![NAFC - National Aerial Firefighting Centre]

BUILDING NATIONAL CAPABILITY AND CAPACITY FOR USE OF RPAS

SURVEY RESULTS

August 2020

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INTRODUCTION

Remotely Piloted Aircraft Systems (RPAS) technology, including associated payloads such as cameras and sensors, has developed rapidly in recent years, and continues to do so. RPAS availability, capabilities and value-for-money are likely to continue to evolve and rapidly improve, especially over the next 5 to 10 years.

Like conventional aircraft, RPAS come in all shapes and sizes, with all sorts of individual limitations and advantages. An RPAS that works well for one application will not necessarily be right for a different application.

There are some viable options for RPAS to efficiently carry out emergency and land management tasks.

Some agency staff are already using RPAS in operations but to date there has not been an organised collaborative approach to sharing-

- Suitable craft and technologies
- Procedures for RPAS use
- Integrating RPAS use into existing resource tracking
- Integration of data feeds into agency IT

In response to the 2019-20 Black Summer fires the integration of RPAS into existing operations is also featuring in discussions including

- The Royal Commission into National Natural Disaster Arrangements
- The CSIRO Report to COAG on Climate and Disaster Resilience
- The Bushfire Earth Observation taskforce

The use of RPAS by some agencies is well developed, but for others is in its infancy, however there is consistent recognition that RPAS can be used in situations where quick and close assessment can be undertaken in areas where either staff or conventional aircraft have difficulty accessing.

Whilst agencies can, and are, developing their own RPAS capability there are benefits to taking a coordinated approach which will allow for:

- Reduction in duplication of effort
- Interoperability for RPAS and RPAS pilots between agencies
- RPAS resource (equipment and pilots) sharing arrangements
- Tracking of RPAS resources
- Immediate deployment of RPAS to operations

The National Aerial Firefighting Centre (NAFC) has initiated a program that will designed to address a national approach. The four key areas of the program are address these issues develop a national capability roadmap that addresses:

- RPAS Capabilities- Current and Future
- RPAS Doctrine
- RPAS Procurement and Registry
- RPAS Regulatory Framework

For full details on the program or to join the mailing list please go to https://nafc.org.au/?page_id=917

ABOUT THIS SURVEY

The first step of the program was to take a snapshot of what was currently happening across AFAC agencies with respect to the current use of RPAS.

The survey was conducted in June 2020. The survey was sent to
- NAFC mailing list subscribers
- AFAC Collaboration Group Members
- Centre of Excellence for Prescribed Burning mailing list subscribers.

There was a total of 55 responses to the survey. The information provided in this document is summarised responses.

The survey responses came from all Australian jurisdictions and New Zealand and across the range of agency types (e.g. from a range of land management, urban and rural fire services and surf lifesaving). There were also some responses from non-AFAC agencies, US agencies and manufacturers. It should be noted that there are several AFAC member agencies who did not respond that are known to have well-developed RPAS capability and that will be captured in future stages of the program.

The summarised qualitative responses are drawn only from AFAC member agency responses.

The survey has highlighted
- That RPAS use is actually more well developed in some agencies than originally conjectured
- There is a wide variance in agencies application of RPAS technology
- There is a wide variance in agencies integration of RPAS into operations and systems.

The survey has also provided useful feedback on the development of the program deliverables.

Full survey responses are available on request from deb.sparkes@afac.com.au

Please tell us the agency where you work/volunteer.

LOCATIONS

Location	%
QLD	31%
NATIONAL	20%
NSW	9%
VIC	9%
SA	7%
NZ	6%
TAS	5%
WA	5%
USA	4%
ACT	2%
NT	2%

AGENCY TYPE

Agency Type	%
Land Management	47%
Fire Service	31%
Contractor	11%
Relief	3%
Defence	4%
LGA	2%
Surf Life Saving	2%
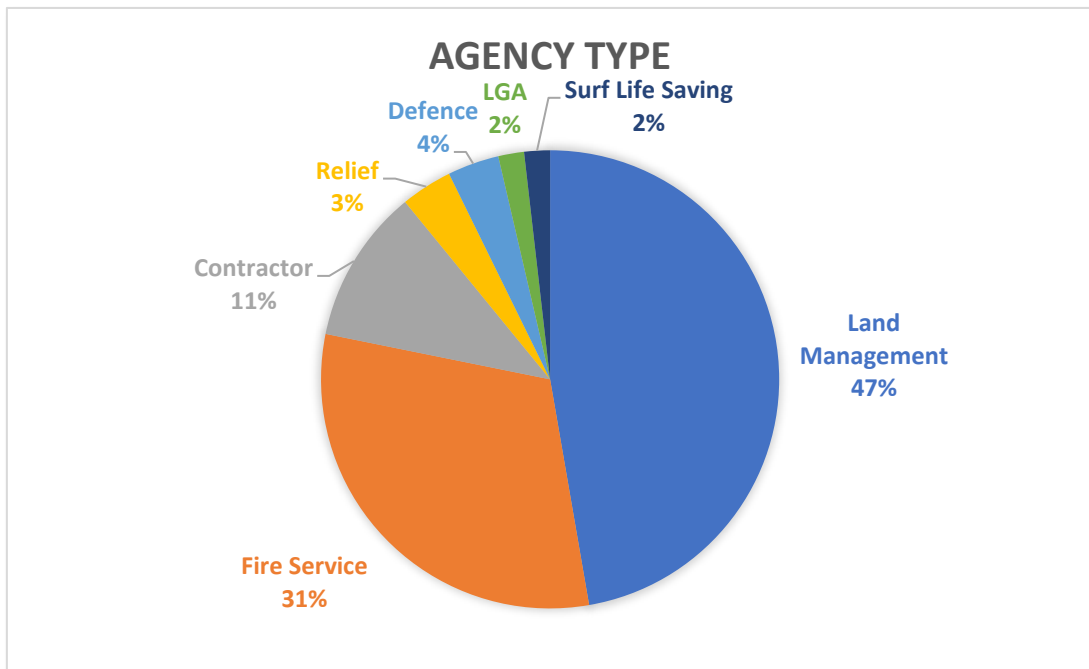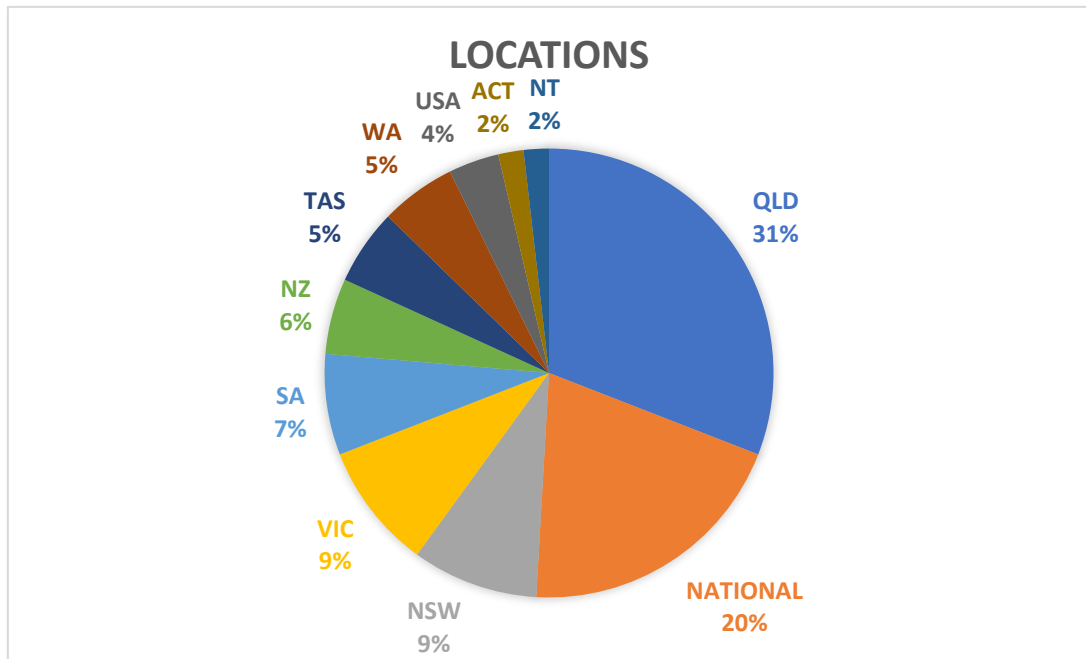
Response numbers by agency

- Queensland Parks and Wildlife Service (11)
- Queensland Fire and Emergency Service (4)
- HQ Plantations (1)
- Brisbane City Council (1)
- South Australia Department of Environment and Water (3)
- South Australia Country Fire Service (1)
- NSW Parks and Wildlife Service (2)
- Fire and Rescue NSW (2)
- NSW Rural Fire Service (1)
- Forest Fire Management Victoria (DELWP) (2)
- Victoria Country Fire Authority (3) (NB survey was conducted before Fire Recue Victoria launched)
- Western Australia Department of Biodiversity, Conservation and Attractions (2)
- Western Australia Department of Fire and Emergency Services (1)
- Tasmania Fire Service (2)
- Tasmania Parks and Wildlife Service(1)
- ACT Parks and Conservation Service (1)
- Bushfires NT (1)
- Fire and Emergency New Zealand (3)
- Surf Life Saving (1)
- Defence (2)
- Disaster Relief Australia (2)
- National Interagency Fore Centre/Department of the Interior USA (1)
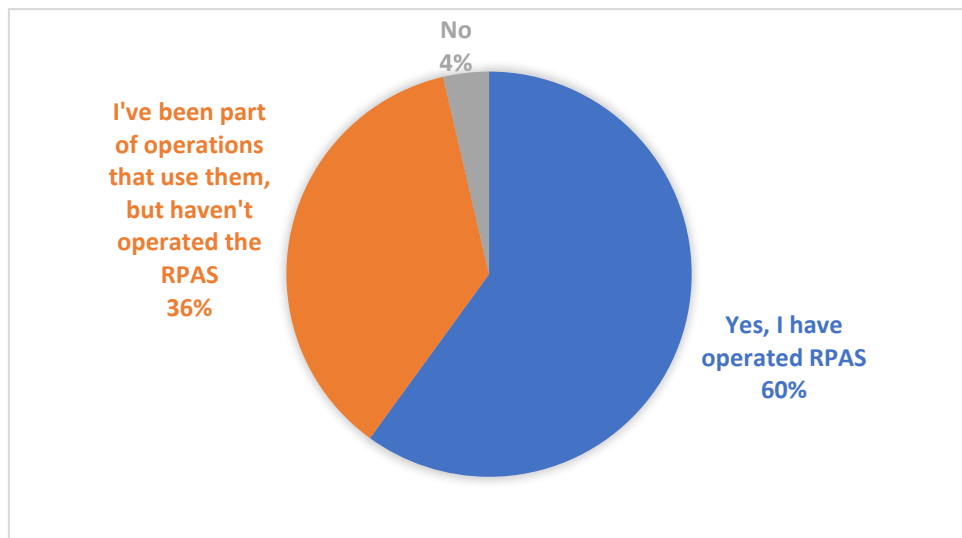- Bureau of Land Management USA (1)

- Contractors (6)

What is your usual role with the agency?
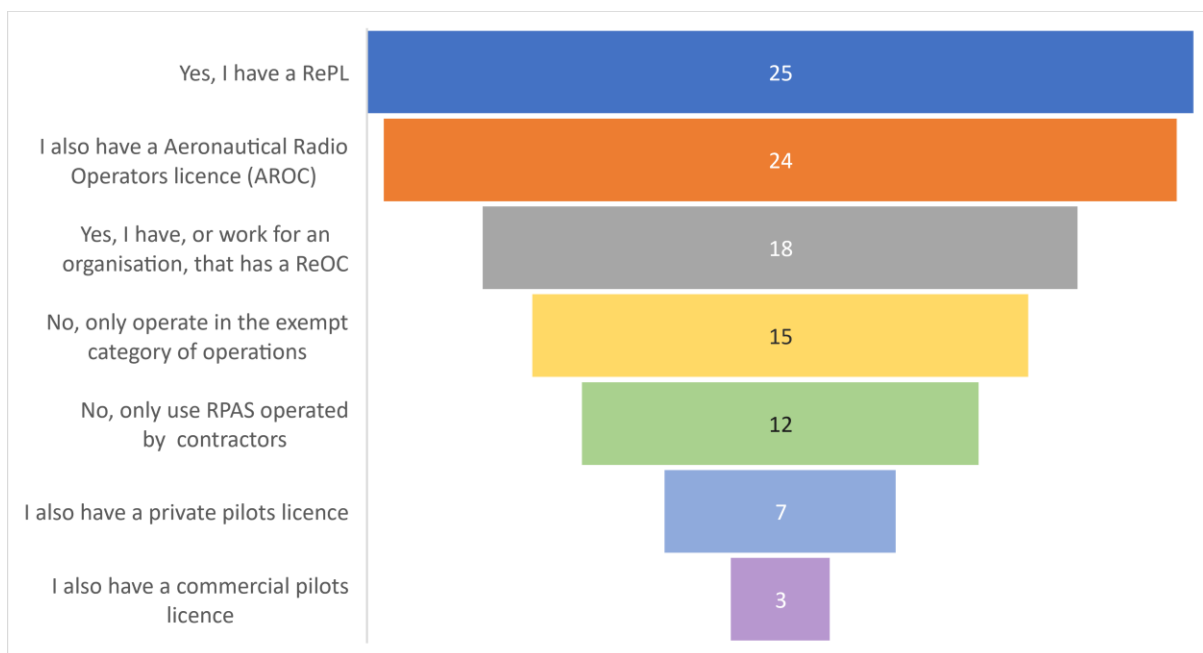## What was your role when using the RPAS?

Usual Role	Role with RPAS
Manager Bushfire & Aviation	Coordination/Strategic Direction
Fire Management Officer	Operator
CEO	Pilot and Mission Commander
Air Operations Officer	Training
Training Officer / Operational air crew	Remote Pilot
Chief Remote Pilot	Chief Remote Pilot
Ranger	Operator
Fire Operations Officer	Pilot
Project Officer	Sector Leader in Fire monitoring (Wildfires), Pest (feral animal work), Project work, site survey, Forrest die back program
Team Leader	Safety Officer
NRM Ranger	Operator
Volunteer rural fire officer	Pilot
forester	Various ops in the field
Ranger	Ranger
Manufacturer & Operator of newly available heavy lift RPAS	Chief Remote Pilot & Systems Engineer
National UAS Fire Operations Specialist	I am a qualified UAS pilot, UAS Manager and UAS Leader. I us the UAS for mapping, situational awareness and aerial ignitions.
UAS Training	Pilot
Regional Fire Services Coordinator	Observer
Ranger	Fire/Weed/Pest Survey/ Compliance
Senior Ranger - Assets	Pilot
Resource Ranger	Ranger
Snr Aviation Officer	Project lead - RPAS aerial ignition, team member Boeing Scan Eagle project
Small/ Tactical UAV operator	Operator
National Park Management	Crew Leader fire response
Senior Ranger	Operational inteligence, attached to IC.
Chief Pilot / Program Manager	Mission Commander
Senior Ranger Fire, Great Barrier Reef Islands	Incident control coordinating use, information collected and authorising operations
Volunteer	Building impact analysis
Assistant Director	Oversee TFS air operations unit
Manager AIr Operations	Remote Pilot, current Chief remote Pilot
Manager Volunteer Training Products	Pilot
Remote Sensing Officer	Mapping burn severity for satellite calibration
Bushfire Risk Unit	pre/mid/post burn information gathering

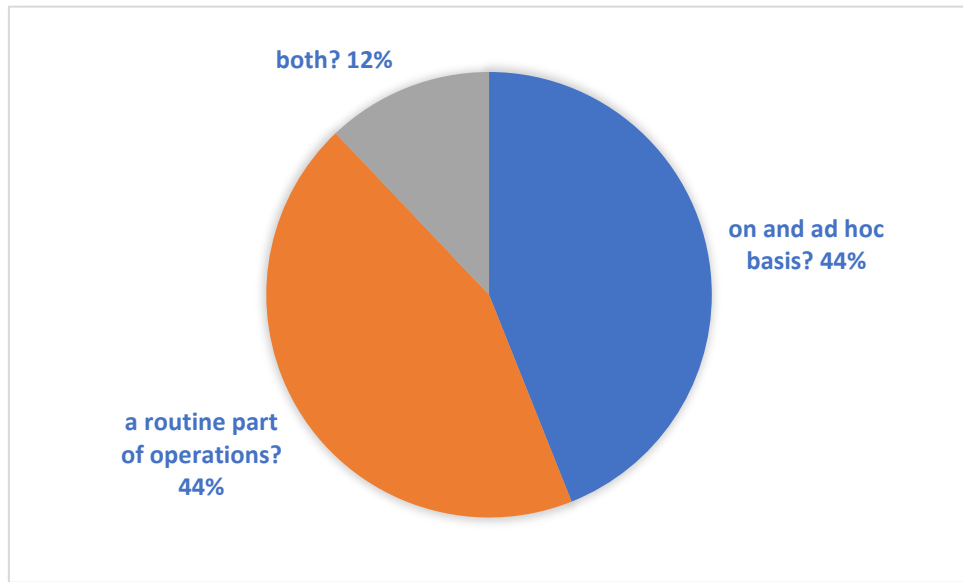| Usual Role	Role with RPAS
Fire Management Officer	Various - Planned Burn IC, Operations Officer, Planning Officer, Pilot
Fire Management Officer	Prescribed Burn controller
Drone training and operator	Coastal surveillance
Volunteer	N\A
Fire Management Officer	Incident Management
Troop Commander	Operator
Burn Planner	Part of burn planning and delivery
Volunteer	Incident Controller requested MFB RPAS capability
Chief Fire Control officer/Director of Operations	oversight of project
Conservation Reserves Planning Officer	Observer
Regional Fire Co-ordinator	Fire Programs - Conservation Officer
District Command / Air Attack Sup	Incident Controller
Area Commander/UAS Capability manager/USAR IMT	Commander UAS element
Incident Management - IC and/or Ops Officer as volunteer	We provided services for aerial ignition for prescribed burning, real time streaming of imagery to ICC, post burn mapping, search and rescue, flood and water inundation mapping
Aviation Officer	Air attack in tactical aircraft within the same area
Project Officer	Planning Officer at S44
Deputy Principal Rural Fire Officer	Operations (Air Division Commander)
Contracts Manager	Finding Contracts for their use on fire
Project manager	Test flight (still a prototype)
RPAS pilot	pilot
CEO	Spatial Awareness of Firefront, people, assets, aircraft
Member	RPAS Support

Have you used RPAS as part of your role with this agency?

No 4%

I've been part of operations that use them, but haven't operated the RPAS 36%

Yes, I have operated RPAS 60%

Are you certified to use RPAS?

Yes, I have a RePL	25
I also have a Aeronautical Radio Operators licence (AROC)	24
Yes, I have, or work for an organisation, that has a ReOC	18
No, only operate in the exempt category of operations	15
No, only use RPAS operated by contractors	12
I also have a private pilots licence	7
I also have a commercial pilots licence	3

Was the use of RPAS...

Who owns the RPAS that was used?
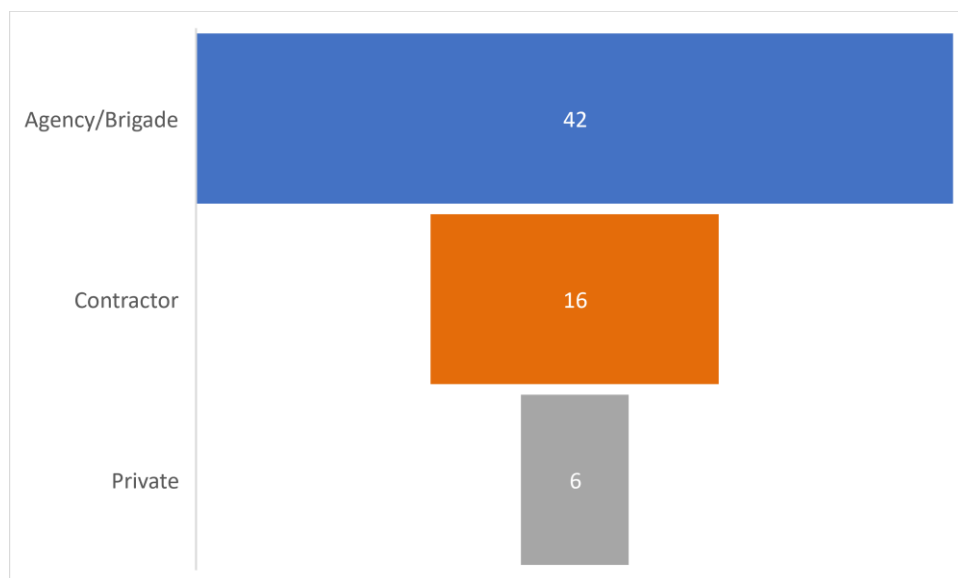
What size were the RPAS you used?

Chart Title

Category	Value
250g - 2kg	37
2kg - 25kg	23
Over 25kg	5
I don't know	3
under 250g	2
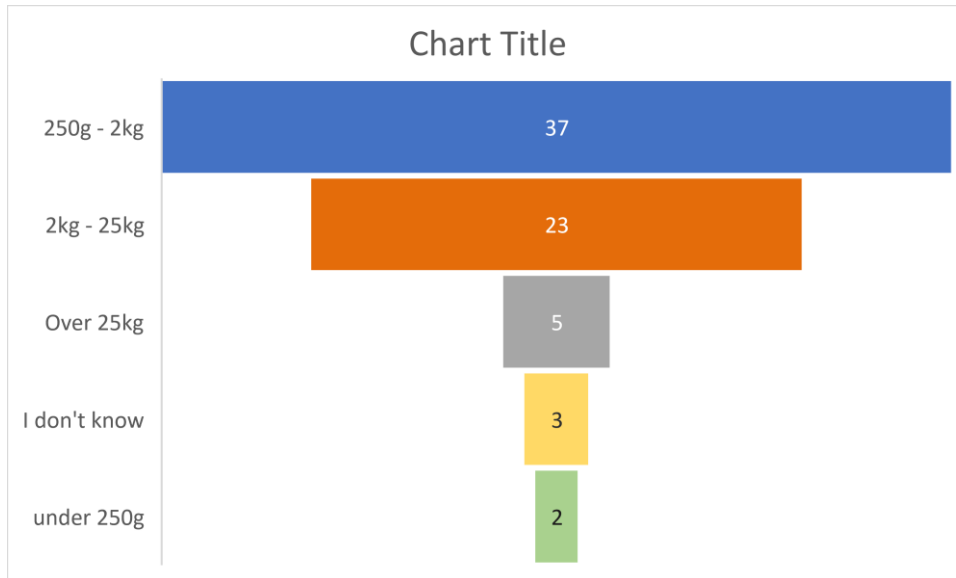
To the best of your knowledge does your agency have SOP for use of RPAS?

I don't know 9%

No, they don't 16%

Yes, they do 75%
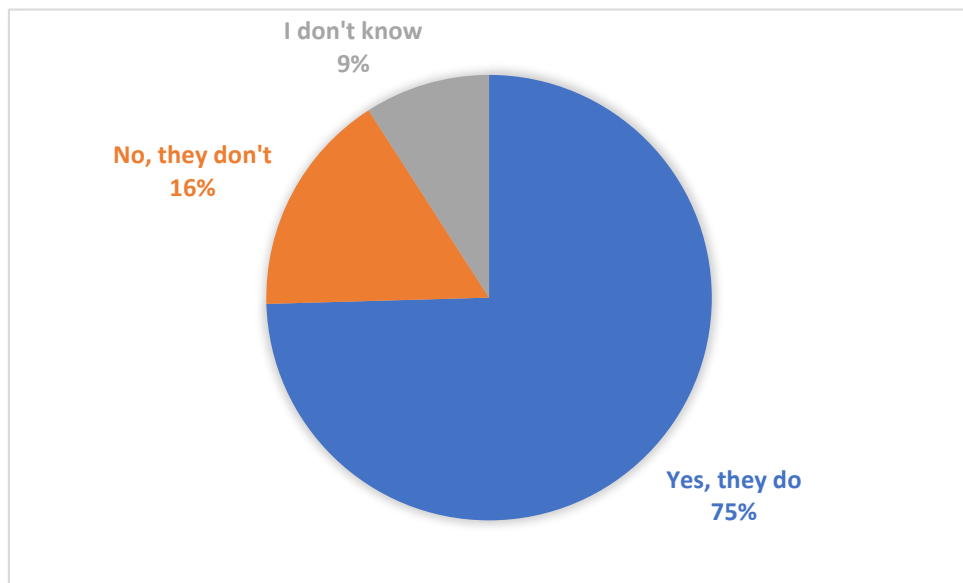
Was your use of RPAS integrated with piloted aircraft operations?
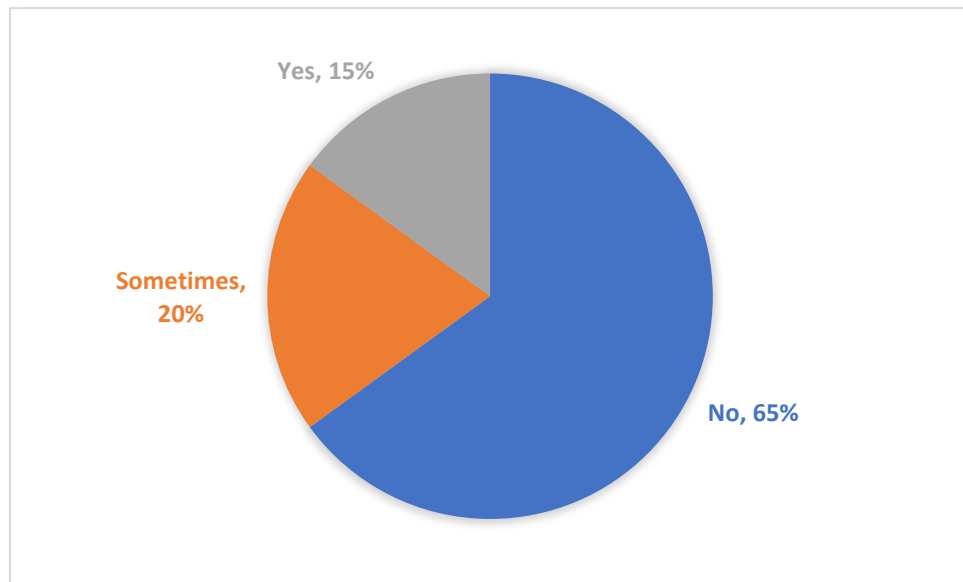
Please expand on how RPAS use was integrated with piloted aircraft operations
(where applicable)

- Communication channels between RPAS pilot and Incident controller, Air Base Manager and aircraft pilots
- Maintaining listening watch of aviation channels
- Established protocols for when piloted aircraft enter vicinity of RPAS operations
- Georeferencing the RPAS flight area
- Utilising at times when piloted aircraft can't fly (night, smoke etc)
- Utilising between piloted operations (e.g recon after aerial incendiary)
- Direct radio contact with aircraft while they were out of the area
- Operating under air obs supervisor

Please describe in detail how the RPAS was utilised? (e.g. intelligence gathering, situational awareness, mapping, aerial incendiary)

- Live streamed intelligence
- Situational awareness – Fireline (ROS, Flame height), spot over searching, smoke, crew movements, public on ground
- IR thermal mapping – containment lines, spot fires, post prescribed fire patrols
- Mapping – burn area, severity
- Photography and video footage for engagement
- Aerial incendiary – prescribed and back burning operations
- Hazard ID - Asbestos, trees, stray stock
- Pre and post fire surveys – animals, weeds, erosion, fuel loads, vegetation assessments
- Damage assessment – houses, boundary fences, infrastructure
- Prescribed burn planning of remote areas
- Rehabilitation – seeding

Why did you use RPAS instead of a piloted aircraft for this operation?

- More agile (especially for confined environments)
- Easier and quicker deployment
- Able to be deployed when unsafe for regular aircraft (terrain, night etc)
- Able to fly at lower altitudes (Below smoke and clouds)
- Better precision
- Better sensor stability and resolution
- Better repeatability of flight path
- Less impact on environment
- Cheaper and more cost effective (especially in small scale observations)
- Able to be carried in vehicles and used where there is no flight support
- Less disturbance to public and ground crews

How did the use of RPAS benefit your role/organisation?

- Use for Improved situational awareness extended across PPRR operations
- Live streaming gave greater situational awareness
- Realtime data gave critical info without having to wait for Air Attack to run lines
- Improved personnel safety by not having them in dangerous situations
- Improved and quicker capacity for data gathering
- Reduced cost
- Increased and repeatable monitoring capacity
- Quicker to survey larger areas
- Gave targeted information for response (e.g. hot spots for mop up)
- Greater flexibility on altitude and movements
- Aerial mapping not previously available due to high costs of regular aircraft
- Smaller agencies without access to aircraft now have aerial information to use
- Can use in smaller reconnaissance missions (e.g. assessing roof damage in building fire)
- Can be deployed from any location without booking/requesting larger aircraft

Please describe if, and how, data is incorporated into existing agency platforms or shared with other agencies (e.g mapping tools, photo libraries, asset inventories)

- Live feed via secure server portal
- Sharing stand-alone data files or urls
- GIS geo-tagged exportable data
- Via verbal briefings to crews
- Internal Photo libraries
- Some well-developed internal systems.
- Most agencies are still developing this capability

Do you face any challenges/constraints/limitations that impact on your use of RPAS?

- Reluctance to use RPAS due to lack of knowledge of capability and benefits
- Keeping up with evolving technology
- Understanding the different machines/technology
- Conflicts with aircraft
- Hurdles due to CASA (approval time, flight restrictions)
- Lack of internal resources (staff/financial) to develop capability (SOP, becoming ReOC
- Accessing data
- Technology mismatches
- No clear agency direction of development of RPAS use
- Roll out to state-wide all-hazards
- Being constrained to VLOS
- Having to adhere to CASA regulations when flying over their own land
- Worried about excessive registration and training requirements
- Having staff with RePL gives flexibility over ReOC where greater admin on flights
- Having only RePL limits use of RPAS (as opposed to ReOC)
- Staff awareness that these are not toys and adherence to protocol is required.
- Overcoming ad hoc use for integrated implementation to ensure safety and regulatory issues are met
- Limited range/battery life
- Public use of RPAS interfering with operations

From your experience where do you see operational improvements through use of RPAS? What can AFAC/NAFC do to help get there?

Operational Improvements

- Partnering with agencies
  - Ensuring there is not duplication of effort/expenditure
  - Delineation of functions
  - Common data available
- Ensure pilots have emergency management background to ensure understating of operations and what information is required
- Don't just focus on pilots but the full suite of knowledge required (Data and GIS management)
- Align data gathering to increasing intelligence (of fire ground, fire scars, fire behaviour) especially in niches not covered by piloted aircraft operation
- Training in mapping and other apps
- Having exemptions to operate BVLOS without ReOC
- Ensure Parks staff can operate under the exempt category
- Work on RPAS and regular aircraft being a comprehensive approach rather than separate
- Use as delivery platform for critical devices - defibrillators, epi-pens, radio batteries etc. to remote crew

AFAC/NAFC Assistance

- Ensure we liaise with right people to get real world information
- Share best practice from around the world
- Help with CASA regulatory framework negotiations
- Develop case studies of successful operations
- Develop best practice standards
- Standardise procedures, risk assessments and exemptions
- Policies for integrating RPAS with piloted aircraft operations
- Develop approved contractor base
- Communication of the benefits of RPAS use
- Run training and workshops (especially in larger category RPAS)
- Set benchmarks and standards for design / features / capabilities
- Build relationship with ADF to tap into their potential
- Develop methodology for integration into Air Ops