NEW ZEALAND AGRICULTURAL AVIATION SAFETY UPDATE SEPTEMBER 2018

NZAAA
Aviation in Agriculture

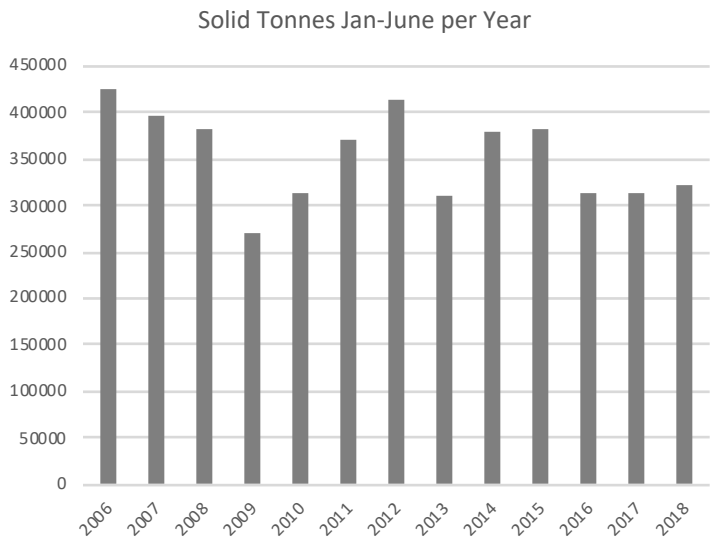
CAA
CIVIL AVIATION AUTHORITY
OF NEW ZEALAND
Te Mana Rererangi Tūmatanui o Aotearoa

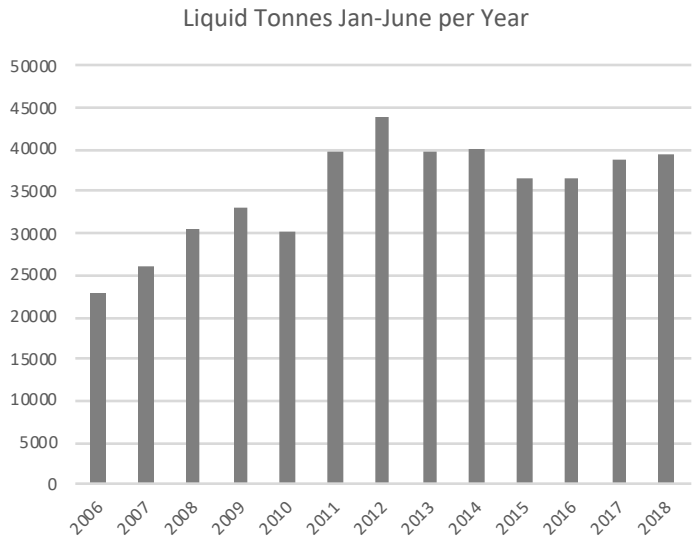
INTRODUCTION

This is a another update on activity and safety in the agricultural sector, with activity and accident rate information current to the end of the first half of 2018. Like the previous updates it includes further details about incidents reported this year to date, If you have questions or comments about the information then please contact me at Joe.Dewar@caa.govt.nz.

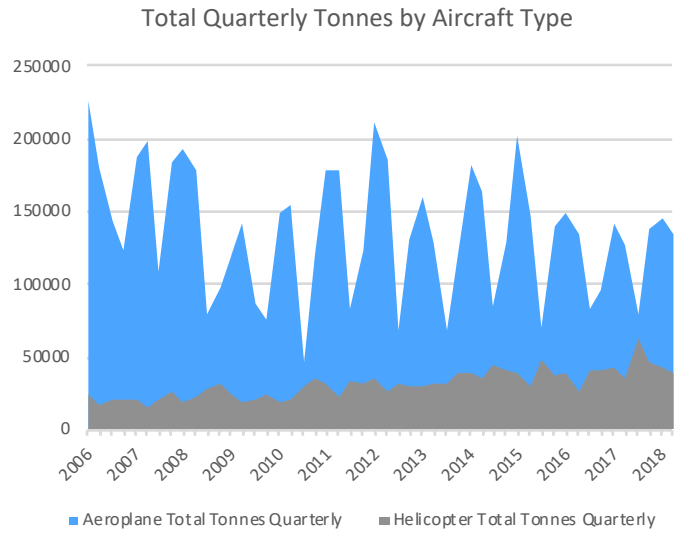
AGRICULTURAL ACTIVITY

The agricultural product statistics indicate that overall sector activity has been up on the same period last year. A total of 322,830 tonnes of solid product have been reported for the year to June, 9,000 more than for the first half of 2017. Liquid application is about the same with 520 more tonnes reported.

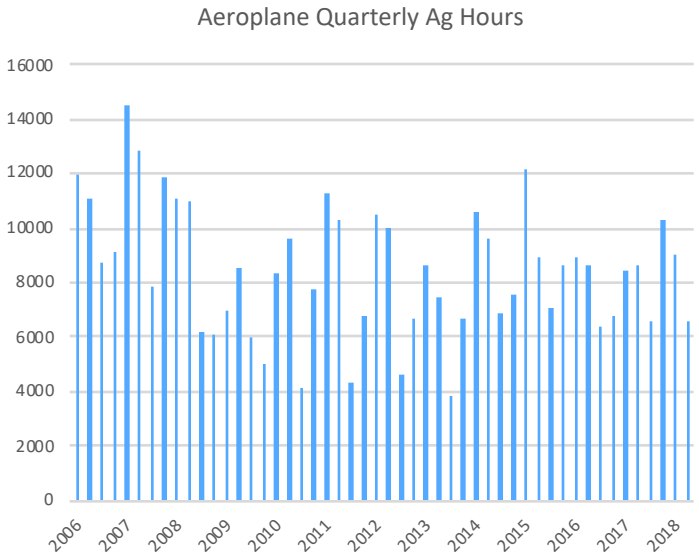


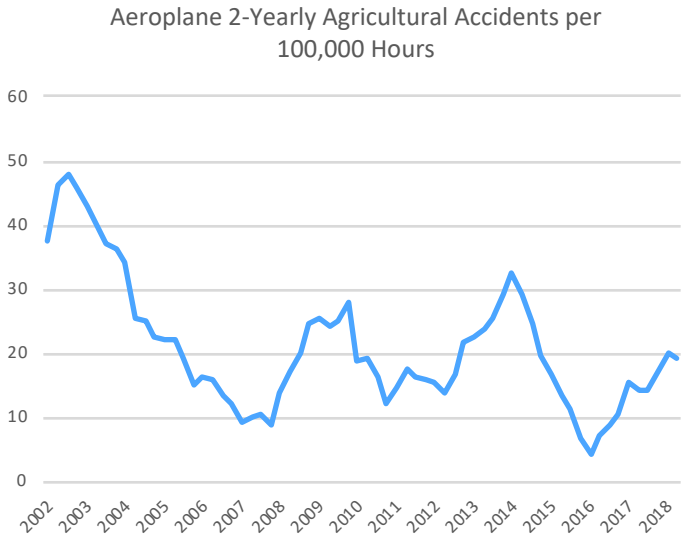


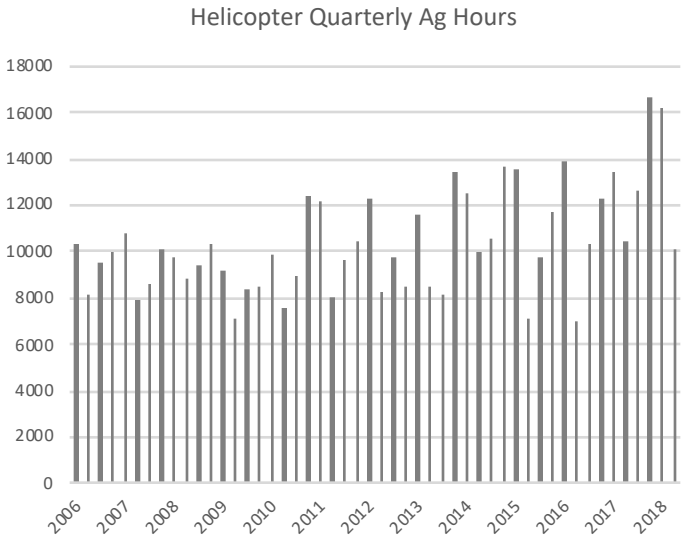
Helicopters continue to increase their share of the overall tonnage. The chart below tracks total quarterly tonnes by aircraft type over time. Helicopters' share of total quarterly tonnage has increased from around 10% in 2006/2007 to 20-25% in recent quarters.

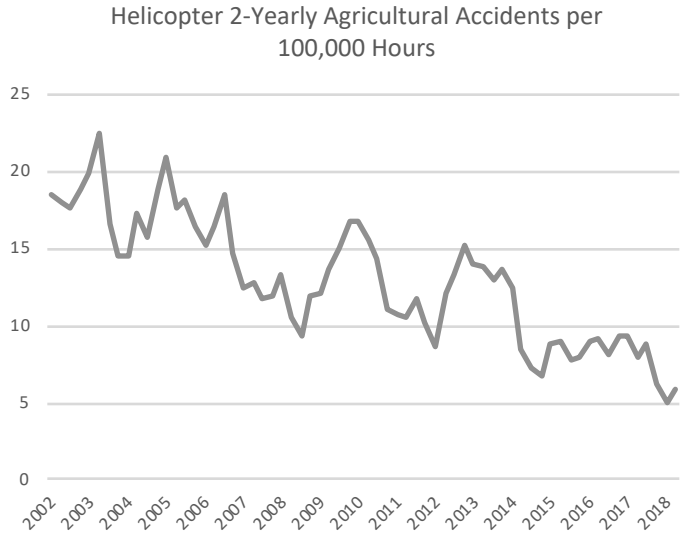


For reported agricultural flight hours, aeroplanes reported 1,390 fewer overall hours in the first half of 2018 compared to the first half of 2017, while helicopters reported 2,400 more.





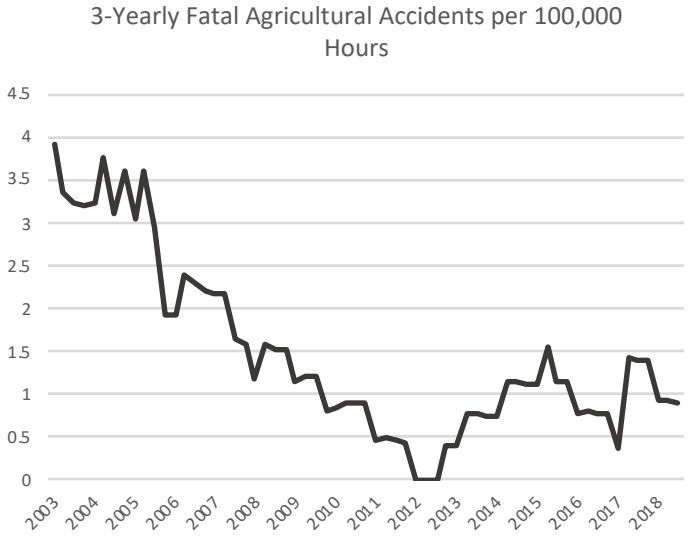




SAFETY PERFORMANCE

There have been four accidents in 2018 to date, an improvement on the previous year where there were 7 accidents in the same period.

Three of the accidents involved agricultural aeroplanes and the other occurred on the helicopter spraying operation. The two yearly accident rate for helicopters currently sits at 5.87 per 100,000 hours; for aeoplanes the rate is 19.12. The overall three yearly fatal accident rate is 0.90 per 100,000 hours.



ACCIDENTS IN 2018

Three accidents have occurred on agticultural operation in 2018 to date.


January


East Coast


Cresco


Take off accident

The aircraft encountered sink on take-off just after getting airborne in light south east wind and hot humid conditions at 1200'ASL. This caused the tail-plane and elevator to strike a fence post at the airstrip threshold.


January


East Coast


750XL


Collision/strike - wire

While turning during of a sowing run the aircraft struck three 50Kv power lines which penetrated the leading edge of the left wing then broke. The aircraft remained airborne and dragged approx. 70m of power lines back to the operating airstrip. On landing the wires snagged on a fence and caused the aircraft to be dragged into a drain next to the airstrip. The aircraft was substantially damaged but the pilot was not hurt.


May


Nelson/Marlborough


AS 350


Collision/strike - tree

On an operation spraying a forestry block, during a turn coming back to start another spray line the helicopter struck a tree with the main rotor blade. The strike damaged one of the blades significantly and put the aircraft out of balance. The pilot landed the helicopter on an old forestry skid site a 100m away. Cloud cover and poor light were identified as key causal factors for the pilot not identifying the tree.


June


Waikato


GA200


Landing accident

After touchdown, directional control was lost. The aircraft ground looped and incurred some rear damage when coming to rest down a slope on the adge of the airstrip after veering to the left. The investigation determined that the tail wheel spring securing bracket bolts had failed causing the rear spring to lose directional control of the aircraft, with the situation exacerbated by the slippery surface of the airstrip caused by dew.

A SAMPLE OF INCIDENTS IN 2018

May

Canterbury

Hughes 500

Ground handling/loading

After an aerial wand spraying operation, with the helicopter at ground idle, as crew removed the spray gear the loader driver inadvertently lifted the spray wand into the rotating main rotor blades. The helicopter was immediately shut down. One main rotor blade was found damaged and a replacement blade was fitted.

February

Waikato

Cresco

Foreign object damage

During take-off, stones thrown from the main wheels impacted the elevator tip fairing which is fibreglass, this deflected backwards deforming the filler plate in to the tailplane - jamming the two together. The pilot dumped the load and managed to return to the airstrip. This problem appeared 25 years ago on Crescos, but has resurfaced with XL tailplanes now being used in agricultural operations.

February

Otago

Hughes 500

Component/system failure or malfunction

During an external load operation spreading fertiliser, the cargo hook attach-point bolts failed during a turn and the cargo hook assembly detached from the fuselage. The load released from the cargo hook and the cargo remained attached to the helicopter by the hydraulic release line. The engineering investigation determined that the cause for the failure was the loosening of the mounting bolts for the base plate due to movement of the load. Bolts with a wire lock provision are being sourced, to be installed on all the operator's helicopter's hook mounts.

July

Hawke's Bay

AS 350

Ground handling/loading

The operator reported that towards the end of long day of spraying the loader driver connected the filler hose and then briefly discussed the performance of the spray gear with the pilot. After this they walked back to the mixing tank. Despite working all day with the policy of receiving a visual thumbs up signal before takeoff, the

pilot lifted into the hover with the filler hose still attached. The loader driver was able to signal the situation to the pilot before they transitioned into forward flight.

February

Central North Island

R44

Near collision/strike - wire

While conducting an agricultural spray job the pilot noticed that a section of the paddock had been missed during the previous spray runs. From a low approach the pilot sprayed the previously missed section, uphill through a small gully, to the top of the ridge. The pilot turned to see where the spray fell and when looking ahead again it was noticed that the pilot had drifted into the path of 220kV power lines.
The pilot flared the helicopter and made a sharp turn to the right to avoid hitting the power lines. There was damage to the right spray boom due to electricity arcing as the helicopter came into close proximity to the power lines. The pilot landed immediately and shut down. The operator determined that during the winter months more time could be dedicated to the pilot's remedial training. It was also recommended that the pilot attend a Wire Strike Avoidance course.

July

Northland

R44

Ground handling/loading

After landing pilot prepared to fit spray booms while the helicopter was running. The spray booms were lifted too high and contacted the lower surface of the main rotor blade causing a free air blade strike. The aircraft was shut down, inspected and servicable main rotor blades were fitted to allow it to fly to maintenance.

August

Manawatu

Hughes 500

External load incident

The pilot was setting their a-b line at the beginning of a sprayting job, when instead of pushing the swathe advance button they inadvertently pushed the hook release button.

WIRESTRIKES

DON'T JUST TICK BOXES – MAKE THE PLAN, FLY THE PLAN

In the safety update that we sent to operators in December last year, we devoted special attention to wirestrikes. **There were 5 agricultural wirestrikes or near-collisions reported in 2017, and 2 have been reported in 2018 to date.** In the December update we discussed the key causal factors, and the practices necessary to mitigate wirestrike risk. We also made reference to the fact that the last fatal agricultural accident was a wirestrike. Following on from that tragic crash, where ZK-JPU collided with power lines near Wairoa in December 2016, safety investigators have worked with the operator to determine the key causal factors and complete the accident investigation report. That report is due for release soon. In the meantime, to make sure the lessons learned from this accident are promulgated as widely as possible, the investigators have collaborated with the operator to prepare this article on the accident. Please give it your attention.

Hazard identification is a crucial task in any agricultural aviation operation, however simply noting the hazards and ticking the boxes does not eliminate the risk they pose. **Knowing the area or just being aware of the hazards is not always enough.**

This was starkly demonstrated by the accident involving ZK-JPU, a PAL 750XL. ZK-JPU was observed following a fellow company aircraft and subsequently striking 6 High Power Conductors. The safety investigation is still ongoing, however the initial findings indicate that the pilot had just completed the first job of the day and was in transit to the next job. The pilot was familiar with the area and was likely aware of the hazard, however it was unlikely that the pilot took the time to review the specific hazards prior to entering the local area. **According to research conducted by the ATSB into aerial application occurrences, 63 % of the pilots knew where the wire was before striking it.**

Tony Kern is a human factors specialist who has spoken at AAA conferences in the past. In his book Blue Threat, Kern writes, "Often, it is not external error producing conditions that cause us to error, but rather an internal mind-set that turns us into our own worst enemy". Threat and error management requires a full

appreciation and understanding of the potential threats and your own susceptibility to human error.

To gain the best understanding and mind-set to deal with the hazardous nature of agricultural aviation it's important to have a clear and realistic picture of the threats, as well as the current task - situational awareness. A pilot's ability to gather information relating to their current environment and task is critically influenced by the state of the pilot's knowledge or the mental model that they construct for the job.

A mental model is a representation of the world based on the pilot's knowledge and built by the pilot's ability to detect or determine changes, via our sensory channels (visual, auditory, etc.) and understand what those changes mean. Think about the domino's depicted in the following image:

It is likely that you thought about what happens next. In doing this you were actually simulating a mental model forward in time. The image does not show the domino's falling but you probably had a good idea of what it would look like. This 'simulation' is a mental model of what is depicted and it is all going on subconsciously.

Our ability to transfer information from our senses to our brain, is controlled by our attentional processes. Individuals have limited attention resources and "when in the thick of it" we know attention is likely focused on the task at hand and so **it is possible to miss vital visual stimuli, the 'looked-but-failed-to-see-effect'.** Thus, we want to apply the knowledge held in our minds to help simulate the mental model of what is currently happening.

Conducting and actively engaging in the hazard identification process provides information to help the pilot construct the appropriate mental model. Pilots need to make a real effort to integrate the hazards into their mental model, this involves taking time to stop and think about the hazards. Bypassing the hazard identification or not giving the process the effort it deserves will impair your mental model and leave you relying on your attention resources and all their limitations while in flight. Having a hazards list complete with ticks in boxes next to you in the aircraft, does not mean the threat is no longer present, but ensuring your metal model is accurate and well informed will strengthen your management of these threats and errors.

Take time to plan, fly the plan and as and when things change, ensure the plan does too!