

UPDATE ON FATALITIES AND DESTROYED CIVIL AIRCRAFT DUE TO BIRD STRIKES WITH APPENDIX FOR 2008 & 2009

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ABSTRACT

At the IBSC 26 Meeting in Warsaw Poland, May 2003 an illustrated Working Paper WP-SA1 (p.87 of Proceedings) 'Fatalities and Destroyed Civil Aircraft due to Bird Strikes 1912 to 2002' provided brief details of **all** cases during the period. Since then information has become available on some previously unknown accidents, as well as information on subsequent accidents. Thus, at IBSC 27, Athens May 2005 an update, WP II-3 (p.65 of Proceedings) was presented covering the years 2002 to 2005 and at IBSC 28 Brasilia November 2008 covering 2006 to 2008. This paper provides brief details on further cases in 2008 and 2009 as well as re-appraised data covering the period 1912 to 2008.

These papers are felt to be useful in drawing attention to the scale of the problem, especially when dealing with those who know little about the subject or who are newly appointed to decision-making positions. A consolidated Paper to replace the Warsaw IBSC 26 Paper will be prepared for IBSC30 in Norway.

It is now believed that the total number of fatal bird strike accidents is 54, killing 276 people and destroying 108 aircraft. These additional accidents are briefly detailed in the Paper so that the totals are now:

- Airliners and Executive Jets – 15 fatal accidents killing 188 and destroying 42 aircraft.
- Aeroplanes 5,700 kg and below – 32 fatal accidents killing 70 and destroying 56 aircraft.
- Helicopters – 7 fatal accidents killing 18 people and destroying 9 helicopters.

The results are broadly unchanged in that the major threat (nearly 80% of accidents) to Airliners and Executive jets is engine ingestion, often due to flocks of gulls (*Larus sp.*). Aircraft of 5,700 kg and below as well as helicopters are most at risk from windshield penetration, mainly the result of collision with birds of prey (*Accipitriformes*). These groups of aircraft mainly fly at heights where birds are most likely to be encountered. Some accidents are the result of pilots attempting to avoid birds.

The Author would welcome any new or additional information.

Keywords: civil aviation, general aviation, mishap investigation, statistics

INTRODUCTION

The paper contains brief details of each case of loss of life or destruction of the aircraft between 2006 and 2008 divided into three Appendices:

- Appendix 1 - Aeroplanes over 5,700 kg (12,500 lb) and all business jets
- Appendix 2 - Aeroplanes of 5,700 kg and below
- Appendix 3 – Helicopters

OVERALL SCALE OF THE PROBLEM

Birds are known to have caused at least:

- 54 fatal accidents
- 276 deaths
- the destruction of 108 civil aircraft

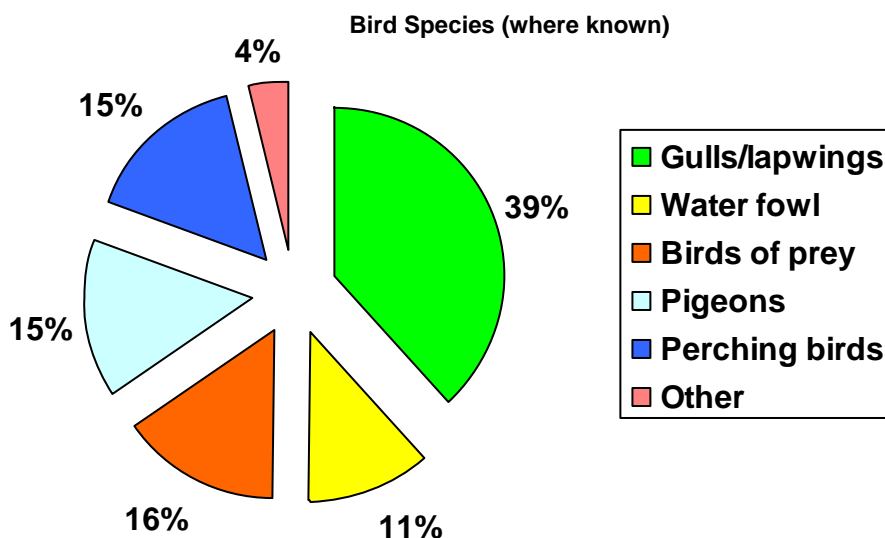
It is very likely there are more, as information is only accurate for the last 25 to 30 years. **The Author would welcome any new or additional information that is sent to him.** This will be made available as a Supplement to this Paper and placed on the IBSC Web Site.

ANALYSIS AND DISCUSSION, 1912 TO 2008

In general sample sizes are too small for in-depth analysis, however a number of points are noteworthy:

Transport Aircraft & Executive Jets – 15 fatal accidents, 188 deaths and 42 write-offs.

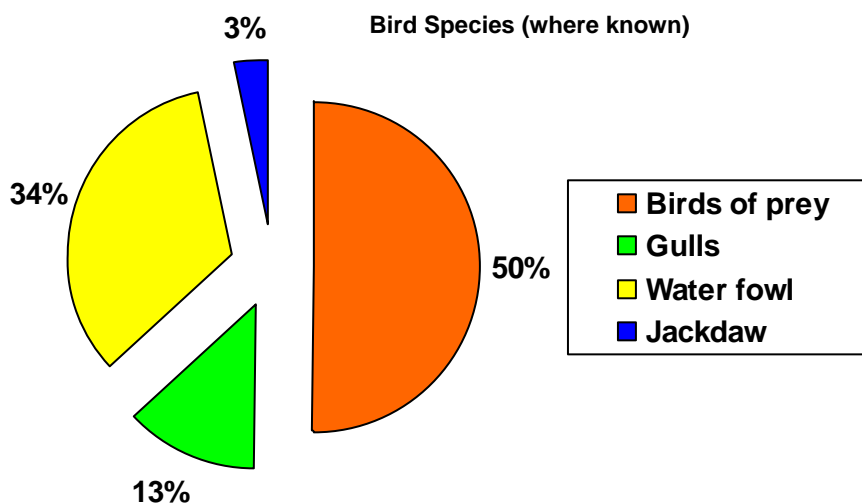
- The 15 fatal accidents to the aircraft above is quite modest however 42 have been destroyed and 188 people killed. Surprisingly, there has only been **one** fatal accident to a jet powered airliner in over 1.4 million flying hours. This may, in part, be due to an improved awareness of the problem, implementation of better airport measures around the world and tougher airworthiness criteria for all but the oldest aircraft and engines. Engine damage was the cause of 85% of the accidents in this group, followed by windshields with 6%. In recent years a high proportion are early Russian aircraft operating at airports where control measures are unlikely. The identified birds were:



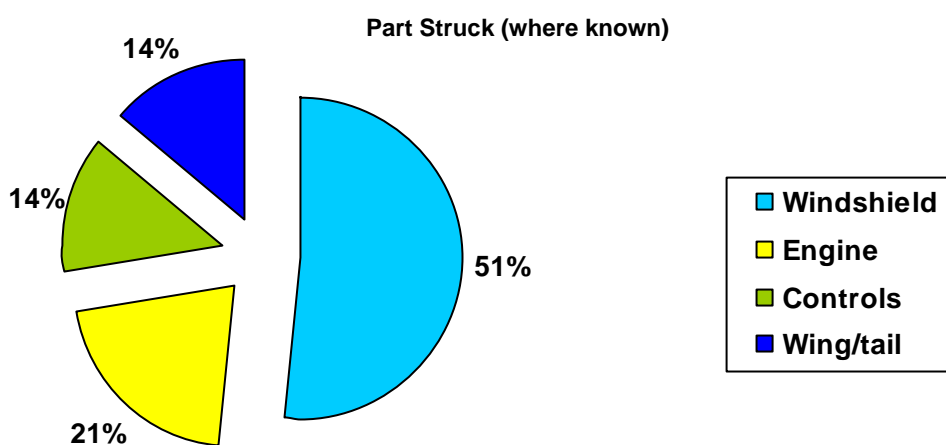
- Although not included in this Paper, there have been many cases of multiple engine damage, fortunately with either enough runway length to abandon take-off, or sufficient power to return. European airlines continue to experience about 20 cases per year where **more** than one engine ingests birds.
- Business jets comprising 34% of the accidents in this section, often operating from aerodromes with little or nothing in the way of bird control measures, and appear to be vulnerable as in many cases their engines are of an age which pre-dates bird ingestion testing.

Aeroplanes of 5,700 kg & Less – 32 fatal accidents, 70 deaths, and 56 write-offs.

- General aviation aeroplanes are **not** required to be designed to withstand bird strikes and are therefore more vulnerable, particularly the windshield, holed in 50% of accidents. These can be holed by a bird as small as a Swift (*Apus apus*, 40 gm).



- The birds struck are markedly different from those of transport sized aeroplanes, the major threat is clearly birds of prey (*Accipitriformes*) and large waterfowl which account for 84% of the cases. These are birds which have little or no fear of predators or other airspace users. Although generally large they are nevertheless hard to spot in time to take evasive action.



- Six of the general aviation accidents were the result of pilots attempting to avoid birds by taking evasive action and either losing control or colliding with ground objects.

Helicopters – 7 fatal accidents, 18 deaths and 9 helicopters destroyed

The accident total is very low considering most helicopters operate low-down where birds fly most frequently. The high proportion in the USA is probably a reflection of the number of helicopters operating in that country. It may be that the relatively slow cruising speed, coupled with rotor noise, acts as sufficient warning for birds to get out of the way. The trend towards faster and quieter helicopters might result in future problems especially as windshields appear to be vulnerable, having probably been holed in 60% of the fatal helicopter accidents, generally after colliding with heavy birds.

CONCLUSIONS

1. Aircraft continue to be destroyed and occupants killed or injured in accidents due to:
 - Striking birds
 - Attempting to avoid birds
 - Birds being the start of a chain of events
2. Although **not** a major cause of accidents, bird strikes are nevertheless a serious safety and economic hazard. Remedial measures and tougher aircraft/engines appear to have improved airliner safety but twin-engined aircraft have in many cases replaced four-engined aircraft so there is a greater risk of ingestion in all engines. Engine damage is the major risk for this group of aircraft, with flocking gulls (*Larus sp*) the major threat causing 39% of the accidents. This underlines the importance of thorough aerodrome bird control measures.
3. Business jets appear to be particularly vulnerable especially when operated from aerodromes with little or no bird control measures.
4. Early Russian aircraft operating from 'remote' areas where bird control measures are unlikely are the major group in recent years.
5. 'General aviation' aeroplanes are most vulnerable to the windshield being holed, the cause of 51% of the accidents. Birds of prey (*Accipitriformes*) were responsible for half of the accidents, followed by waterfowl with 34%. This group of aircraft mostly fly at heights where birds are most prevalent.
6. A high proportion of helicopter accidents were due to the windshield being holed, sometimes by heavy birds. Again, helicopters mainly operate low down where most birds fly and the trend towards faster, quieter helicopters, will provide less time for birds to take avoiding action.
7. Bird strike accidents are a rare event that can happen out-of-the-blue even at airports which may consider that adequate measures are in place to minimise the risk. It should be borne in mind that **complacency is the enemy of safety.**

ACKNOWLEDGEMENTS

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Section 1 – Airliners & Executive Jets

CESSNA 500 - UPDATE to IBSC28 Brasilia Paper

4 March 2008	Cessna 500 Citation	Oklahoma City	Wing	5 on board
N113SH	2 x P & W JT15D	USA	White Pelicans	5 fatal

Shortly after taking off at 15.13 EST for Mankato, Minnesota and climbed to 3,100 ft, (the airport is 1,300 ft amsl) before it made a steep descent over a lake and crashed in woodland 4.1 nm from the airport killing the two crew and 3 passengers. A witness fishing on a lake near the airport said it may have flown through a flock of birds as one was landed in the lake. The aircraft appeared to spin and turn almost upside down.

Update Info: NTSB report AAR-09/05 reveals that the probable cause was wing structure damage with one or more large birds which resulted in loss of control of the 1975 built, original model, Citation. The birds were American white pelicans (*Pelecanus erythrorhynchos* wt. 10.5 kg).

25 May 2009	Boeing 747F-200	Brussels Airport,	Engine	5 on board
N704CK	4 x P & W JT9D	Belgium	Kestrel	5 uninjured



The Kalitta Air flight was a cargo flight from New York-JFK to Bahrain with a technical stop at Brussels with 73 tonnes of cargo. The Boeing 747 was taking off at 13.30 from runway 20 (2,987 m) when the right engine experienced a momentary loss of power accompanied by a loud bang, heard by the crew and external witnesses, and by flames, seen from the control tower. CVR data revealed this was 4 seconds after V1. Two seconds later and in spite of being 6 seconds past V1, the take off was abandoned. All four engines were brought back to idle, and braking action was initiated but the thrust reversers were not deployed. The aircraft came to a stop 300m beyond the end of the runway, above a railway embankment. The aircraft was severely damaged; breaking into three parts. The crew were highly experienced the Captain having over 15,000 hrs with 3,000 on the B747. DNA revealed a Kestrel (*Falco tinnunculus* wt. 200 gm) strike. (*Preliminary Report from Belgian Accident Investigators*)

10 Nov 2009	Boeing 737-800	Rome, Ciampino	Engine	172 on board
EI-DYG	2 x CFM56-7	Italy	Starlings	1 serious injury



At about 7.56 am while below 500 ft on short finals to land, the Ryanair flight from Frankfurt Hahn, encountered an enormous starling flock (*Sturnus vulgaris* wt 80 gm). The First Officer as pilot flying initiated an immediate go-around but there were multiple strikes on the nose, wings, windshield and both engines lost power with burning smell and vibration. Engines did not respond and remained at 40% N1 so elected

to land. The aircraft impacted hard with stick shaker and the left hand landing gear was forced into the aircraft structure. The aircraft slid to a halt on the runway with one engine resting on the runway. One person was injured when evacuating via the one slide which had been deployed, the rest were evacuated via steps. The aircraft has been written-off. (*Italian Report awaited*).

15 Jan 2009	Airbus A320	Hudson River, New York	Engines	155 on board
N106US	2 x CFM56-5	USA	Canada geese	1 serious inj



The US Airways Flight 1549 took off at 15:26 from New York La Guardia's runway 04 for Charlotte, Carolina. The first officer was handling pilot. As they were reaching an altitude of 3,200 feet the crew encountered a formation of Canada geese (*Branta canadensis wt. 3.6 kg*). Impacts were felt and both engines began to lose power and there was a burning smell. The captain took over control of the flight while the first officer attempted to relight the engines. ATC were informed that they had lost thrust in both engines and were turning back toward LaGuardia. It quickly became evident that they were not able to reach LaGuardia and the possibility of Teterboro, New Jersey was considered. The captain realized that it was too far stated his intention of going for the Hudson River. They descended over the George Washington Bridge and ditched opposite mid-town Manhattan. The occupants evacuated the aircraft onto the wing and aboard escape slide rafts. Coast Guard, commuter and tour vessels rescued everyone on board in spite of some people in the water and the strong current. The maximum altitude reached was 3,200 feet and the last radar return received was at 300ft and 153kts. The aircraft was retrieved from the river. Both DNA and feather analysis confirmed that both engines had ingested Canada geese. It was fortunate the captain was a glider pilot. (*NTSB Report AAR-10/03*).

Section 2 – General Aviation Aeroplanes

Update to Warsaw IBSC 26 Paper - Delete the following Edge accident as enquiries reveal there is no evidence it was a bird strike and may have been a convenient story at the time.

22.04.01	Edge 360 1 piston	Barksdale AFB, Propeller USA	1 -	1 serious
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Near the end of an air display routine the pilot had just completed a 16-point roll and was flying level at about 30 ft and nearly 200 mph when reportedly a bird flew into the propeller. The aircraft bounced off the grass infield bending the fixed landing gear and into the air again. The pilot suffered two cracked vertebrae and the aircraft was damaged beyond repair.

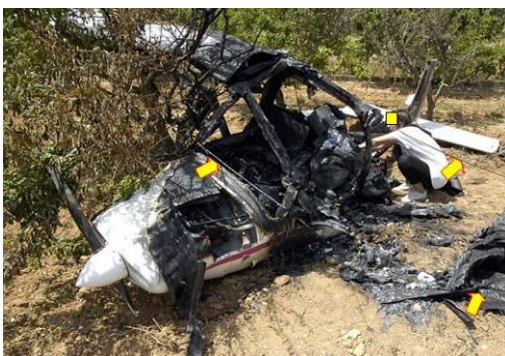
1 February 2009 N737B	Schweizer G-164B 1 x P & W R1340	Ferriday, Louisiana USA	1 on board 1 minor/nil
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While on short final the agricultural spraying biplane struck a flock of birds. The remains penetrated the windshield and struck the pilot in the face temporarily blinding him. He attempted a go-around but the aircraft impacted the runway, nose over and came to rest inverted. The fuselage sustained structural damage. Bird remains confirmed as Double-crested cormorant (*Phalacrocorax auritus* wt. 2 kg) and Red-winged blackbirds (*Agelaius phoeniceus* wt. 50gm).

29 Aug 2008 N87376	Ercoupe 415C 1 x Continental C75/85	Sebring, Florida USA	2 on board Nil injuries
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At about 1,300 ft in the climb the pilot found pieces of wood and feathers coming into the cockpit via the open canopy. He shut down the engine and made a forced landing in a field. The aircraft impacted a shallow ditch obscured by tall grass causing the nose gear to collapse bending the right main spar and buckling the firewall. One blade of the wooden propeller was splintered.

28 June 2008 CS-XAK	Jabiru SK 1 x abiru 2200	Tavira, Algarve Portugal	2 on board destr'yd, 1 minor inj
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At about 11.00 hrs after flying from Portimão the three axis microlight was on the final approach about 1 km from the landing strip when the pilot dodged a bird by turning and diving. The aircraft struck power lines which became entangled with the aircraft. It crashed 180 metres from the displaced threshold. The two occupants escaped, the pilot suffering a minor arm injury but the aircraft was destroyed by fire.

Section 3 – Helicopters

4 Jan 2009 N748P	Sikorsky S76C 2 x Turbomeca Arriel	Morgan City USA	Windshield Red-tailed hawk	9 on board 8 Fatal, 1 Serious
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The helicopter operated by PHI Petroleum Helicopters was ferrying oilfield workers to an oil platform in the Gulf of Mexico. Seven minutes after take off from Amelia, Louisiana, 12 miles from departure, it crashed partly submerged in marshy ground near Bayou Penchant. Examination revealed concentric ring fractures of the windshield and also in the gell-coat just above the windshield. DNA testing of swabs taken from the pilot side windshield revealed microscopic remains and further swabs were taken from a range of parts. Small feather parts were found under a right side windscreen shield and in folds of the right side engine inlet filter, identified as Red-tailed hawk (*Buteo jamaicensis wt.1.1 kg*). Research is continuing into the possible scenarios that could have caused the loss of engine torque and electrical anomalies found on the flight recorders as well as crew responses. A loud bang followed by air noise was revealed by the CVR. The original laminated glass windshields had been replaced a year previously by lighter weight cast acrylic windshields approved by the FAA under a Supplemental Type Certificate. (*NTSB Interim Report CEN09MA117, Final Report awaited*).

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