Birdstrike

photo – Paul Sadler

Combating the threat of birdstrikes

by Geoffrey Thomas

The first recorded inflight collision involving a powered aircraft and a bird is believed to have occurred not too long after the first powered flight.

In September 1905, Orville Wright was chasing a flock of birds when he struck one. He landed safely but the encounter was fatal for the bird.

The incident, recounted in the Wright Brothers' diaries, began a dangerous relationship that continues to this day, having claimed many hundreds of human lives and countless thousands of birds.

That danger was famously re-emphasised in mid-January in the accident involving US Airways Flight 1549, which ran into a gaggle of Canada geese shortly after taking off from New York/LaGuardia, lost both engines and successfully ditched in the Hudson River.

It is fair to say, however, that the risk posed by mixing aircraft and birds is never far out of mind even if solutions remain elusive. Today, for a variety of reasons, the risk may be greater than ever, say experts.

"There is no doubt US 1549 was an accident waiting to happen," warns recently retired US Dept of Agriculture ornithologist Richard Dolbeer, chairman of Bird Strike Committee USA (BSC-USA).

"There has been a dramatic increase in bird species, particularly large flocking bird varieties, and in our 1990-2007 database we had 1000 incidents of direct hits into two engines," he says.

According to BSC-USA data, the cost of venturing into the bird's domain is high. Human fatalities in birdstrike related air crashes number 219 worldwide since 1988, while birdstrikes cost US civil aviation more than US$650 million a year. Globally that number is US$1.2 billion.

Testifying to a US congressional committee following the 1549 ditching, FAA Deputy Associate Administrator for Aviation Safety Peggy Gilligan said the agency has collected more than 100,000 voluntary wildlife strike reports since 1990, 85 per cent of them involving commercial aircraft, with the "increasing number of birdstrikes a combination of better reporting and increasing bird populations."

When reporting was introduced in the US in 1990, that year saw only 1900 reports. This had grown to 8000 in 2008, but the problem is even worse than the numbers indicate, says BSC-USA, with studies showing that only about 20 per cent of birdstrikes to passenger aircraft are reported and only five percent of general aviation aircraft strikes.

The pattern is similar in Australia, according to a report from the Australian Transport Safety Bureau released in late 2007. It examined birdstrikes from 2002 to 2006 and found that in the five year period there had been an increase in strike reports from 750 in 2002 to 1250 in 2006, with a total of 5103 strikes, 7.5 per cent classified as damaging.

The news that birdstrikes are becoming more frequent is of little surprise to Dolbeer given the increase in bird populations.

For instance, the North American non-migratory Canada goose population increased about fourfold from 1 million in 1990 to more than 3.9 million in 2008.

Between 1990 and 2007, more than 1400 strikes involving Canada geese were reported in the US and more than 40 per cent of the events involved multiple birds.

Dolbeer adds that there have been increases in other large birds such as "snow geese, bald eagles, ospreys, sandhill cranes, wild turkey vultures and white pelicans." And these birds are heavyweights with a body weight of 5-10kg.

The reasons for the spectacular increases, he says, relate to the banning of DDT and similar chlorinated hydrocarbon insecticides in 1972, an increase in the protection of many species and expansion of a number of wildlife refuges. "In the 1960s the environment was pretty polluted and the measures put in place were obviously a good thing and enabled species to rebound," he notes.

FAA statistics show that the closer the aircraft is to the runway, the higher the risk

of a birdstrike, with 73 per cent occurring within the airport environment up to 500ft.

Thus regulators globally have focused birdstrike mitigation efforts at and up to 5nm from airports.

In 2000 the FAA began research to determine if low cost radars can detect birds reliably at or near airports to provide a real-time bird strike advisory system. It is conducting radar evaluations with three Accipiter avian radar systems at Seattle-Tacoma International and Chicago/O'Hare, three being installed at New York/JFK and a possible rollout for LaGuardia and Newark.

Avian radars are not new and have been the subject of research and development for more than 40 years. Airport ASR-9 Doppler surveillance radar and WSR-88D weather radar have been used for bird detection at distances of up to 100nm. But cost, update rate and resolution have impeded their avian potential for shorter ranges near airports.

Accipiter Radar Technologies CEO and president Tim Nohara says major advances in automatic avian target extraction took place between 2000 and 2005, spurred by the interest of the US military, FAA and Transport Canada.

Radar engineering companies Accipiter Radar with Accipiter and DeTect with Merlin entered the market to compete with GeoMarine's development in 2000 of the first automatic vertical scanning MARS radar for bird detection.

Accipiter avian radar systems are in use at numerous US Navy, Marine Corps and USAF airfields as well as in the commercial trials. In those trials, Nohara says the purpose is to "understand what they give you and comprehend their limitations and then move to see how controllers and wildlife experts can use this tool."

He sees what he calls the "wildlife management mode" as the here-and-now: "The avian radars are extremely effective in assisting often under-resourced staff in managing habitat, frightening birds off and even advising ATC of a large flock."

However, Nohara is not so sure about the public acceptance of a "sense-and-avoid mode" that would have a cockpit radar display for pilots for use around airports. "There are advocates for this but we can't have pilots making sudden manoeuvres in the airport vicinity. I am not certain we want to go there."

He sees this type of mode for pilots as perhaps "10 years out."

Netherlands based TNO has developed its Robin Lite for civil airports. The radar has evolved over 20 years from its Robin designed for the military, which has resulted in a 50 per cent decline in strikes in that environment.

While airports and regulators grapple with the effectiveness and use of avian radars, airlines can add a significant weapon in the war on birds if the experience of Qantas is any guide.

LITE AS DAY Qantas is installing Precise Flight's Pulselite on its 737 fleet and its Q400s. (Geoffrey Thomas)

After a year long, highly successful trial, it is installing Oregon based Precise Flight's Pulselite on its 737-800 and -400 fleets as well as its Q400s.

Pulselite is a hardware addition, the size of a typical CD burner, which pulses the aircraft's landing lights approximately 45 times per minute.

Originally designed as a "be seen and avoid strategy" for GA aircraft, Pulselite-equipped planes can be seen at more than 40nm during the day. The system can be linked to TCAS and will activate on a traffic advisory if the pilot has the aircraft's strobe lights selected.

Qantas conducted an extensive evaluation of Pulselite from January 2005 to August 2007 and found a 40 per cent reduction in strikes for the 737-400 fleet and a massive 66 per cent reduction for the -800 fleet.

That variation is explained by a more intense landing light configuration for the -800, says Precise Flight Australian representative Peter Reardon.

According to Qantas Boeing technical pilot Alex Passerini, the system "has shown a positive trend in reducing birdstrikes and has a host of other advantages."

The 737 trial, which now has turned into a 737 fleet wide commitment, followed similar experience with the Dash 8-300 fleet, where installation of Pulselite resulted in a birdstrike reduction of approximately 50 per cent.

The fleet was averaging 3.65 strikes/aircraft/year prior to the evaluation and 1.83 with Pulselite.

QF's success has resulted in orders from Air Pacific, Air Vanuatu and Jetconnect for 737s and Air Nelson for its Q300s. Horizon Air was the first US airline to install the system after a serious birdstrike in 2003.

According to Reardon, a former air safety investigator and air safety consultant, a bonus of the system is that the life of landing lights, which do not run as hot because they pulse, has increased by 300 per cent.

Qantas has applied Pulselite to its vertical stabiliser logo lights on the -800 fleet as a runway incursion defence strategy. Its experience is starting to gain traction in the US and elsewhere as it talks with its associate airlines, says Precise Flight VP Scott Phiben, who adds, "they're our shining light!"

The Pulselite work is positive, says Dolbeer. "I am really excited about what Qantas is doing. We are working with Precise Flight examining more cycling of the light pulse and also adding the ultraviolet light spectrum." Ultraviolet paint for parts of aircraft is also a possibility, he says.

Dolbeer raises some fascinating but simple facts about the relationship between birds and planes: "Most birds aren't suicidal and they will get out of the way if they can see or hear an aircraft."

But aircraft are much quieter these days, so "birds can't hear an aircraft approaching," particularly in the landing phase. Studies have shown that aircraft powered by the noisy engines from the 1960s had far fewer birdstrikes, he says, pointing out that most aircraft had four engines and "now most have just two."

He laments that there is a major disconnect between biologists and the aviation industry.

"What we need is a more robust reporting system as we cannot solve the problem unless it is better defined."

There is also a significant lack of understanding about birds, he says.

"We need more training of pilots and air traffic controllers about the habits of birds. For example, when faced with an encounter, birds will always dive to get out of the way – they use gravity."

Tragically, many hull losses are caused by strikes when the birds are already on the runway before the takeoff roll starts, says Dolbeer.

"Birds always face into the wind when they are on the ground and aircraft takeoff and land into the wind so the birds can't see the aircraft coming. Pilots and ATC just assume that birds would fly away. Well, the birds will not fly away!" ■