QUEENSLAND COURTS

CORONERS COURT OF QUEENSLAND

FINDINGS OF INVESTIGATION

CITATION:	**Non-inquest findings into the death of a commercial aerial spraying pilot**
TITLE OF COURT:	Coroners Court
JURISDICTION:	BRISBANE
DATE:	28/10/2024
FILE NO(s):	2022/4751
FINDINGS OF:	Ainslie Kirkegaard, Coroner
CATCHWORDS:	CORONERS: Work related death; aviation crash; commercial aerial spraying; low level spraying; bird strike; Air Tractor AT-502B aircraft

Table of Contents

Background

1. The pilot is a 32 year old man who died in an aircraft crash while spraying crops on a farming property on 19 September 2022. He worked as a commercial agricultural pilot with an aerial spraying service.

2. His death was reported to the coroner because he died in work related aircraft crash.

3. The pilot held a valid Class 1 Aviation Medical Certificate and a Commercial Pilot Licence (Aeroplane). He also held aerial application and low-level ratings, as well as tailwheel and retractable undercarriage, manual propellor pitch control, and turbine engine endorsements. He had 3,738 hours of aeronautical experience, of which 2,681 hours was in turbine agricultural aircraft.

4. He had been working with the aerial spraying service for four months prior to his death. He was regarded as a very experienced pilot and good operator.

The events of 19 September 2022

5. The pilot was operating out of a private airstrip on 19 September 2022. He was flying an Air Tractor AT-502B aircraft, operated by the aerial spraying service. This is a single-seat low-wing tailwheel aircraft manufactured in the United States in 1996. It had a total wingspan of 15.8 metres and was powered by a Pratt & Whitney Canada PT6A-34AG turboprop engine. It was first registered in Australia on 6 August 2004. It was issued with a Special Certificate of Airworthiness in the restricted category 2 on 10 August 2004. A maintenance release was issued on 9 September 2022.

6. The pilot started work at 6:30am, completing two loads on another job. He left the airstrip at around 9:00am with his first load spraying herbicides on the farming property. He completed the first load, returning to the airstrip at 9:51am. He left with the second load at 10:12am, returning for the third load at 10:50am. He left with the third load at 10:58am. He contacted the farm manager expressing concern the breeze may cause the herbicide to drift and affect other crops. He was spraying along the edge of a paddock lined by bush and trees.

7. An employee who was working with the pilot that day mixing and loading the herbicide, became concerned when the pilot had not returned from the third run by 11:58pm. He sent the pilot a text message and then phoned him at 12:01pm but it went straight to voicemail. This was unusual as the pilots usually have good service in the air. The employee notified the aerial spraying service Operations Manager, who phoned the pilot's mobile number, but it went to straight voicemail. The Operations Manager immediately phoned the farm manager who provided contact details for the neighbouring farm manager and made his way to the paddock where the pilot was spraying. The neighbouring farm manager was closest to the paddock. He had heard the plane earlier and knew where it was spraying. As he made his way to the paddock at around 12:15pm, he saw the plane was down. He messaged the Operations Manager advising he was still 2km away. On arrival to the plane, he could see the pilot was fatally injured and the plane was destroyed.

8. Emergency service personnel attended the scene. Paramedics confirmed the pilot was deceased. He was entrapped in the collapsed cockpit. He was fastened into the pilot's seat by the aircraft's 4-point restraint harness. His flight helmet had dislodged.

9. There were dismembered bird parts scattered through the collapsed cockpit. Two large bird wings were found approximately 200 metres from the aircraft, along with bird feathers scattered around the vicinity.

10. Officers from the QPS Forensic Crash Unit and investigators from the Australian Transport Safety Bureau (ATSB) attended the scene and commenced investigations. Preliminary assessments identified bird strike as the cause of the crash.

Autopsy examination

11. Autopsy revealed extensive traumatic injuries consistent with light aircraft collision in which the deceased person was the pilot. The injuries were associated with minimal blood loss indicating the

pilot died rapidly on impact. The severity of the head and facial injuries was such it was not possible to determine whether the pilot sustained injuries directly as a result of the bird strike. There was also single vessel coronary atherosclerosis with moderate narrowing and no evidence of chronic ischaemic heart disease. The pathologist considered this finding was unlikely to be contributory to the collision. Toxicological analysis detected no carbon monoxide, alcohol, or other drugs.

Forensic Crash and ATSB investigation outcomes

Weather conditions

12. At the time of the crash the weather was clear, approximately 26.3C with an average windspeed of nine knots from the west-south-west, with a calculated cross wind component of about eight knots. The conditions were considered favourable for aerial spraying.

GPS data

13. The aircraft's Satloc GPS data showed the aircraft completed 17 spray runs on the paddock in a racetrack pattern. At around 11:25am, the aircraft was turned to track north along the western boundary. It was then turned at the northern end to commence the 18th spray run to the south. The last GPS data point was recorded three seconds after starting this run.

14. Information provided by the aerial spraying service indicates they expected the paddock would be sprayed at a height of approximately two metres (6ft) above the ground, to be just above the weeds. The Satloc GPS data indicated the aircraft had a ground speed of 116 kt (200 km/h) for the spray run during which the crash occurred.

Crash scene examination

15. The aircraft had impacted the ground adjacent to the fence line. Its orientation was consistent with the direction of travel. The ATSB investigation determined the left wing impacted first, followed by the fuselage in a near vertical attitude. The propeller and engine were buried in the soft earth, with the spread of wreckage contained to a small area. Ground scars and damage to the left wing indicated the wing struck the ground at about 30° to the horizontal. The length of the ground scar from the point of impact to the fuselage was about 12.6 metres.

16. Examination of the propeller and engine indicated the engine was delivering power at the time of the impact. Fuel and chemical product residues were also found at the accident site. There was no post-impact fire.

17. The extent of damage to the cockpit was such it was not possible to determine the position of the engine controls prior to impact. The elevator trim control level was found to be in the 'nose-up' position. The left elevator trim tab was found to be in the 'up' position, which would be consistent with the control lever in the 'nose-down' position. ATSB investigators considered this discrepancy likely resulted from compression of the fuselage due to the impact with terrain. This was based on the rod connecting the controls to the trim tab likely sliding towards the rear of the aircraft while the fuselage compressed, moving the trim tab 'up' or in the 'nose-down' position. ATSB investigators concluded it very likely the aircraft was trimmed 'nose up', this being the configuration typically used when conducting low-level aerial spraying.

18. There were no pre-existing technical failures identified with the aircraft that would have contributed to the crash.

19. Investigators observed a large bird carcass in the cockpit. Severed bird wings were located approximately 310 metres north of the wreckage, in line with the aircraft's track along the fence line, indicating the approximate location of the initial bird strike. There were bird feathers along the flight path from the bird wings to the aircraft wreckage. Biological residue from the bird was found outside the right cockpit window and among the pieces of Perspex from that window. There was further biological residue on the left side of the cockpit behind the pilot's seat indicating the bird passed through the right cockpit window in an upward trajectory towards the left side. There was no evidence of the bird striking any other part of the aircraft.

20. The pilot's flight helmet had sustained damage to the right-side shell and left-side earpiece during the accident sequence. The left-side helmet strap had separated from the earpiece. Yellow paint transfer from the rear of the cockpit was found on the back of the helmet. Bird biological residue was found on the inner surface of the helmet visor.

21. The impact was not considered survivable.

22. The SatLoc data's final recorded point was about 800 metres north of the wreckage, and 500 metres from the location of the severed bird wings. Based on the aircraft's previously recorded ground speed and direction of travel, there were about five seconds between the bird strike occurring and the impact with the ground. The ground speed of the aircraft was about 116 kt (200 km/h) which was a similar speed to other runs, and the height was about 8 ft above ground level, which was a similar height to the previous runs.

23. The bird was identified as a Plains Turkey or Australian Bustard (*Ardeotis australis*). This is a large, hefty bird known to be largely ground dwelling and slow/reluctant to take flight. It is Australia's heaviest flying bird.

24. The ATSB investigation determined that the bird struck the right Perspex windshield when the pilot was completing a spray run parallel to the paddock fence line flying at approximately eight feet above the ground. The impact caused the windshield to shatter. The aircraft continued flying for a further 310 metres, or about five seconds. In the absence of recorded flight data after this point, it was not possible to determine exactly what occurred, but it was considered likely the bird strike affected the pilot's ability to control the aircraft, resulting in a collision with terrain.

25. The Air Tractor 502B windshield is constructed of three sections. The front section was double glazed glass, and the left and right sections were Perspex. The thickness of the glass on VH-KDR was ¼ inch, which was the standard thickness when the aircraft was manufactured in 1996. The two side pieces were manufactured from Perspex, measuring 4mm in thickness.

ATSB incident analysis

26. The ATSB investigation concluded the aircraft experienced a bird strike while flying the southbound spraying track at about 8ft above ground level. It was likely the aircraft struck the bird while flying at about 116 knots (200 km/hr) resulting in a collision with sufficient energy to break the right Perspex windshield. The aircraft sustained flight for about five seconds. Given its height above the ground (8ft) relative to its wingspan (total 15.8 metres), the aircraft likely entered a short climb resulting in a near vertical attitude at impact, indicative of a loss of control. There was significant damage to the pilot's helmet and a small amount of bird biological residue in the visor. However, it remains unknown whether the pilot sustained a level of incapacitation due to a direct strike from the bird or he experienced a level of startle or distraction following the bird strike. The ATSB investigation concluded it was likely the bird strike affected the pilot's ability to control the aircraft when operating a low-level, resulting in a loss of control and collision with terrain.

Incidence of bird strike related damage and fatalities

27. The ATSB investigation noted bird strikes are relatively common with over 1300 occurrences reported in 2022.

28. Review of the ATSB occurrence database from 2000-2022 revealed 30 bird strike occurrences were reported during aerial spraying operations. Of those, one resulted in minor injury, 20 resulted in minor damage and one resulted in substantial damage.

29. As at June 2023, there was one other fatal bird strike related incident in Australia (involving a private helicopter flight).

30. Review of international data identified two bird strike related incidents in the United States resulting in damage to the windshield while conducting aerial spraying operations in an Air Tractor 502B (2000 & 2017) and three bird strike incidents resulting in minor windshield damage and no injuries

during other aerial activities (2015, 2020, 2021).

31. There was a fatal bird strike related incident during aerial spraying in South Africa in September 2008 involving an Air Tractor 502B. In this incident, the aircraft wreckage was located in a field in an inverted position. Bird remains and feathers were identified inside the aircraft cockpit. A piece of glass windshield was also found within the cockpit that was covered in bird remains. The carcass of a blue crane was found near the wreckage. The investigation was unable to determine if the pilot was incapacitated or fatally injured as a result of the collision with the bird before the impact with the ground. The South African Civil Aviation Authority recommended the Air Tractor manufacturer investigate the possibility of replacing the existing windshield with a thicker, stronger windshield to be used by clients operating these aircraft in areas of high bird activity.

32. In 2009, Air Tractor published a service letter advising that thicker centre windshields were being installed in current production aircraft. The thicker windshields were 3/8 inch thick glass compared to the original 1/4 inch. The letter also advised that the thicker windshields could be installed in existing aircraft, though not mandatory.

33. The ATSB contacted Air Tractor regarding the availability of thicker side windshields. Air Tractor initially advised there had been no consideration for using thicker material. The manufacturer stated that the windshield design on the Air Tractor was standard for the agricultural aviation industry, and in previously reported bird strikes where the bird had entered the aircraft through either side windscreen, the bird missed the pilot and hit the back wall. Further, they described difficulties in replacing the Perspex windshield with glass due to the curvature of the design, which would increase the likelihood of glare and would add weight. In late August 2024, Air Tractor advised ATSB it is currently installing the Hershy Flying Service Storm Shield (STC SA01845WI) to provide the pilot with a greater level of protection against foreign object strike such as a drone or bird.

Safety message

34. The circumstances in which the pilot died highlight the ongoing hazards of bird strikes to aircraft, particularly during low-level spraying operations.

35. The ATSB references published recommended practices available from the Australian Aviation Wildlife Hazard Group (2014) to manage risk of wildlife strikes for organisations that may be involved in a wildlife strike occurrence. Practices include considering the likelihood of a wildlife strike and proximity of known wildlife to aircraft manoeuvring areas and flight paths, as well as identifying wildlife characteristics such as their agility, speed, manoeuvrability, and their ability to avoid aircraft. Other considerations include the consequence of a strike, including the effects of the mass of the wildlife species, the velocity of the aircraft involved, the resultant impact force(s) and the damage that could result; and if adequate control of the aircraft can be maintained following a strike event. If a bird strike does occur, available protections for a pilot include the wearing of flight helmets, 4-point seatbelts, and the fitment of thicker aircraft windshields, where possible.

Findings required by s.45

Identity of the deceased – [deidentified]

How he died – I find that the pilot died from severe traumatic injuries sustained when the Air Tractor 502B aircraft he was operating while conducting low-level aerial spraying crashed after being struck by a Plains Turkey. This occurred as he was about to commence his 18th spray run over the paddock where the crash occurred. The bird strike caused the pilot to lose control of the aircraft and crash into the ground. It is not known whether the pilot's ability to control the aircraft was the result of him being startled by the bird strike or becoming incapacitated by direct strike by the bird. The bird entered the cockpit through a side section of Perspex windshield. The aircraft manufacturer has since advised the Australian

Transport Safety Bureau it is currently installing a storm shield on its aircraft to provide more protection against foreign object strike.

Place of death – [deidentified]

Date of death – 19/09/2022

Cause of death – 1(a) Multiple injuries
1(b) Light aircraft collision

I close the investigation.

Ainslie Kirkegaard
Coroner

20 September 2024