking or for ex-defence procurement for fire detection, reconnaissance, mapping.

Outcome: Where applicable, RPAS gain an increasing role and utilisation both in ISR and aerial ignition.

Using simulation for aerial management training

In 2019, NAFC conducted an industry survey and forum to develop mutually agreed pathways towards making use of simulation technology to assist the training and skills maintenance needs of its members. This initial work formed the foundation for a project to coordinate a multi-agency network reviewing training strategies and simulation systems and overseeing the development of a fit for purpose strategy to enhance the use of simulation.

Simulation is increasingly recognised as a critical tool for enhancing the training of personnel who use, manage, supervise and support aviation capabilities in fire and emergency agencies. It requires fit-for-purpose simulation technology to enable agencies to train and

maintain a skilled aviation fire workforce, without the need to spend extensive hours flying. Simulation provides cost effective training and skills maintenance in critical aviation roles.

Currently there is quite limited use of simulation during training in Australia, whether it be for knowledge acquisition or for the practice of core activities. The degree to which simulation is used or is likely to be used in the near future varies significantly and appears to be linked to state and territory resourcing. NSW RFS has established a specific aerial firefighting simulation capability in Dubbo NSW, building pilot capability to better understand and operate with air attack supervisors and ground attack crews.

While simulation is used in various ways by some agencies, very few agencies have developed simulation platforms that are immersive and incorporate all the key elements such as fire and landscape visuals, flight and navigation, and pilot interaction. In the case of air attack supervisor trainees this would also include communications with ground firefighters and other aircraft. This is a reasonably intensive phase of learning and requires careful structuring to progressively dial up the task requirements and level of complexity for the trainee.

A joint or collective approach between agencies is likely to be the best way to share development and running costs and create more consistent training for the sector. Given the opportunity to network simulations, a joint, collective approach could be configured to enable most agencies to have simulation pods but collaborate with a simulation centre to help run the sessions for their personnel.

Outcome: All states and territories are aware and familiar with available simulation in use across jurisdictions both online and physical. NAFC continues to present opportunities to increase the role and function of simulation to support aerial firefighting. Research confirms its benefits and utility.

Resource to risk decision support tool

As part of the 2018 NAFC Business Case to increase Australian Government funding to support aerial firefighting, it was identified that a national resource to risk decision support tool needed to be developed. This has been funded and has application for all resourcing decisions, not just aerial assets, and seeks to overlay factors such as seasonal outlook, current and forecast weather, fire starts, and assets under threat with available resources. The intent is to deliver a national decision support capability, increasing the efficiency and effectiveness of resource allocation, resulting in operational savings and further enhancing the mitigation of bushfires and their economic impact.

Outcome: A national resource to risk decision support tool is developed in 2021 with application for all resources, both aerial and land, and is available to all jurisdictions to assist with resource decision making.

Review of training framework

With the increase in aircraft utilisation, there is increasing demand on operational and management support. While this is a state and territory responsibility, this strategy identifies opportunities to improve the training framework together with using simulation to maintain competence of currency of personnel.

In 2019-20, AFAC and NAFC undertook a complete review of the Aerial Firefighting Training Framework. This is in line with the public safety training requirements and nationally accredited training. It means that aerial firefighting competencies have been reviewed, updated, and endorsed and should be consistently applied across Australia.

Likewise, the training and development of fire agency personnel aligned to the Aerial Firefighting Training Framework, responsible for tasking, guiding, observing and supporting aerial firefighting is critical for safe, effective and efficient aerial firefighting. Training needs to be available online and increased use of simulation platforms to enhance training and to maintain currency are existing national projects. Credentialing of these staff within the Emergency Management Professionalisation Scheme (EMPS) is an important enhancement as these staff are amongst the most likely to be deployed both interstate and overseas.

The NSW RFS is developing a physical aviation 'centre of excellence' at the NSW RFS Training Academy in Dubbo. All NSW aerial firefighting aviation courses will be conducted at this facility with students accommodated on site. Simulation capabilities are being collocated with more to be added, and plans are being finalised for a purpose-built aerial firefighting classroom. It is intended that this facility will be made available for all agencies and jurisdictions. NAFC is also exploring an online aerial firefighting training capability, drawing on available agency programs and simulation that can be readily shared online. NAFC Strategic Committee is well placed to promote skills mapping and progression through EMPS and offer doctrine and publications.

Outcome: All agency aerial firefighting training is aligned to the nationally accredited Aerial Firefighting Training Framework. The NSW RFS aviation 'centre of excellence' further develops and remains available to all jurisdictions. Existing and proposed online simulation is shared and used across jurisdictions.

Night operations

Night operations, particularly surveillance operations, occur currently. VIC and NSW are conducting night trials for aerial firefighting operations. The benefit of aerial operations at night includes greater operating use of available airframes and pilots; (generally) less intense fire activity; reduced firefighters on the ground (minimising risk from falling branches in particular during aerial drops) and easier identification of the active fire edge, leading to reduced fire spread. The challenges include greater operational risk flying at night and the requirement for night qualified crews and suitably equipped aircraft. As night flying capabilities increase, this needs to be balanced against the inherent risks. This strategy supports the continued trialling and development of this capability.

Outcome: Trials continue developing capability and maximise opportunities to employ aerial firefighting aircraft at night.

Future aerial firefighting projects

The NAFC Strategic Committee is looking for innovation to further improve aerial firefighting delivery. This could include initiatives such as:

- > With heavier lift capacities and faster transit speeds than existing capabilities, Black Hawks and Chinooks present as future Type 1 Rotary Wing replacements with increased speed, lift and endurance improving their delivery capability. Further research and evaluation is required to confirm the performance of improved belly tank design and delivery.
- > Ongoing engagement with CASA regarding the broader employment of Black Hawks for utility use so they can transport fire crew and civilians if required, is a critical capability requirement.
- > Increased data capture and transfer. ARENA presents opportunities for increased data capture and subsequent analysis to aid cross agency knowledge transfer and interstate aircraft resource sharing.

Financial considerations

Funding model

The funding available for aerial firefighting is ultimately a state and territory decision which varies significantly depending on the projected season and aerial resources identified by each jurisdiction to mitigate the risk. This state and territory funding is supplemented by the Australian Government. The Australian Government cost

sharing model with states and territories through NAFC began in 2003 and was originally \$5m pa which increased to \$10m pa and in recent years has been around \$15m pa as a co-contribution to standing charges of major aerial assets. Following the submission of a NAFC Business Case in 2018, the Australian Government contribution has now increased to \$26m pa, acknowledging the increased national role and deployment ability of LATs across the country.

The states and territories currently (as at February 2021) contribute to the standing charges (the costs of securing the aircraft and having them available for operational use) for the existing 163 services (**\$80.3m pa**) and the Australian Government contributes **\$26m pa** (\$23.8m directly to aircraft leasing) as reflected in **Appendix C**. States and territories are then responsible for all operating costs, which totaled **\$480m** over the 2019–20 Black Summer (noting the Australian Government contribution to standing charges increased to **\$46m** in that year). A significant portion of the operational costs (unknown to NAFC) are subsequently recovered by the states and territories from the Australian Government through disaster relief payments.

Clarity of funding

The NAFC Strategic Committee has identified that the Australian Government contribution needs to be allocated to each state and territory prior to the commencement of each season, so jurisdictions have clarity of allocation and are aware what is being provided federally and what funding they will need to source from state and territory revenues. Operating charges are the cost of the states and territories.

It has been historically agreed that 5 per cent (currently \$1.3m) of the annual NAFC receipts from the Australian Government is the figure applied to managing national projects, reflecting the need for long term investment to have continuous improvement in aerial firefighting systems and for maintaining the NAFC Office.

Funding principles

The following funding principles are measured by the NAFC Strategic Committee to identify the allocation of Australian Government funding to each state and territory.

- > Funding will reflect a collaborative, co-funding model and should normally be as a proportionate contribution to state/territory expenditure.
- > Funding will provide a greater proportion of support to smaller states and territories who have less capacity to contribute to capability.
- > Funding should optimise opportunities to leverage synergies, sharing between states and territories, providing capabilities that an individual jurisdiction may not otherwise have been able to afford.

- > Funding will reflect the need for long term investment, to have continuous improvement in aerial firefighting systems and may be considered for research, testing, evaluation and development purposes.
- > Funding should consider maximising Australian sovereign capability.

Specific funding allocations to support jurisdictions will be reviewed annually and agreed by the NAFC Strategic Committee. Australian Government funding disbursements for 2020–21 are at **Appendix D**.

Fuel costs

Fuel remains a major cost of aircraft operations and security of supply, an issue beyond the immediate influence of NAFC, should not be ignored. Availability of aviation fuels is a vital enabler for aerial firefighting operations.

Aerial firefighting infrastructure

Expenditure will also need to be considered for new and maintaining existing aerial firefighting infrastructure. Examples of infrastructure investments include:

- > storage and readiness of fire-retardant stocks to meet escalating needs and availability in country
- > retardant/suppressant mixing and loading facilities
- > systems for risk and resource management.

Measuring and reporting on successes

Notwithstanding this, there is a need for greater emphasis on measuring and reporting of aerial firefighting successes as well as identifying system improvements. State and territory emergency services currently apply rules and guidelines for firefighting resource readiness, response, and arrival times. It remains open as to whether such approaches conducted by states and territories can be extended onto a national scale.

While there have been attempts to quantify the economic value of aerial firefighting, this has proven problematic and remains outstanding analysis. Consistent with the Australian Government comprehensive approach to emergency management, benefits should take account of prevention and mitigation, preparedness, response, and recovery activities and this is further considered under research as part of this strategy.

Data driven investment decisions

It will remain a challenge to argue for greater investment in future capability if the efficacy, achievements, and costs of the current capability cannot be reported on. Like any business, aerial firefighting needs to be transparent on the return on investment. A tool that enables greater cost interrogation would enable greater confidence for future investment bids. ARENA can certainly assist with data analysis.

It may be more helpful to consider aerial firefighting expenditure as insurance, much like national defence expenditure. It is a capability that cannot be readily turned on or off and requires an ongoing commitment that will be fully exhausted some years, and under utilised in others.

Research

The 2020 Royal Commission into National Natural Disaster Arrangements identified in **Recommendation 8.2** that *“Australian, state and territory governments should support ongoing research and evaluation into aerial firefighting. This research and evaluation should include:*

1. *assessing the specific capability needs of states and territories, and*
2. *exploring the most effective aerial firefighting strategies.”*

Researching the effectiveness of aerial firefighting and the specific capability requirements has always been challenging and these difficulties have been reflected in assessments in other countries employing aerial firefighting. It is intrinsically difficult to identify and quantify the value of aircraft both from a speed of response and benefit of outcome. Firefighters on the ground appreciate the benefit; communities feel better protected, and individual houses and other infrastructure are saved from aerial firefighting operations. This has not, however, been readily assessed in the past with scientific or economic evidence.

Assessing the real time cost and benefit of aerial firefighting and the cost benefit of ongoing aerial firefighting applications is not well developed in Australia. ARENA will assist in identifying real time costs once it is fully integrated into state air desks. Real time costings need to become a greater consideration for future aerial firefighting. VIC has developed an aviation econometrics model to assist with identifying the value of deploying aircraft and while this has merit, its operational application is still being planned. Cost benefit analysis requires further research.

The NAFC Strategic Committee through state and territory input does makes regular adjustments to capability requirements in each jurisdiction. The NAFC Strategic Committee has also undertaken evaluations and case studies of some aerial firefighting including specific evaluation of LAT use. These have been first-hand, practical observations and case studies rather than scientific studies. There is a clear need for greater evaluation and monitoring of successful aerial firefighting strategies, although these need to be initiated by the users in states and territories.

Further work is required to identify cost benefit analysis of aerial firefighting across a broad range of factors (economic, operational, political and community). Linked to this is the identification of most effective firefighting strategies. Aerial firefighting is currently measured in the relatively crude figures of hours flown and litres of suppressant dropped. While this measures activity, it does not measure effectiveness. This has been highlighted as a priority for the new resilience research entity being established in July 2021.

NAFC needs to remain aware of emerging technology and practices that arise across Australia, New Zealand and further overseas. Research into assessments of aerial firefighting effectiveness needs to be of particular focus and the better use of existing satellite installations and potential high altitude platforms to identify fires and guide aircraft requires further research.

Governance

The AFAC Board governs NAFC in the broadest sense and carries the financial and fiduciary risks and responsibilities. Within the AFAC Ltd governance structure, the NAFC Strategic Committee, a sub-committee of the AFAC Board, oversees the operation of NAFC and the allocation of federal funding. Obligations and accountabilities are detailed in the NRSC Resource Management Agreement and the NAFC Strategic Committee Terms of Reference. States and territories are responsible for aviation operations within their jurisdictions. NAFC coordinates, generates efficiencies, and where needed progresses collective national projects to reduce duplication and maximise benefit to states and territories.

Aerial firefighting is a national capability that continues to develop over the longer term. It is not something that can successfully progress in isolation of service providers, fire agencies, regulators, or government. It requires a coordinated, holistic approach and a long-term methodology, as aircraft are major capital investments and are reliant on long term government budget commitments.

This capability is also reliant on sustainable availability and development of pilots, aircrew, engineers, and maintenance staff. While this has not been a limiting

factor to date, the demographics of aircrew and maintenance personnel need to be considered and operators must consider availability of future pilots with appropriate experience and training.

The ADF have a significant aerial resource whose primary mission is the defense of the nation and to support the national interest. It is prudent to share information on aerial firefighting between the ADF, NAFC and states and territories. There is however, material risk in depending on ADF assets. ADF assets may be able to offer a capability through the Defence Assistance to the Civilian Community. In most cases, ADF support will be restricted to base infrastructure availability, personnel transport, or utility roles.

This partnership with AFAC, industry, the ADF and governments is critical to the successful governance, sustainability, and effectiveness of aerial firefighting in Australia.

While the Australian Government does not have a direct role in the governance of aerial firefighting, Emergency Management Australia as co-chair of CCOSC is directly engaged in resource sharing and is kept informed through the NRSC of interstate resource deployments. The high profile and community interest in aircraft and aerial firefighting means that governments at all levels need to be kept informed in a timely manner of aerial firefighting development.

Performance indicators and measurement

Improved operational, service delivery and contract performance measures are required. Common measures such as litres dropped, reflect little more than business, and offer no indication of efficiency or effectiveness. Future considerations should include:

- > response time against target time
- > litres delivered per hour, per dollar
- > accuracy of water bombing on required target
- > operational performance reporting
- > efficiency of contract administration.

Procurement and Acquisition

The 2020 Royal Commission into National Natural Disaster Arrangements identified in **Recommendation 8.3** – Developing the aerial firefighting industry capability:

Australian, state and territory governments should adopt procurement and contracting strategies that support and develop a broader Australian-based sovereign aerial firefighting industry.

The NAFC Strategic Committee is of the view that this already occurs. With 88% of the existing aerial firefighting fleet contracted to Australian companies, this is a sound base. The 2020 Royal Commission into National Natural Disaster Arrangements is seeking a broader Australian based sovereign industry, which this strategy proposes.

Agencies and contractors who own aircraft should be encouraged to operate under business principles and conduct trials of new capabilities, which need to be encouraged and funded. Maintaining currency of overseas developments is of further assistance in considering future acquisitions and fire agencies need to remain flexible in their approach as they consider new resources as they become available and modify resource needs as necessary to maintain the effectiveness of firefighting operations.

A primary purpose (and the single greatest output) of NAFC is the assistance in aircraft procurement. By considering state and territory requirements and coordinating these nationally, and then aligning these with available industry capability, efficiencies of scale and effect can be gained across jurisdictions and industry. Aerial resources need to be best positioned to meet the needs of the fire services. Future procurement is also likely to require consideration of longer leases, leasing to buy, and outright purchasing of assets.

Analysis of leasing versus owning aerial firefighting aircraft is an ongoing consideration with many variables. Identifying the best combination of leased and owned aircraft will provide the optimum capability for Australia. While leasing has been the historical practice, with greater flexibility to adapt to season changes and risks, the decision to lease is no longer a financial decision alone. More concurrent seasons across Australia, increased competition for resources in North America, and variability in the currency exchange has brought into question leasing as a blanket approach for future aerial firefighting capability. There are also a range of leasing and ownership options that need to be considered.

Noting that 81 per cent of the current aerial firefighting fleet resides and operates in Australia (all but larger delivery aircraft), the capital outlay to own airframes already resident in Australia is less compelling. Alternatively, apart from the existing NSW RFS owned LAT, no other LAT aircraft reside in Australia. To ensure availability during what is becoming longer and more intense fire seasons, having some LAT owned or on long-term lease has considerable merit. This strategy confirms that approach.

Longer-term leases (e.g. 300 days) effectively offers year-round availability, with the potential to deploy these aircraft in multiple jurisdictions as the fire season progress from north to south along the east coast of Australia, or east to west. A further option is engaging in a lease-to-buy option, securing aircraft in the longer term while minimising the capital outlay in the initial years.

Owning airframes may provide an optimal economic benefit over a 10-year period based on average usage. Long and intense fire seasons however, such as 2019-20, may increase aircraft flying time and reduce the longer-term life of the aircraft. That said, increased usage during a busy season may also present short-term savings when compared to leasing and hourly rates.

Regardless of whether aircraft are leased or owned, how the aircraft is operated is a further consideration. Owning aircraft is only an option for larger fire services and even then, operating may be contracted out, to release agencies from the complexities and risks of engaging pilots, maintaining airframes, and achieving currency and compliance.

While contract periods have generally been 3 years +1+1, there is general support for extending the lengths of contracts, with emphasis on ability to scale up and scale down through:

- > focusing on seasonal extension periods or otherwise varying periods to maintain flexibility
- > considering more partial availability arrangements so that service periods are longer but include days of guaranteed commitment – lowering cost of longer service periods.
- > use of dovetail arrangements, for example services for QLD and TAS.

All of the above are ongoing considerations for the NAFC Strategic Committee and having that central point of governance enhances Australia's ability to monitor the most effective procurement approaches in future. At present there is no need for sudden change; rather an incremental approach based on ongoing analysis and the impact of market forces in the context of available budget.

Call when needed

As already noted, one advantage from the current arrangements is the existence of states and territories CWN aircraft arrangements. CWN aircraft can be brought on for short periods as the risk or operational need requires, which is funded by states and territories. There are up to 350 aircraft identified that could be engaged in a CWN basis across Australia. CWN will continue to be a key element of Australia's approach to aerial firefighting capacity.

Conclusion

Aerial firefighting has become a critical capability for managing the bushfire risk for Australian communities. While it is fundamentally a state and territory responsibility, the Australian Government has agreed to co-share costs to the order of \$26m pa. This recognises that the provision of aerial firefighting is a very costly budget item, particularly for smaller jurisdictions to fund, but also recognises that contracting and procuring these services through NAFC generates efficiencies and savings and is a truly national capability. It also optimises opportunities for resource sharing between jurisdictions.

The National Aerial Firefighting Strategy also holistically identifies the complexity of issues and projects that contribute to aerial firefighting. There are multiple states and territories seeking services, multiple domestic and international providers, all operating in challenging, complex, and demanding regulatory environments with significant political and community scrutiny. Add to this the precision and risk mitigation required for successful and safe aerial operations, and the challenges are evident.

Aerial firefighting capability in Australia has developed significantly over a relatively short period of time. This strategy identifies what has been done so far. It maps risks and opportunities for future development. Progressing initiatives on a national basis offers the best outcomes for communities, governments and business supporting the sector.

This national strategy is an opportunity to move further towards an evidence-based, best value business approach for acquisition and long-term capability modelling. The strategy provides clarity and transparency into the future sector intentions and reassurance that aerial firefighting risks are identified and managed appropriately. Finally, there is a commitment to review the strategy annually, to ensure any developments are identified and innovation can be adopted.

Appendices

It is intended Appendices will be adjusted depending on annual arrangements.

- > Appendix A: The 2021 contracted services by jurisdiction.
- > Appendix B: Australian and overseas owned and registered aircraft engaged through NAFC.
- > Appendix C: Typical annual funding allocation to standing charges.
- > Appendix D: Commonwealth funding disbursements for 2020-21.

Appendix A:

The 2021 contracted services by jurisdiction.

Jurisdiction	Fixed Wing	Rotary Wing	Other
QLD	1x FW LAT	3x RW T2	
	1x FW LAT AAS	2 x RW T3	
	2x FW T4		
	1x FW Recce		
NSW	2x FW LAT	2x RW T1 HV	2x Linescan
	2x FW LAT AAS	9x RW T2	
	1x FW Recce	4x RW T3	
	9x FW T4		
ACT		2x RW T2	
		1x T3	
VIC	2x FW LAT	3x RW T1	2x Linescan
	1 x FW LAT AAS	2x RW T1 HV	
	4x FW Recce	13x RW T2	
	18x FW T4	14x RW T3	
TAS	4x FW T4	5x RW T2	
		3x RW T3	
SA	2x FW Recce	1 x RW T1 HV	
	14x FW T4	8x RW T3	
NT	5x FW T4	2x RW T3	
WA*	1 x FW LAT	1 x RW T1 HV	1 x Linescan
	1 x FW LAT AAS	9 x RW T2	
	2 x FW T4	1 x RW T3	

*Department of Biodiversity, Conservation and Attractions WA Parks and Wildlife Service contract additional aircraft outside the NAFC contracted fleet and CWN arrangements.

Appendix B:

Australian and overseas owned and registered aircraft engaged through NAFC.

	Australian owned — Australian registered	Australian owned — Overseas registered	Overseas owned — Australia registered	Overseas owned — Overseas registered	NAFC contracted services from Australian Companies
Large Airtanker	0	1 NSW RFS owned	0	6	6
Type 1 (Large) Rotary Wing	0	0	0	9	9
Type 2 & 3 (Medium and Small) Rotary Wing	59	12	0	4	75 services (7 aircraft each fill 2 services)
Fixed Wing Firebombers	54	0	0	0	54
Light Fixed Wing including LAT AA	14	0	0	0	14
Linescan	5	0	0	0	5
Total	132	12	0	19	163
	81%	7%		12%	100%

Appendix C:

Typical annual funding allocation to standing charges.

	Standing Charges	Commonwealth Contribution	State/Territory Contribution (balance)
ACT	1,244,237	513,080	731,157
NSW	17,140,417	5,486,333	11,654,084
NT	1,653,605	742,702	910,903
QLD	4,774,941	1,772,977	3,001,965
SA	8,393,469	2,070,355	6,323,114
TAS	4,286,218	2,107,180	2,179,038
VIC	26,748,792	5,320,314	21,428,479
WA	16,157,156	5,502,481	10,654,920
LAT deployment		361,079	
Grand Total	80,398,836	23,878,401	56,883,658

Appendix D:

Commonwealth funding disbursements for 2020-21.

	Commonwealth Funding Disbursement 2020-21	Aircraft Standing (actual)
ACT	\$500,000	\$513,080
NSW	\$5,500,000	\$5,486,333
NT	\$700,000	\$742,702
QLD	\$1,800,000	\$1,772,977
SA	\$2,000,000	\$2,070,355
TAS	\$2,100,000	\$2,107,180 (Winch)
VIC	\$5,300,000	\$5,320,314 (NVIS & RPAS)
WA	\$5,500,000	\$5,502,481
National LAT	-	\$361,079
Total	\$23,400,000	\$23,876,501



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