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2015–2016 year in review



Australia's national transport safety investigator

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Safety summary

Why the ATSB did this research

Aerial application operations encounter different risks compared to other aviation sectors because these pilots work at very low-levels. Working at these levels means that pilots encounter more hazards, such as powerlines, trees, and poles. When working at these levels, pilots have a high workload to navigate these hazards, and have a shorter reaction time if they encounter an issue and need to respond accordingly. Recent investigations by the ATSB have also highlighted the risks during an operation if the aircraft is overloaded, such as airframe damage. This is the second report in a series of publications on aerial application (including aerial spraying, spreading and fire control). This report will cover accidents and serious incidents reported to the ATSB between May 2015 and April 2016 to coincide with the previous operational year.

What the ATSB found

Between May 2015 and April 2016, there were 29 accidents and serious incidents reported to the ATSB. Of these, 16 were accidents and 13 were serious incidents (near accidents). The most prevalent occurrence was wirestrike, comprising nearly 40 per cent of all occurrences (11 occurrences). Other types of accidents and serious incidents were engine failure or malfunction (6), collision with terrain (3), controlled flight into terrain (2), and runway excursions (2). Safety factors relating to human factors were most prevalent, in particular monitoring and checking, which contributed to 35 per cent of occurrences.

Safety message

Given the nature of these operations there are strategies to lower risks. The Aerial Application Association of Australia (AAAA) have published strategies in their pilots manual that can be applied to managing wirestrikes and engine failures. One strategy is planning. In regards to wirestrikes, planning involves knowing the location of wires in the area and organising the spraying pattern accordingly. Planning to manage the event of an engine failure includes noting potentially safe areas to land, such as open fields. Another strategy is to maintain focus during the task, such as continually reminding yourself of the presence of wires, and in the case of engine failure, focusing on following procedures will assist in avoiding further damage.

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Introduction

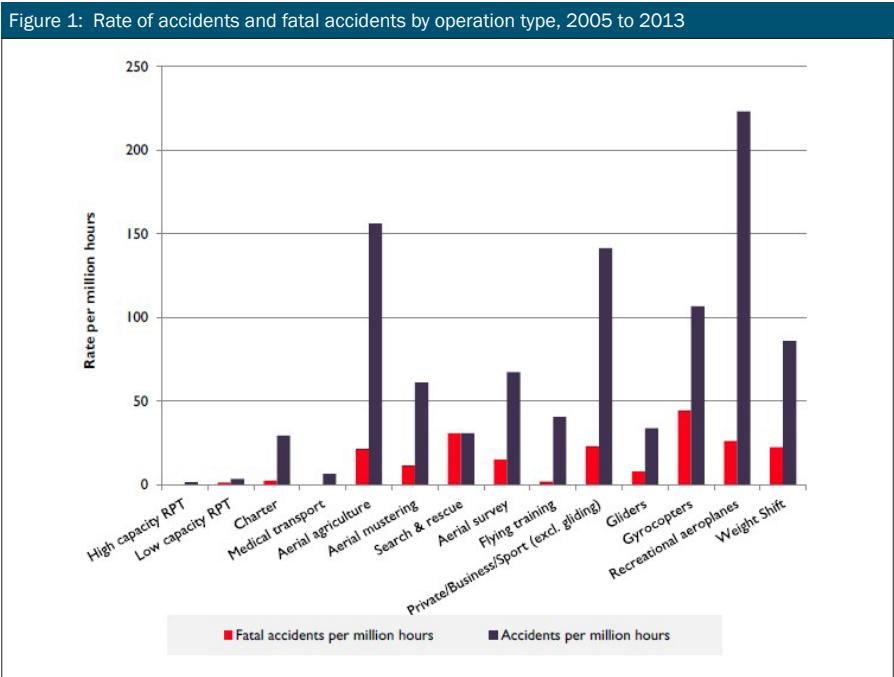
This is the second publication in a series from the ATSB on aerial application (agricultural spraying, spreading and firefighting) accidents during the previous operational year (May 2015 to April 2016). Aerial application operations have a notably high accident rate relative to other aviation sectors. These operations involve inherent risks that are not present in most other types of flying. Risks include low-level flying with high workloads and numerous obstacles, in particular powerlines and uneven terrain. This report will focus on the aerial application accidents that occurred between May 2015 and April 2016 and fatal accident investigation reports published by the ATSB in this period to coincide with the agriculture season in most parts of Australia.



Source: AAAA

Statistical trends in aerial agriculture

The 2015 edition of ATSB’s annual Aviation Occurrence Statistics reported that aerial agriculture had the second highest accident¹ rate per million hours flown across the operation types, second only to non-VH-registered recreational aeroplanes. Within the VH-registered general aviation sector, aerial agriculture had both the highest average rates of accidents (154.8 per million hours flown) and fatal accidents (21.1 per million hours flown) (Figure 1).



Source: ATSB aviation occurrence statistics 2005 to 2014 (AR-2015-082)

1 Accident: an occurrence involving an aircraft where a person dies or suffers serious injury, the aircraft is destroyed or is seriously damaged, and/or any property is destroyed or seriously damaged (*Transport Safety Investigation Act 2003*).

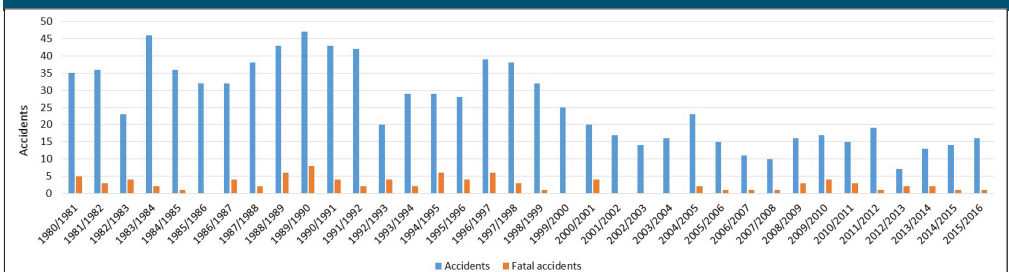


Source: AAAA

Aerial application accident and serious incident long-term trends

In the 2015–2016 agriculture season,² there was little change in the number of accidents (including fatal accidents) from 2014–2015 involving aerial application (agriculture spraying, spreading and firefighting). However, there has been a slight growth in accidents across the past three years (Figure 2). Longer term, it can be seen there are considerably less accidents each year in the past decade than in the preceding 25 years.

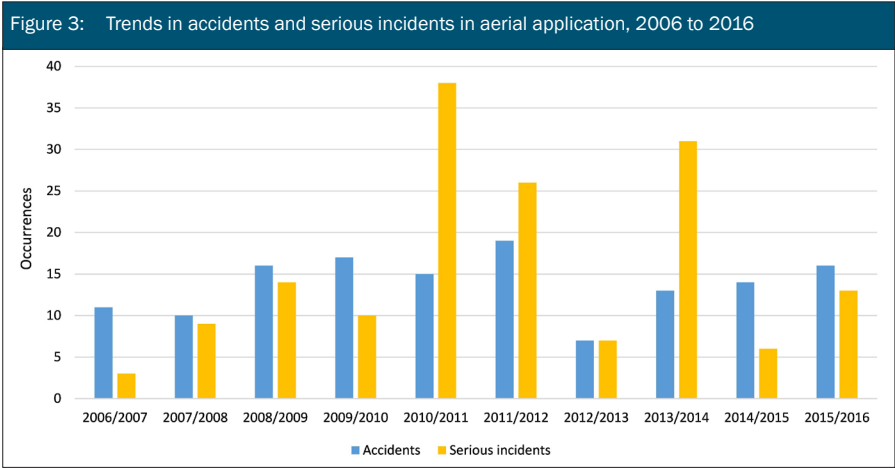
Figure 2: Trends in all accidents and fatal accidents in aerial application, 1980–2016³



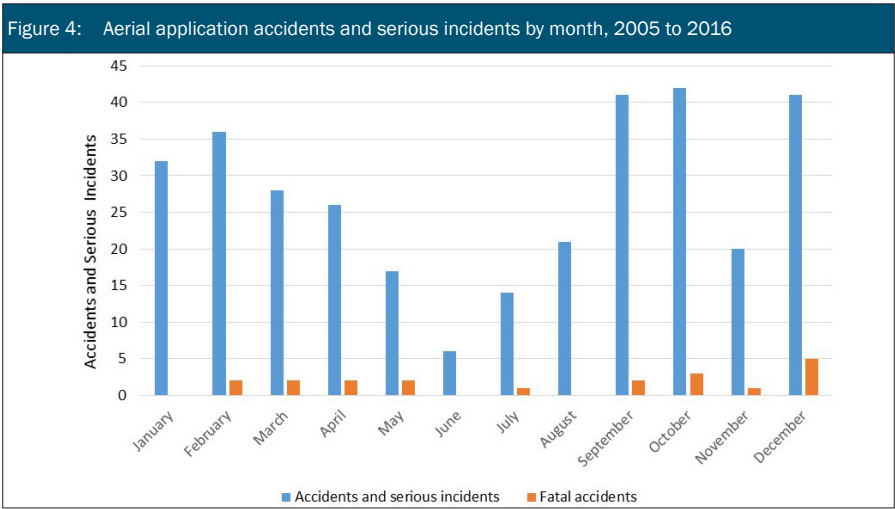
² For the purpose of this report, agriculture seasons are measured from May through to April.

³ Number of accidents not normalised for changes in aircraft activity.

In most years in the past decade, there have been about as many serious incidents⁴ as there have been accidents. Fluctuations in the number of serious incidents have roughly followed the number of accidents each year (Figure 3). In 2015–2016, there were 13 serious incidents, only three less than the number of accidents.

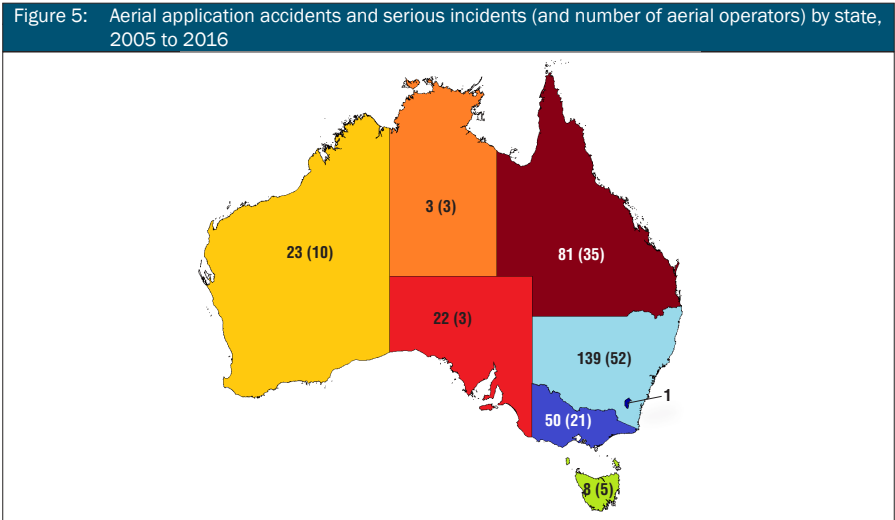


The seasonal nature of aerial application work fluctuating across the year in most parts of Australia is reflected in the numbers of safety occurrences recorded for each month. The highest number of accidents and serious incidents in the past 10 years were in September, October, and December. The lowest number are in June and July (Figure 4).

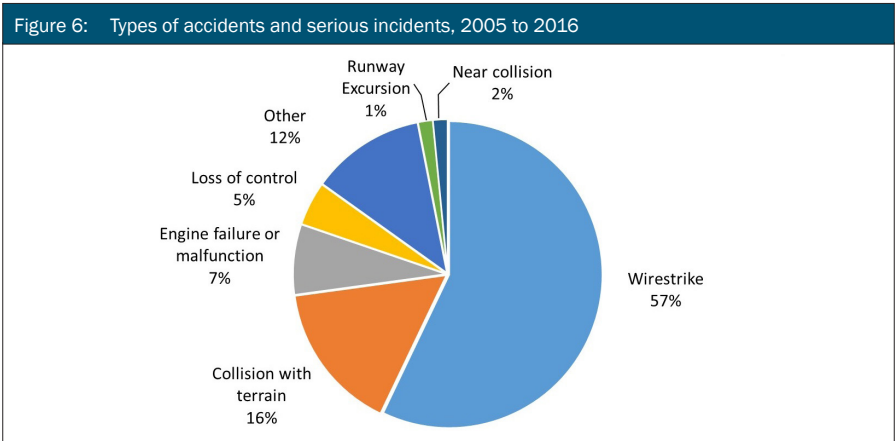


4 Serious incident: an incident involving circumstances indicating that an accident nearly occurred (ICAO Annex 13).

There is variation by state (Figure 5). New South Wales has the highest accident and serious incident rate, followed by Queensland. This is in line with New South Wales having the highest number of operators and Queensland having the second highest.

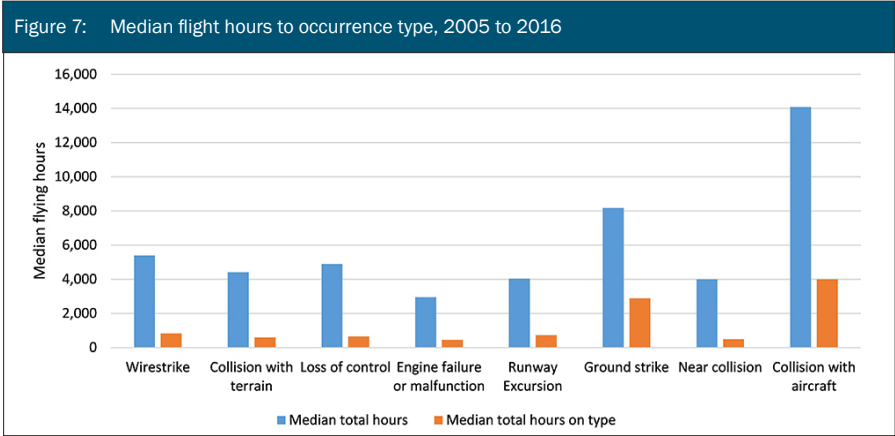


Across the last decade, wirestrikes were the most prevalent type of occurrence with more than half of the total accidents and serious incidents involved a wirestrike (Figure 6). Collision with terrain, engine failure, and loss of control were also common types of accidents and serious incidents. These types of occurrences remain the most prevalent in 2015–2016. Less common but important, as will be discussed below in the In-flight breakup involving PZL M18A Dromader aircraft investigation (AO-2013-187), is the effect of heavier loads have on airframe life.



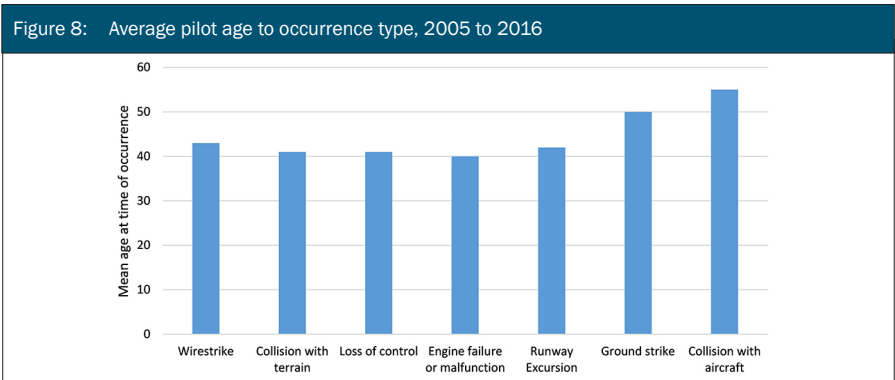
In the previous 10 years, 73 per cent of pilots reported being aware of the wire before they struck it (where information was known about their awareness of the wire). Of the 11 wirestrikes in the previous year, the ATSB had information on six about pilot prior awareness of the wire struck. Of these six, five of the pilots involved were aware of the wire before they struck it.

Total pilot experience for those pilots involved in accidents and serious incidents had a median of 4,800 flight hours in total. The median flight hours on the aircraft type was considerably lower at 674 hours.



The different median experience levels for each type of accident and serious incident can be seen in Figure 7. Pilots involved in collisions with other aircraft and ground strikes⁵ had the highest flight hours (Figure 7). Pilots involved in accidents and serious incidents involving engine failure or malfunction had the lowest median flight hours.

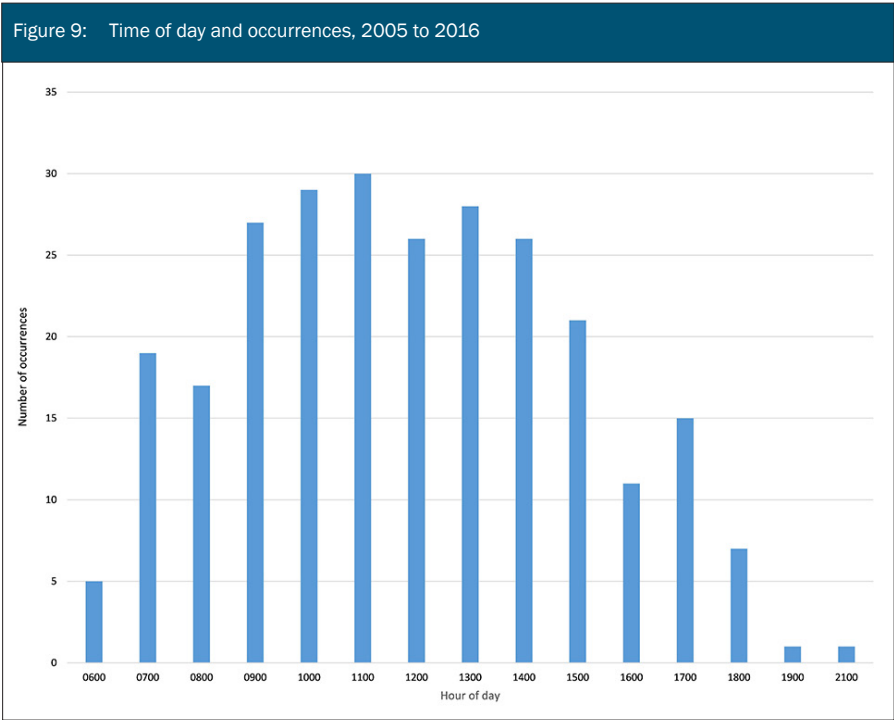
Overall, the average age for pilots involved in accidents was 42 years in the past 10 years. Pilots involved in engine failure or malfunction, collision with terrain, and loss of control tended to be younger as the average age was between 40 and 41 years. Pilots



5 When part of the aircraft drags or strikes the ground during take-off or landing.

involved in ground strikes and collisions tended to be older with average age of 50 and 55 at time of occurrence, respectively (Figure 8).

When the time of day was known, the highest number of occurrences happened between 9 am and 3 pm, with a slight dip at midday (Figure 9).



Aerial application occurrences in 2015–2016

There were 29 accidents and serious incidents reported to the ATSB in May 2015 to April 2016 year. Of these, 16 were accidents and with one resulting in a fatal injury. Of these occurrences, two resulted in destroyed aircraft and 14 resulted in substantial damage to aircraft.

These 29 accidents and serious incidents were categorised in 10 different occurrence types (Table 1).

Table 1: Primary occurrence types in reported accidents and serious incidents in 2015-2016

Table 1: Primary occurrence type in reported occurrences, 2015 to 2016	
Safety factor	Number of occurrences
Wirestrike	11
Engine failure or malfunction	6
Collision with terrain	3
Controlled flight into terrain	2
Runway excursion	2
Near collision	1
Taxiing collision / Near collision	1
Birdstrike	1
Fuel exhaustion	1
Other (Tail rotor strike)	1

In 2015–2016, the most common safety factors identified contributing to these occurrences were human factors related (Table 2). These factors include monitoring and checking, distractions, and assessing and planning. Monitoring and checking was the most prevalent as it was identified in nearly 35 per cent of occurrences. Weather was the next prevalent, comprising nearly 30 per cent of occurrences. Note that occurrences may have more than one safety factor.

Table 2: Common safety factors identified to have contributed to accidents and serious incidents in 2015–2016

Table 2: Safety factors in reported occurrences, 2015 to 2016	
Safety factor	Number of occurrences where safety factor contributed
Monitoring and checking	10
Weather conditions	8
Technical failure	7
Distractions	7
Physical environment	6
Assessing and planning	6

Completed investigations

This section covers ATSB investigations published between May 2015 and April 2016.

AO-2013-187: In-flight breakup involving PZL M18A Dromader aircraft

In October 2013, the pilot of a modified PZL Mielec M18A Dromader was undertaking a firebombing mission in the Budawang National Park, near Ulladulla, New South Wales. Another firebombing aeroplane and a support helicopter were also involved in the mission.

The crew of the support helicopter identified a firebombing target and marked its location to the pilots of the firebombing aeroplanes by hovering overhead.

The crew onboard the helicopter reported the Dromader made a broad, descending left turn, about 100 ft above the trees and directly towards the target. The Dromader rolled level and at about the same time the aircraft's left wing folded up and separated. The aircraft then immediately rolled left and descended, impacting trees and terrain. The Dromader was destroyed by impact forces. The pilot was fatally injured.

The investigation found that the aircraft's left outboard wing lower attachment lug (Figure 10) fractured through an area of pre-existing fatigue cracking in the lug lower ligament. The fatigue crack originated at the small corrosion pits in the attachment



Figure 10: Outboard view of the fractured lower attachment fitting at the left wing main spar interconnection



Source: ATSB

fitting. These pits formed stress concentrations that accelerated the initiation of fatigue cracks. The factors that were identified in the investigation included:

- Wing attachment fitting inspections: the corrosion pits in the left outboard wing lower attachment fitting were not completely removed during maintenance, which was contrary to the Civil Aviation Safety Authority (CASA) airworthiness directive. Furthermore, numerous micro-cracks, which were probably present in the bore of the left outboard wing lower attachment fitting at the last inspection for CASA airworthiness directive AD/PZL/5, were not detected by the non-destructive inspection.
- Aircraft operation: the aircraft had been operated at high speeds and subjected to a higher flight load spectrum than assumed by the manufacturer when it determined the aircraft's service life limitation. This likely increased the rate of fatigue damage, increasing the rate of formation and growth of the micro-cracks in the left outboard wing lower attachment fitting.

During the investigation, eight safety issues were identified relating to accident. These included:

- Operators of some Australian M18 Dromaders, particularly those fitted with turbine engines and enlarged hoppers and those operating under Australian supplemental type certificate (STC) SVA521, have probably conducted flights at weights for which airframe life factoring was required but not applied. The result is that some of these aircraft could be close to or have exceeded their prescribed airframe life, increasing the risk of an in-flight failure of the aircraft's structure.
- Operation of the M18 aircraft with a more severe flight load spectrum results in greater fatigue damage than anticipated by the manufacturer when determining the service life of the M18. If not properly account for, the existing service life limit, and particular inspection intervals, may not provide the intended level of safety.
- Although wing removal was necessary to provide adequate access for effective visual and magnetic particle inspections of M18 wing attachment fittings, the aircraft manufacturer's service bulletin allowed the wings to remain attached during these inspections.
- Eddy current inspections used for this aircraft were not approved by CASA as an alternate means of compliance to an airworthiness directive. Aircraft would have been exposed to an inspection method that was potentially ineffective at detecting cracks in the wing attachment fittings.
- The engineering justification package supporting Australian supplemental type certificate SVA521 did not contain consideration of the effect an increase in the average operating speed could have on the rate of fatigue damage accumulation.

As a result of this investigation, the ATSB reminded operators of M18 aircraft of the importance of the correct application of service life factors when operating at weights above the original maximum take-off weight. In addition, PZL Mielec plans to release

additional maintenance documentation clarifying the need for removal of the wings for proper inspection of the wing attachment fittings. Finally, at the request of the owner, the supplemental type certificate for operation of the modified M18 Dromader at take-off weights up to 6,600 kg has been suspended by CASA.

To help ensure that maintenance objectives are consistently met, the ATSB reminds aircraft maintenance personnel of the importance of only using properly-approved maintenance instructions. This accident confirms the importance of referring directly to those maintenance instructions when conducting maintenance.

AO-2015-037: Wirestrike involving a Robinson R44

In April 2015, the pilot of a Robinson R44 helicopter was completing herbicide dispensing operations in South Australia. Two client representatives were also on board, who were directing the noxious weed management operations and manually dispensing the chemical into each bush.

In preparation for the herbicide operations, the pilot conducted an aerial survey of the area, which was a standard operating procedure to confirm the location of powerlines.

While surveying the field at low-level in search of the weeds, the helicopter struck a previously unidentified powerline. The helicopter's main rotor blade made initial contact with the powerline. Subsequently, the helicopter undertook an avoidance manoeuvre and the tail rotor blades also made contact with the wire, severing the blade tips. The helicopter was substantially damaged, but the occupants were uninjured (Figure 11).

The unidentified powerline was a single wire that was strung between the poles supporting the main and secondary powerlines. It also crossed, unsupported, through



Source: Maintenance organisation

the southern boundary of the operational area. It was not mentioned by the locals, nor marked on the data logger powerline overlay map. It was not easily visible from the air although additional support poles did lead the wire away from the secondary powerlines towards a distant building.

The pilot commented later that the aerial survey of the powerlines confirmed the accuracy of the local knowledge and created a sense of confidence that all obstacles had been identified and accordingly mapped. In hindsight, a fully independent assessment by the pilot for the presence of powerlines in the area may have located the single wire.

As a result of the investigation, the operator undertook the following safety actions:

- The aircraft operator reviewed the risk assessment and aimed to standardise procedures. This included a focus on hazards and published information relating to high risk activities.
- The client updated their procurement processes in respect to hazard identification, operational briefings, and safety inductions.
- This investigation provides a reminder to flight crews of the need for consistency in aerial surveys for powerlines, the establishment of standardised procedures for their identification, and independent assessment of their presence.

2015–2016 occurrences

Below is a summary of all occurrences involving aerial application for the May 2015 and April 2016 season. They have been grouped by the type of occurrence.

Wirestrikes

Given that flying close to the ground is required during aerial application operations, there are many hazards that pilots may encounter at that level. Powerlines and other wires are the most prevalent hazard. Between 2004 and 2015, 58 per cent of accidents and serious incidents during aerial application reported to the ATSB were wirestrikes (ATSB, 2015). Wires themselves can be difficult to identify on their own as their colour can blend into the sky and may not be easily seen from different angles. Poles and insulators can be used as cues given difficulty of seeing wires until they are relatively close, there is normally very little time for pilots to respond to wires once spotted.

Previous research has found that 63 per cent of pilots knew where the wire was before they struck it (ATSB, 2005). Importantly, pilots must make themselves aware of local wires during an aerial reconnaissance conducted prior to the operation. During the operation, the pilot may have been working around the wire they subsequently struck. Striking a wire that they were aware of usually occurs when something changes – a change in spraying direction, a distraction from a mechanical issue, checking the load, focusing on the GPS to ensure an accurate run, sudden sun glare, a last minute change in plan including a clean-up run – meaning the pilot may have been focused on other things, rather than the location of the wire.

The AAAA Pilots Manual outlines strategies for aerial application pilots to manage wires. These strategies include being aware of your own fitness to fly and managing pressures generated within yourself and external sources, such as land owners, to complete the task.

AO-2015-087: Wirestrike involving an Eagle DW1

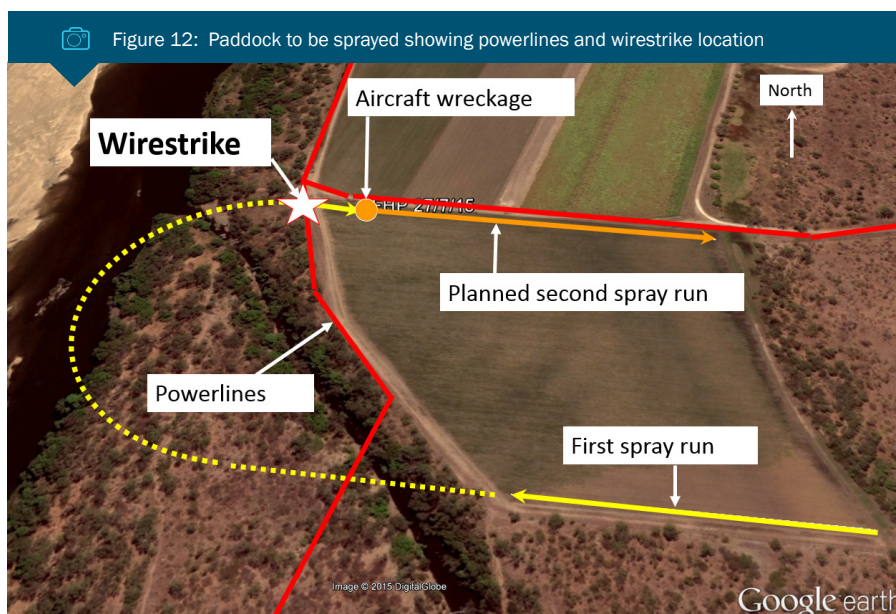
In July 2015, the pilot of an Eagle DW1 was conducting aerial spraying operations on a property in Queensland. The pilot completed aerial spraying of two paddocks and then loaded the aircraft with about 450 L of chemical and half a tank of fuel.

As the pilot took off to spray the third paddock for that day, they overflew the paddock and identified two sets of powerlines. The pilot formed a plan to spray the paddock using a racetrack pattern and flying it in a clockwise direction. One set of powerlines ran parallel to the spray direction, and the other ran across it at the western end. There was

a line of trees along the western powerline, which obscured vision of the power poles (Figure 12).

The pilot completed the first spray run towards the western powerline, overflow it, and then turned to line up for the second spray run. The pilot noted the powerline ahead, but then diverted their attention to the other powerline, running parallel to the direction of flight, and about 5 m off the left wingtip. The pilot also looked inside at the GPS to check the aircraft's line for the spray run.

The pilot commenced the descent into the paddock through the clearing in the trees and did not see the powerline at the time. As the aircraft descended, the pilot looked up and suddenly sighted the powerline. The pilot decided to push forward on the controls to increase descent. The aircraft then struck the powerline above the propeller on the wing struts.



Source: Google earth and the pilot– annotated by the ATSB

After the aircraft struck the wires, it yawed violently to the left. The pilot used the right rudder to turn the aircraft away from the other powerlines, and the force of the aircraft pulled the transformer off the power pole on the left. The aircraft then yawed to the right. The force broke the power pole on the right and severed the powerline.

The aircraft decelerated rapidly and the wires pulled the aircraft towards the ground. The pilot landed the aircraft with the wings level. The landing gear sheared off, the propeller struck the ground, and aircraft came to rest facing the opposite direction. The aircraft was destroyed and the pilot sustained minor injuries (Figure 13).

There were two safety factors identified in the investigation:

- **Assessing and planning:** the pilot had sprayed that paddock once previously and had used an anti-clockwise racetrack pattern. On that occasion, the power poles were on the eastern side of the trees and they were more visible from that direction. However, prior to the accident, the pilot flew clockwise and the poles were not visible from that side.
- **Monitoring and checking:** the pilot reported that they were aware of the powerline the aircraft collided with, but did not have it at the forefront of their mind at the beginning of the spray run. The pilot's attention was diverted to other powerlines, parallel to the direction of flight, and also inside the aircraft to the GPS. The pilot also reported that stating aloud 'powerlines ahead', would have helped to maintain awareness of the wires.



Figure 13: Eagle DW1 at accident site



Source: Aircraft operator

Other wirestrike occurrences:

- The pilot of an Air Tractor AT-802 was conducting aerial spraying operations in New South Wales. The pilot decided to spray the paddock in a back-to-back pattern within a series of mini- patterns. This was counter to their previous strategy of starting with the wire and then working away from it. During the operation, the aircraft struck a wire and the pilot conducted a precautionary landing. There was skin damage to the right-hand wing and wingtip and spray booms (Figure 14). The pilot reported they had not focused on their attention on the wire they struck because the wire was not in the planned spraying pattern at that stage. Furthermore, the pilot was also focused on the clean-up runs that would need to be sprayed (ATSB occurrence 201503510).



Figure 14: Wingtip damage to Air Tractor AT-802



Source: Reporter

- During aerial spraying operations in New South Wales, a Piper PA-36 Pawnee Brave struck a wire. The wire was unmarked and the pole was among trees making it difficult to see. The aircraft's propeller and left-hand leading edge were damaged (ATSB occurrence 201600460).
- During aerial application operations in Western Australia, a Cessna 188T Ag Husky was working perpendicular to powerlines. After flying under a wire, the pilot tried to clear some trees and flew into a spur line. Both wires of the spur line were severed. The aircraft then clipped a tree while climbing. There was impact damage on the leading edge of the outer left wing, dents and scrapes on the right wing and propeller, damage to spinner and rotary atomiser, and the spray boom was severed. The previous day, the wires were flown over and checked before the commencement of this spray flight, however, the pilot forgot about the spur line. The pilot also reported thinking about too many other things at the time (ATSB occurrence 201503623).
- During cotton spraying operations in New South Wales, an Air Tractor AT-502 struck and broke two high-tension cables while flying over the wire. It was reported the pilot may have misjudged the height of the wire (ATSB occurrence 201600238).
- During aerial operations in Queensland, an Ayres S2R Thrush struck powerlines. There was no damage to the aircraft, but three high voltage cables were cut by the aircraft's wire-cutters (ATSB occurrence 201600256).
- An Air Tractor AT-502B was spraying a cotton field in New South Wales, perpendicular to powerlines. Due to a strong tailwind and the aircraft being heavy with a high power setting, the tail sat higher than normal. While approaching the wire, the pilot was contacted by another pilot on the UHF radio, which was a source of distraction. During this time, the aircraft was not low enough to fly under the powerline and struck the wire whilst at 90 degree angle. This occurrence is an example where flying parallel to powerlines and removing distractions can assist in safer operations (ATSB occurrence 201600157).

- Whilst spraying a paddock of blackberries in New South Wales, a Bell 206B helicopter struck a wire. The wire-cutter was effective at cutting through the wire, however, another wire hit the main rotor, tail rotor, and horizontal stabiliser, causing damage (Figure 15). The pilot then autorotated the helicopter to the ground (ATSB occurrence 201505993).



Figure 15: Damage to Bell 206B horizontal stabiliser and tail rotor



Source: Reporter

- During crop spraying in Queensland, an Ayers SR2 Thrush struck a wire, leading to the wire being severed. This led to minor damage to propeller tip. In the location being sprayed, trees obscured the power pole, but another visible power pole nearby could have confused the pilot about the true trajectory of the wire. The pilot had previously sprayed in the area but not regularly enough to remember the paddock layout. There was also some distraction during the pre-spraying inspection flight because another aircraft from a different operator was arriving to spray an adjacent field. Furthermore, although the weather on the day was considered satisfactory, there was fog and misty conditions at the time. This meant that identifying powerlines may have been more difficult (ATSB occurrence 201505714).
- During aerial spraying operations in New South Wales, an Air Tractor AT-502 struck a powerline, resulting in minor damage to aircraft. The pilot was previously aware of the powerline as it ran the full width of the field, however, once they remembered it, it was too late to avoid the powerline. The powerline was difficult to see at times as there were trees along the creek line about 150 m behind the wire. There were also trees in the paddock the pilot had to manoeuvre around. In addition, the pilot was focused on ensuring there was enough product to complete the paddock, which was a source of distraction (ATSB occurrence 201504627).

Lessons learnt:

Given the number of potential hazards in spraying areas, it is important to identify powerlines pre-operation, such as during aerial reconnaissance. Once they have been identified, then the operations should be planned around them. Ideally, it is preferable to fly parallel to powerlines, otherwise organising the spray run so you work away from them. Another strategy is to make sure you know what the powerlines look like from different directions.

During the operation, it is also important to continually monitor the presence of powerlines, using poles and insulators for cues, even if they have markers. Although it can be difficult to continuously focus your attention over long periods of time, there are some useful techniques that can help. To assist in maintaining focus on the operation, have a ritual to focus only on operational tasks. For example, closing the cockpit door is a sign that only operational tasks/thoughts will be dealt with, and non-operational issues will be dealt with after you have landed. The AAAA suggest another way to keep focus is to ask yourself:

- *where is the wire now?*
- *what do I do about it?*
- *where am I in the paddock?*

There are videos available online about wirestrikes. The ATSB has produced a clip which can be viewed on the ATSB YouTube channel.⁶ The National Agriculture Aviation Association in the United States has produced a detailed safety and education video called Wires and Obstructions.⁷

Engine failure or malfunction

Another common occurrence type reported in 2015–2016 related to engine failure or malfunction. This can lead to serious consequences during low level flight, such as collision with terrain.

Similar to reacting to the presence of wires, pilots reacting to an engine failure will have little time to make a decision when at spraying height. Therefore, having a strategy to manage these types of situations, if they occur, is important.

Engine failure or malfunction occurrences:

- The pilot of a Pacific Aerospace 08-600 (Cresco) was spreading superphosphate in New South Wales. At the end of the first run, the engine made a popping sound, then smoke began to appear, and a whirring sound was heard from the engine. In response, the pilot lowered the nose looking for a place to land. Once identifying the aircraft was losing power, the pilot feathered the propeller. The pilot identified a safe landing area, which was on the side of a hill. During this time, the pilot made an emergency call to the ground crew and pressed the red emergency button on Spidertracks. At about 10 seconds from landing, the pilot pulled the emergency fuel cut-off lever. Upon touchdown, the aircraft was at full flap and the pilot could see

⁶ www.youtube.com/watch?v=R5UI9YPDuk4

⁷ www.agaviation.org/safetyeducationvideos

a large tree stump so had to steer slightly left to avoid it. The pilot flew the aircraft over rises and gullies and at the last rise, the nose gear collapsed and the aircraft stopped approximately 15 m up the hill. The aircraft had substantial damage to the nose wheel. The pilot immediately left the aircraft with an injured foot (ATSB occurrence 201600534).

- The pilot of an Ayers Thrush S2R was spraying a sorghum crop with Vivis, an organic product in Queensland. During the fourth take-off and the second load that day, the engine had total loss of power. The pilot then dumped the load and conducted a force landing into a paddock. The aircraft struck terrain one wing low and came to a stop. The aircraft sustained substantial damage as the landing gear was ripped out and the engine and propeller struck terrain. The pilot had minor injuries (ATSB occurrence 201600332).
- During aerial spraying operations in an Air Tractor AT-802 in New South Wales, the pilot noticed the chip warning light was on and decided to fly to the nearest airstrip. Within minutes, the engine had completely failed and the pilot carried out a forced landing in a paddock. The engineering inspection revealed fractures in the sun gear teeth, planet gear, and power turbine blades (ATSB occurrence 201504454).
- During aerial spraying operations in Western Australia, a Cessna 188 Ag Husky experienced a total engine failure. The chemicals were dumped and the pilot conducted a forced landing in a paddock. During landing, the aircraft became inverted with substantial damage (Figure 16). The pilot had minor injuries. The engineering inspection revealed the number 2 crankshaft journal failed (ATSB occurrence 201503692).



Figure 16: Cessna 188 inverted after landing



Source: Reporter

During the clean-up run after aerial spraying operations in Western Australia, the pilot noticed a smell from the engine and the engine started vibrating. All oil pressure was lost from the engine. The pilot then levelled the wings, then checked the throttle and the pitch. The engine then had a drop in revolutions per minute (RPM) and the aircraft lost all thrust and the vibration increased in severity. The pilot then dumped the remainder of the load and conducted a forced landing in a field. The engineering inspection revealed a counter weight had broken from the camshaft (ATSB occurrence 201503637).

- During take-off while conducting aerial crop spraying operations in Victoria, a loud bang was heard from the engine of an Airparts FU-24 (PAC Fletcher). The connecting rod was then ejected from the engine. The engine then lost power and the pilot dumped the load. The pilot attempted to conduct a forced landing, but the right-hand wingtip impacted with a gumtree on the side of the road. The aircraft spun around, then came to rest. There was substantial damage to the aircraft including damage to the engine, outer panel on the right wing, propeller, and the nose leg had collapsed (Figure 17). An inspection revealed that the connecting rod on the number 8 cylinder failed and broke through the crankcase (ATSB occurrence 201600577).



Figure 17: Wing damage on the Airparts FU-24



Source: Reporter

Lessons learnt:

Planning for an emergency situation, such as an engine failure is important. According to the AAAA manual, planning for the operations should also include a route to and from the application area. Learning where open spaces exist while planning can save valuable time in managing an engine failure if it does eventuate. If a helicopter is used for operations, practicing low-level autorotative landings may also be useful. In all kinds of aircraft, having a thorough knowledge of the emergency procedures in the flight manual will assist in managing unexpected situations.

Collision with terrain

AO-2015-092: Collision with terrain involving a Grumman G164

The pilot of a Grumman G164 (Ag Cat) was conducting aerial spreading of superphosphate on a property in the Australian Capital Territory.

In the afternoon, after taking-off for the seventh load of the day, the aircraft started to sink, which may have been due to a downdraft coming of the hill. To stop the aircraft from sinking, the pilot started dumping the load of superphosphate. The aircraft then started to climb, so the pilot stopped dumping the load. The pilot also commenced a shallow left turn, away from the rising terrain. As the aircraft turned about 100 ft above ground level (AGL), it started to sink again. As the aircraft sank, the pilot felt a shake through the airframe, indicating the aircraft was close to stalling. The pilot then tried to dump more of the load. At the same time, the pilot lowered the aircraft's nose and rolled the wings level to try to recover from the impending stall.

The pilot sighted a powerline, a road, and a row of trees ahead, beyond which the terrain rose steeply. The aircraft continued to descend and the pilot maintained the aircraft in a normal nose attitude for landing. As the aircraft approached the ground, the pilot reduced the throttle to idle and held the aircraft control stick in the full back position. The tailwheel struck the ground first, and then the right main landing gear dug into the soft ground. The aircraft flipped and became inverted (Figure 18). The pilot received minor injuries.



Figure 18: Damage to Grumman G164



Source: Pilot

The pilot commented afterwards it would have been favourable if the airstrip had been higher up and closer to the target zone. Therefore they would have had more time to dump the load, less distance to climb on each load, and a more accurate assessment of the wind conditions. Furthermore, dumping granular substances, such as superphosphate takes longer than liquid. Although the superphosphate had been dumped at the highest rate, about 300 kg of the initial 500 kg superphosphate load remained in the hopper. The pilot also commented that avoiding similar incidents was to

understand the atmospheric conditions in steep mountainous country. This is because variation in wind strength and direction due to terrain can have serious consequences on flight safety, particularly when operating at low airspeeds and close to the ground.

There were some safety factors identified in this investigation:

- Wind: the wind was about 2–5 kt crosswind on take-off. The pilot believed that the aircraft encountered a downdraft from the hill.
- Assessing and planning: the pilot observed the wind while he was having lunch, but decided to take-off again. They did not account for the wind at the top of the hill.

The investigation highlights the importance of understanding the weather conditions in different areas, particularly in steep mountainous areas and planning operations accordingly. The wind strength and direction can affect the flight, especially when operating at low airspeeds and close to the ground.

Other collision with terrain occurrences:

- During the fourth pick-up during aerial firebombing operations in windy conditions in Victoria, the blades of a Bell 212 helicopter struck a tree. There was minor damage to the helicopter (ATSB occurrence 201600147).
- During take-off to conduct the ninth load of crop spraying operations, the pilot of an Air Tractor AT-502 encountered windshear in New South Wales. The pilot selected additional flap, however, the flaps failed to extend. The aircraft failed to clear the ground so the pilot dumped the load. However, the aircraft still struck a fence at the end of the runway. The pilot returned the aircraft to the airstrip for a precautionary landing. There were dents to the tail section from the spray equipment. The engineering inspection revealed the flap relay had failed (ATSB occurrence 201505172).

Controlled flight into terrain

AO-2015-111: Collision with a vehicle involving an Air Tractor AT-502B

In September 2015, the pilot of an Air Tractor AT-502B was conducting aerial spraying operations in New South Wales. The spray application area was a block of nine adjoining paddocks. The pilot planned to spray the group of paddocks as a single block.

While en route to the spray application area, the pilot made a broadcast on the UHF that spraying operations were about to commence and the area where it would occur. While the pilot was making the broadcast, there was a tractor operating in the southern part of the spray application area, and the tractor driver responded to the pilot's broadcast. Although the tractor was in the spraying area, the pilot believed there was no likelihood of an immediate conflict with the spraying operations.

Due to the southerly wind, the pilot intended to commence spraying runs along the northern edge of the block and gradually work toward the south. The pilot advised the tractor driver that they would be able to safely continue in the southern area without creating any conflict for spraying operations. Without hearing any other responses to the

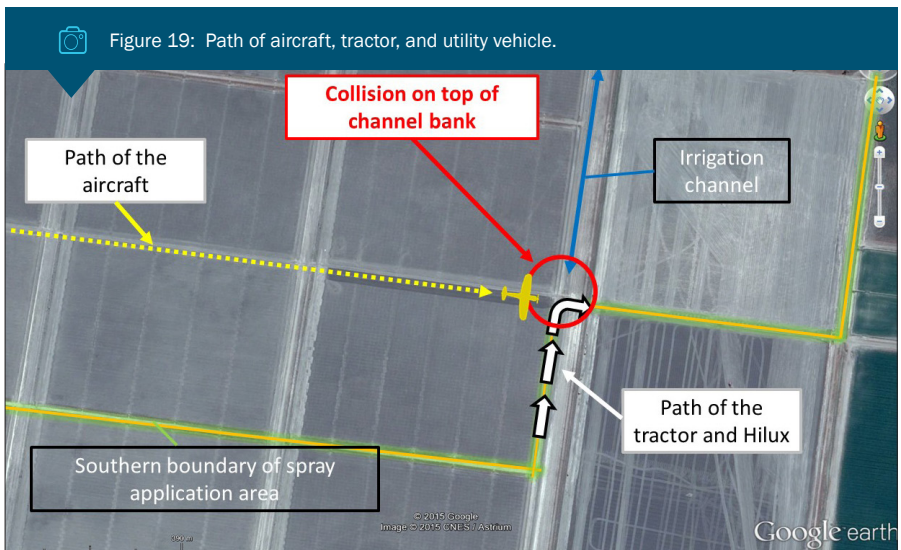
broadcast, the pilot switched to a different UHF frequency in accordance with normal practice.

The pilot commenced spraying operations and was flying a left-hand race-track pattern, in an east-west direction, moving the pattern further south with each spray run. After a short time, the pilot departed the spray application area to reload with more chemical mixture at a nearby property.

The pilot then returned to the spray allocation area, and resumed spraying operations. The pilot did not make another UHF radio broadcast upon the resumption of spraying operations.

During this run, the pilot was conducting a spray run in an easterly direction, along a roadway that divided some of the paddocks inside the spray application area. The pilot intended to continue the run, across the irrigation channel, and along the southern boundary of the eastern most paddock in the spray area (Figure 19).

At this time, the pilot also reported seeing a white utility vehicle turn onto an irrigation channel crossing ahead of the aircraft. However, the vehicle appeared to be slowing to a stop, short of the intersection/irrigation channel crossing. The pilot assumed that the driver of the vehicle had seen the aircraft, and was stopping to allow the aircraft to continue its run over the channel crossing.



Source: Google earth (supplied by the agricultural company and annotated by the ATSB)

Confident that the vehicle was stopping, the pilot continued the spray run and as per normal routine. The pilot checked the spray pressure gauge, and momentarily looked to each side of the aircraft to confirm that no spray nozzles were blocked. As the pilot then turned their attention forward again, and commenced a short climb to clear the raised channel bank, they saw that the utility had not stopped. The utility had continued along the road, turned right, and was climbing up over the raised channel bank (Figure 19).

The pilot immediately stopped the spray and continued to climb, but was unable to clear the utility. As the vehicle and aircraft were both heading west, the aircraft struck the utility from behind. The left wheel of the aircraft struck the tray headboard of the utility.

Following the collision, the pilot climbed the aircraft to a higher altitude. The pilot checked that the aircraft was handling normally, including a brake pressure check, to confirm that the landing gear was still attached. The pilot saw that the driver had exited the vehicle, so they made a broadcast on the UHF advising farm personnel of the accident and requesting assistance for the driver. The pilot then flew back to the loading area and conducted a fly-by to enable the support crew to inspect the landing gear, prior to an uneventful landing. The pilot was uninjured, but the driver of the utility had a shoulder injury.

An inspection of the aircraft revealed parts of the left landing gear were damaged, particularly in the area where the leg of the landing gear attaches to the aircraft structure. The utility was substantially damaged in the collision, specifically the tray headboard and roof structure on the passenger side of the cabin area.

The investigation identified a number of safety factors:

- **Communication and co-ordinating:** The pilot did not broadcast their position prior to conducting the second group of spray runs, nor did they confirm with the driver of the utility their intentions.
- **Procedures:** The agricultural company procedures were out of date. Furthermore, the operations at this farm also allowed for pilot to be on a different channel to the ground workers once the initial broadcast had been made.
- **Monitoring and checking:** The pilot assumed the drivers of the tractor or utility were stopping at the intersection and did not check with them.
- **Assessing and planning:** when the pilot assumed the drivers were stopping, they decided to continue with the spray run.

There was a number of safety actions initiated by the agricultural company after the investigation:

- Revise and re-issue the Pesticide Application Management Plan (PAMP) given it had expired.
- Provide more specific instructions regarding roles and responsibilities, including the responsibilities of managers, farm employees, and pilot engaged in aerial application operations (including communications requirements).
- Communicate specific requirements with respect to buffer zones separating equipment and aircraft, and define responsibilities related to the application of those buffer zones.
- Improve relevant signage at property entry points notifying (and reminding staff and visitors of spraying operations, movement restrictions and communication requirements).
- Require farm employees and pilots engaged in aerial application operations to operate on the same UHF channel.

- Include relevant procedures in property site instructions to provide for safe movement of farm employees, visitors, and equipment when spraying operations are planned.

This investigation is an example of the importance of effective communication between parties. Effective communication means that details of the operation, or their movements, are clarified and the parties will not need to rely on assumptions as they can elevate risk if incorrect.

AO-2015-142: Collision with an antenna pole involving an Air Tractor AT-502B

In December 2015, the pilot of an Air Tractor AT-502B was conducting aerial spraying operations in Queensland.

During the break after the first run, the pilot was provided with a map of the next area to the sprayed, which included a number of gas wells. Each gas well was on a gravel pad, with an antenna that posed a potential hazard to low-flying aircraft. The pilot was advised there were no other known hazards, such as powerlines, in the area.

Prior to commencing the operation, the pilot overflew the area twice to inspect the field at about 100 ft AGL and about 50 ft AGL. The pilot noted the wells on the gravel pads, and verified that there were no powerlines in the treatment area. The pilot also saw a solar panel a short distance from a well, located in the crop, and not on a separate pad. The pilot did not see an antenna at the site of the solar panel at the time.



Figure 20: Bore with solar panels and antenna pole (after collision)



Source: Aircraft operator

The pilot elected to use the solar panel as a reference point and established a plan for the spraying. The aircraft then climbed and tracked a short distance away, and the pilot set up the GPS in readiness to commence the spray run.

The pilot commenced the first spray run, tracking towards the solar panel. As the aircraft came within about 20–30 m of the panel, the pilot noticed a pole behind the panel, extending about 3 m above the crop, with an antenna on it. Although the pilot immediately climbed to avoid the pole and antenna, the aircraft struck the pole (Figure 20).

The pilot's primary concern was to check the aircraft controls. The pilot conducted a climb to a safe height and checked the flight controls and all the controls responded normally. The pilot could not see any damage to the aircraft or any fuel venting from the tanks. The pilot then checked the engine instruments and verified all indications were normal. There was a slight vibration, which the pilot assessed as possible damage to a panel on the airframe, or a blade of the spray pump used to disperse the load. The pilot then switched the pump off, but the vibration continued.

The pilot decided to land as soon as practicable and assess the damage of the aircraft. The pilot broadcast on the UHF radio advising the company that the aircraft had struck a pole, but was still flying normally, and would be returning to the airport. However, as the aircraft was relatively heavy, the pilot elected to spray about 500–600 L of the chemical, at a higher flow rate than normal to reduce the load prior to returning to land.

During the return flight, the aircraft still had a minor vibration. After landing, it was found the aircraft sustained damage to the left wing and propeller (Figure 21).



Source: Aircraft operator

The investigation identified three safety factors:

- **Assessing and planning:** The pilot had assumed the gas company equipment was located on gravel pads. Other gas wells had an antenna on a pole, but they were on gravel pads, as well as being higher.
- **Physical environment:** The pole blended into the background of the crop. This is because the galvanisations on the pole resulted no shine and there was a line of trees beyond the crop.
- **Procedures:** The pole had not been in place when pilots from the same company had previously conducted spraying operations in that field.

This investigation emphasises the importance of communication in identifying risks for low-level flying operations. This is especially relevant when working in an area where unknown hazards can be difficult to see. Furthermore, if hazards are marked, it assists pilots to identify them during an inspection and can be included in the plan.

Runway excursion

- A Thrush S2R was tasked to spray two loads of pesticide on a cotton field in New South Wales. Upon arrival over the field, it was determined the wind direction was unfavourable and a decision was made to suspend the task and return for landing. Upon landing, the aircraft veered to the left and the pilot applied full right rudder to correct. The deviation to the left continued and the pilot attempted to apply right braking force. However, with the right rudder pedal fully forward, the pedal impacted upon the hopper wall which prevented any corrective braking force. The aircraft continued to veer to the left on the runway. The pilot applied reverse thrust in an attempt to reduce forward velocity, however, the aircraft impacted an embankment and the propeller struck the ground before stopping. There was minor damage to aircraft's right wingtip. It was also found that the rudder cable was incorrectly fitted which led to the loss of directional control (ATSB occurrence 201600229).
- During take-off to conduct crop spraying operations in New South Wales, the pilot of an Air Tractor AT-502B encountered reduced visibility due to sun glare. The aircraft veered to the side of the runway resulting in propeller and engine damage (ATSB occurrence 201600176).

Other (Tail rotor strike)

AO-2015-147: Tail rotor strike of a slung load involving a Eurocopter AS350

In December 2015, the pilot of a Eurocopter AS350 helicopter was conducting fire control work in New South Wales. There was a pilot and crewperson on board. The fire control work included use of a Bambi Bucket to drop water on the fires, slung under the helicopter by a 100 ft line.

At the end of the day, the pilot elected to land the helicopter on a helipad to refuel before returning to base. The helicopter landed with the bucket and line in front of the helicopter, and the fuel drum to the right of the helicopter. While the engine was still

running and the rotor blades turning, the pilot realised that the helicopter's fuel cap was on the left side. Therefore, they needed to turn the helicopter around to access the fuel drum.

The crewperson exited, stood in front of the helicopter, and took hold of the long-line to ensure it remained clear during the turn. The pilot then lifted the helicopter to about 2 ft above the ground. The crewperson used hand signals to direct the pilot. After the helicopter had turned 180 degrees, the pilot lowered the helicopter after the crewperson gave the signal. As the helicopter lowered down, the tail rotor struck the bucket, which was on the ground behind the helicopter. The pilot detected the strike as a vibration through the pedals. They immediately moved the helicopter forward slightly, lowered the collective, and landed. The tail rotor was damaged (Figure 22).



Figure 22: Damage to Eurocopter AS350 tail rotor



Source: Helicopter operator

The investigation identified the following safety factors contributing to the incident:

- **Monitoring and checking:** The pilot commented they were not looking at the bucket while they were following the crewperson's hand signals. The bucket then ended up behind the helicopter.
- **Experience:** Both the pilot and crewperson were experienced in helicopter operations, however, they had limited experience in fire control work and they were rostered together.
- **Fatigue:** The pilot may have also experienced fatigue as it was their ninth consecutive day of duty. Fatigue may have had an effect on reducing the pilot's ability to monitor the bucket.
- **Time pressures:** There was pressure for the crew to complete the task due to last light requirements, crew transport, and a request for the crew to continue water bombing.

This investigation highlights the importance of crew co-ordination when completing a task. This includes the crew monitoring their team member's role as well as their own, clearly communicating progress, and ensuring their individual actions are consistent with goal of completing the task.

Near collision

AO-2015-101: Near collision involving a Schweizer 269 and a Military Lockheed AP-3C

In August 2015, the pilot of a Schweizer 269C helicopter was conducting aerial spraying in the Edinburgh area of South Australia. A Lockheed AP-3C aircraft (Orion) was approaching to land at Edinburgh Airport. The helicopter pilot was required to track through a corner of controlled airspace, so they contacted air traffic control to request clearance. The tower controller misheard the pilot's request for clearance to Clare Valley and provided instructions to track to Calvin Grove. The pilot complied with the instruction, even though the clearance was not the direction requested, nor the clearance expected. Being new to the area and being concerned about the clearance issued, the pilot tried unsuccessfully to contact their company via UHF radio to ask for advice.

While the helicopter and the Orion were tracking to the airport, the controller assessed that the helicopter would cross the runway centreline in front of the Orion. The controller provided a clearance for the helicopter to track to Calvin Grove, which the pilot heard. However, their radio was still selected to transmit on UHF not VHF, so the controller did not receive a response. The pilot also misheard the controller's clearance and began to track to Clare Valley. Since the controller did not receive a response, they made attempts to contact the pilot. The pilot could hear the calls and eventually realised they had the incorrect radio selected to transmit. Altogether the controller made six attempts to re-establish two-way communications with the pilot over a period of 92 seconds.

At this time, the crew of the Orion also heard the controller's attempts to contact the helicopter but were unaware of the helicopter's position. However, they assumed it was not a consideration for their tracking.

When the Orion and helicopter were 1.5 NM apart, the tower controller then conducted another radio check. The pilot of the helicopter responded and advised the radio was not selected on the correct frequency, and they had requested a clearance to track to Clare Valley, not Calvin Grove. By this time, the distance between the helicopter and the Orion reduced to about 1 NM laterally and 200 ft vertically.

Immediately after the helicopter pilot's response, the controller asked whether the pilot could see the Orion. The pilot sighted the aircraft and responded to the controller. The controller then directed the pilot to pass behind the Orion. The pilot immediately climbed to avoid a collision, and estimated the Orion passed about 100 ft below. The crew of the Orion sighted the helicopter and increased rate of descent to pass beneath the helicopter. The Orion crew estimated the helicopter has passed about 50 ft directly above the Orion and were concerned the helicopter might collide with the Orion's vertical tail fin.

The Orion landed on the runway. The helicopter was subsequently cleared to track to Clare Valley.

The investigation identified safety factors relating to the helicopter pilot and air traffic control. Safety factors associated with the helicopter pilot were:

- Communicating and co-ordinating: When the pilot was cleared to Calvin Grove, not Clare Valley as requested, they did not query the clearance. Furthermore, when the pilot switched the radio to UHF to talk to their company, they did not switch it back to VHF resulting in a loss of two-way communication with the tower.
- Monitoring and checking: Because the pilot was expecting a clearance to Clare Valley, they only realised later they were cleared for Calvin Grove and then changed their tracking, which meant the helicopter's path converged with the Orion. At this time the pilot initially did not realise their radio was still selected to UHF and could not communicate with the tower controller.

This investigation highlights the importance of communication, in particular between aircraft and air traffic control. Communication involves ensuring the messages are transmitted over the correct frequency and querying any information provided that requires clarification. Communication is also related to providing the correct information using the appropriate resources. Effective communication allows for all parties involved to monitor their current situation.

Taxiing collision/near collision

- During aerial operations in New South Wales, the pilot of a Pacific Aerospace 08-600 (Cresco) was outside of the aircraft assisting the loader driver to clean up the dumpsite on the last load. The parking brake was on and the propeller was feathered. However, the aircraft taxied from its parked position down a steep slope and collided with trees (ATSB occurrence 201503864).

Fuel exhaustion

- The pilot of a Hughes 500D (McDonnell Douglas 369D) helicopter was spraying wheat crops on their own property in New South Wales. The pilot decided to complete clean-up runs and tight areas first due to surrounding crops and powerlines through the paddock. As the pilot was focused on powerlines, they were distracted from the aircraft's fuel state. As the aircraft was turning to level off to spray on the last run, the engine shut down and pilot pitched the nose down to conduct a forced landing. The helicopter stayed upright but the main rotor impacted the tail boom. The aircraft received damage to the tail boom (ATSB occurrence 201505754).

Birdstrike

- The pilot of a Robinson R22 was conducting firefighting operations in the Northern Territory. While en route to refuel, the pilot noticed a group of whistling kites on their left and in close proximity to the helicopter. To increase the distance between the birds and helicopter, the pilot made a right turn while climbing past 200 ft AGL. The pilot then heard a loud bang from the rear of the helicopter which was then followed by a sharp yaw to the right and subsequently the helicopter started to spin in a clockwise direction around four times. The pilot then attempted to control the spin and noticed what appeared to be the tail rotor falling below the aircraft. The low rotor horn was then activated. The pilot then attempted to autorotate the helicopter so they fully closed the throttle and lowered the collective to recover the rotor RPM and regain forward airspeed. Once in autorotation, and realising there was no suitable landing area, the pilot decided to land between trees. Just prior to hitting the ground, the pilot pulled full collective in an attempt to cushion the landing. The helicopter struck the ground heavily, resulting in substantial damage (Figure 23). Once on the ground, the engine was still running so the pilot pulled the fuel mixture and switched off the fuel valve. When the blades had completely stopped, the pilot then exited the helicopter (ATSB occurrence 201504814).



Figure 23: Damage to Robinson R22



Source: Reporter

Ongoing investigations

The following investigation is in the preliminary stages. The results of this investigation will be updated in future editions of this publication.

AO-2016-027: Collision with terrain involving Bell 206B helicopter

In March 2016, during crop spraying operations, the helicopter struck powerlines before colliding with terrain. The pilot was fatally injured and the helicopter was destroyed by a post-impact fire.

Table summary of 2015–2016 aerial application occurrences

ATSB number	Occurrence types	Safety factors	Aircraft type	State
201503338 (AO-2015-087)	Collision with terrain, Wirestrike	Assessing and planning, Monitoring and checking	Eagle DW-1	Qld
201503510	Wirestrike, Forced / Precautionary landing	Assessing and planning, Distractions	Air Tractor AT-802	NSW
201503557 (AO-2015-092)	Loss of control, Collision with terrain	Assessing and planning, Wind	Grumman G-164B (Ag Cat)	ACT
201503623	Wirestrike	Monitoring and checking, Distractions	Cessna T188C (AGHusky)	WA
201503637	Engine failure or malfunction, Forced / Precautionary landing	Technical failure (Fracture)	Cessna A188B/A1 (AGTruck)	WA
201503692	Engine failure or malfunction, Forced / Precautionary landing		Cessna T188C/A1 (AGHusky)	WA
201503864	Taxiing collision / Near collision, Other	Aircraft handling	Pacific Aerospace 08-600 (Cresco)	NSW
201503898 (AO-2015-101)	Near collision, Air-ground-air, Operational Non-compliance, Loss of separation	Communicating and coordinating – External (Pilot), Monitoring and checking (Pilot), Assessing and planning (ATC), Communicating (ATC), Handover / takeover (ATC), Monitoring and checking (ATC)	Schweizer 269C	SA
201504209 (AO-2015-111)	Controlled flight into terrain	Communicating and coordinating – External, Other action, Procedures, Distractions, High workload, Task knowledge / skills, Other physical environment factors, Monitoring and checking, Assessing and planning	Air Tractor AT-502B	NSW

ATSB number	Occurrence types	Safety factors	Aircraft type	State
201504454	Engine failure or malfunction, Diversion / return, Warning Devices, Forced / Precautionary landing	Technical failure (Fracture), Technical failure (Mechanical discontinuity), Technical failure management (Manufacture)	Air Tractor AT-802	NSW
201504627	Wirestrike	Monitoring and checking, Other physical environment factors, Distractions	Air Tractor AT-502	NSW
201504814	Birdstrike, Forced / precautionary landing, Collision with terrain		Robinson R44	NT
201505172	Collision with terrain, Turbulence / Windshear / Microburst, Flight controls,	Windshear, Technical failure (Electrical discontinuity)	Air Tractor AT-502	NSW
201505714	Wirestrike	Visibility, Distractions	Ayres S2R-R1820	Qld
201505760 (AO-2015-142)	Controlled flight into terrain, Diversion / return	Assessing and planning, Other physical environment factors, Procedures	Air Tractor AT-502B	Qld
201505754	Exhaustion, Forced / Precautionary landing	Distractions, Monitoring and checking	Hughes 500D (McDonnell Douglas 369D)	NSW
201505993	Wirestrike, Hard landing, Forced / Precautionary landing	Monitoring and checking	Bell 206B	NSW
201506044 (AO-2015-147)	Other	Communicating and coordinating – Internal, Monitoring and checking, Using equipment, Task experience / recency, Time pressure, Other weather conditions, People management, Training and assessment	Eurocopter AS350B3 (Écureuil)	NSW
201600147	Collision with terrain	Turbulence, Wind	Bell 212	Vic.
201600157	Wirestrike	Wind, Distractions	Air Tractor AT-502B	NSW
201600176	Ground strike, Runway Excursion	Visibility	Air Tractor AT-502B	NSW

ATSB number	Occurrence types	Safety factors	Aircraft type	State
201600229	Runway Excursion, Loss of control, Ground strike	Technical failure (Mechanical discontinuity)	Thrush Aircraft S2R-T34	NSW
201600256	Wirestrike	Other physical environment factors	Ayres S2R	Qld
201600238	Wirestrike	Monitoring and checking	Air Tractor AT-502B	NSW
201600332	Engine failure or malfunction, Loss of control, Collision with terrain, Forced / Precautionary landing		Ayres S2R-T34	Qld
201600403 (AO-2016-027)	Wirestrike, Collision with terrain	To be determined (ongoing investigation)	Bell 206B	Qld
201600460	Wirestrike	Monitoring and checking, Other physical environment factors	Piper PA-36-300 (Pawnee Brave)	NSW
201600534	Engine failure or malfunction, Collision with terrain, Forced / Precautionary landing	Other physical environment factors	Pacific Aerospace 08-600 (Cresco)	NSW
201600577	Engine failure or malfunction, Collision with terrain, Rejected take-off	Technical failure (Mechanical discontinuity)	Airways FU-24 (PAC Fletcher)	Vic.

Australian Transport Safety Bureau

The Australian Transport Safety Bureau (ATSB) is an independent Commonwealth Government statutory agency. The ATSB is governed by a Commission and is entirely separate from transport regulators, policy makers and service providers. The ATSB's function is to improve safety and public confidence in the aviation, marine and rail modes of transport through excellence in: independent investigation of transport accidents and other safety occurrences; safety data recording, analysis and research; fostering safety awareness, knowledge and action.

The ATSB is responsible for investigating accidents and other transport safety matters involving civil aviation, marine and rail operations in Australia that fall within Commonwealth jurisdiction, as well as participating in overseas investigations involving Australian registered aircraft and ships. A primary concern is the safety of commercial transport, with particular regard to operations involving the travelling public.

The ATSB performs its functions in accordance with the provisions of the *Transport Safety Investigation Act 2003* and Regulations and, where applicable, relevant international agreements.

Purpose of safety investigations

The object of a safety investigation is to identify and reduce safety-related risk. ATSB investigations determine and communicate the factors related to the transport safety matter being investigated.

It is not a function of the ATSB to apportion blame or determine liability. At the same time, an investigation report must include factual material of sufficient weight to support the analysis and findings. At all times the ATSB endeavours to balance the use of material that could imply adverse comment with the need to properly explain what happened, and why, in a fair and unbiased manner.

Reporting to the ATSB

Accidents and safety incidents such as those presented above are reportable to the ATSB under Section 18 and 19 of the *Transport Safety Investigation Act 2003*. Upon receiving notifications of accidents and incidents, the ATSB may choose to conduct a no-blame safety investigation. These aim to improve safety by understanding what contributed to the occurrence and identifying system issues that can be addressed through safety action. Even if it is not investigated, reported incidents are used by the ATSB to monitor trends and look for sector-wide system issues that are shown through multiple reports of similar occurrences. With your reports, the ATSB hopes to identify issues early on before they lead to accidents.

Immediately reportable matters

Accidents and serious incidents are immediately reportable matters, and must, in the first instance, be notified to the ATSB by telephone toll-free call on 1800 011 034.

Immediately reportable matters include all accidents involving death, serious injury, destruction of, or serious damage to the aircraft or property or when an accident nearly occurred. The reason for this immediate notification requirement is in the cases where the ATSB conduct a safety investigation, ATSB investigators need to act as quickly as possible to preserve evidence and to determine the proximal and underlying factors that led to the occurrence.

Immediately reportable matters must also be reported to the ATSB in writing within 72 hours. This can be done by completing a form online at www.atsb.gov.au/mandatory/asair.

Routine reportable matters

A routine reportable matter is a transport safety matter that has not had a serious outcome and does not require an immediate report but transport safety was affected or could have been affected. Routine reportable matters must be reported to the ATSB in writing within 72 hours. This can be done by completing a form online at www.atsb.gov.au/mandatory/asair.

Routine reportable matters include a non-serious injury or when the aircraft suffers minor damage or structural failure that does not significantly affect the structural integrity, performance characteristics of the aircraft and does not require major repair or replacement of the affected components.

Reporting a safety concern confidentially

REPCON (REPort CONFidentially) is a voluntary and confidential reporting scheme. REPCON allows any person who has an aviation safety concern to report it to the ATSB confidentially. Protection of the reporter's identity and any individual referred to in the report is a primary element of the scheme.

- The following safety concerns in relation to aircraft operations may be reported under
- REPCON. The list is not exhaustive:
- an incident or circumstance that affects or might affect the safety of aircraft operations
- a procedure, practice or condition that a reasonable person would consider endangers, or, if not corrected, would endanger, the safety of air navigation or aircraft operations
- any other matter that affects, or might affect the safety of or aircraft operations not reportable under a mandatory reporting scheme above.
- REPCON reports can be submitted on the telephone 1800 020 505, email repcon@atsb.gov.au or online www.atsb.gov.au/voluntary/repcon-aviation.aspx.

Sources and submissions

References

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Further reading

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