UPDATE ON FATALITIES AND DESTROYED CIVIL AIRCRAFT DUE TO BIRD STRIKES with Appendix for 2006 to 2008

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ABSTRACT

At the IBSC 26 Meeting in Warsaw Poland, May 2003 an illustrated Working Paper WP 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. The paper was 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. 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. This paper provides brief details on further cases between 2006 and 2008 as well as updated statistics covering the period 1912 to 2008.

It is now believed that the total number of fatal bird strike accidents has risen to 56 killing 262 people. And destroying 103 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 41 aircraft.
- Aeroplanes 5,700 kg and below – 31 fatal accidents killing 61 and destroying 53 aircraft.
- Helicopters – 6 fatal accidents killing 10 people and destroying 8 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.

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

1. 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 – Aircraft losses due to Collision with Animals

2. Overall Scale of the Problem

Birds are known to have caused at least:

- 52 fatal accidents
- 259 deaths
- the destruction of 102 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.

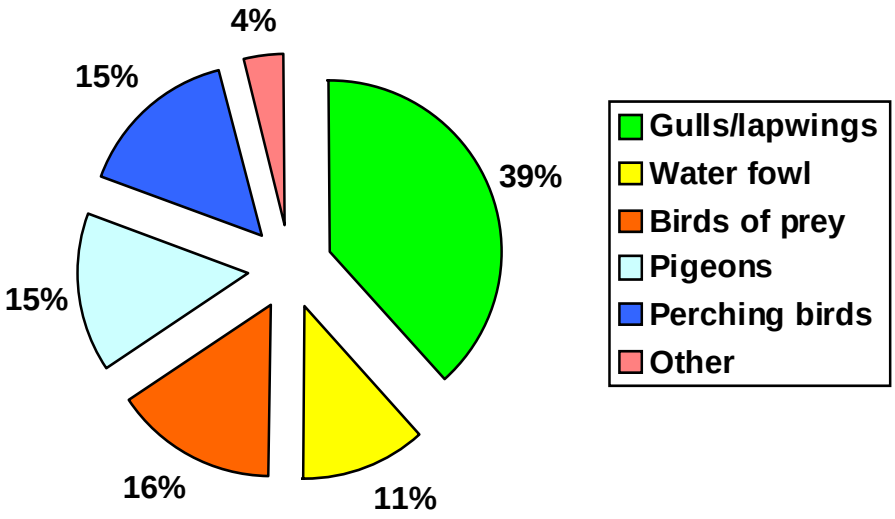
3. Analysis and Discussion, 1912 to 2008

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

3.1 Transport Aircraft & Executive Jets – 15 fatal accidents, 188 deaths and 41 write-offs.

- The 15 fatal accidents to the aircraft above is quite modest however 41 have been destroyed and 188 people killed. Surprisingly, there has only been **one** fatal accident to a jet powered airliner in over 1,250 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:

Bird Species (where known)

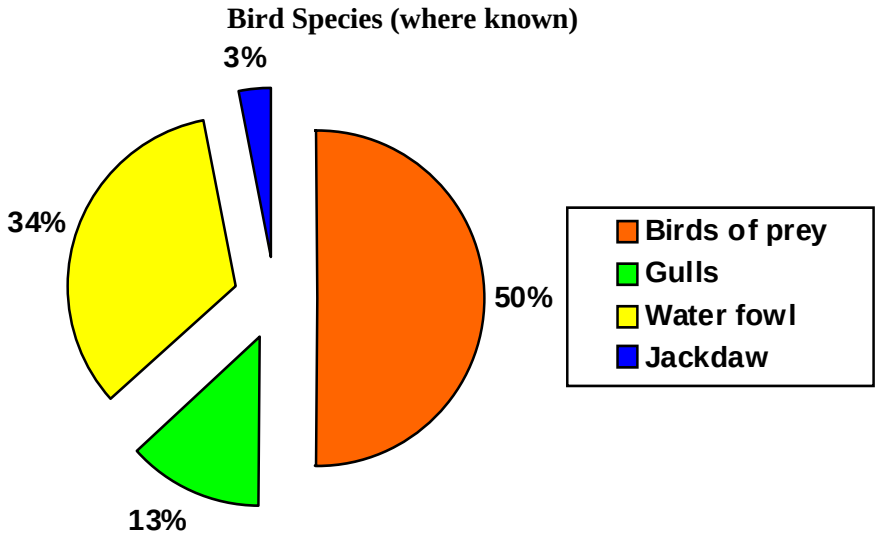


- Although not included in this Paper, there have been many cases of multiple engine damage, fortunately with either enough runway length to abandon take-off, or sufficient power to return. European airlines continue to experience about 20 cases per year where **more** than one engine ingests birds.

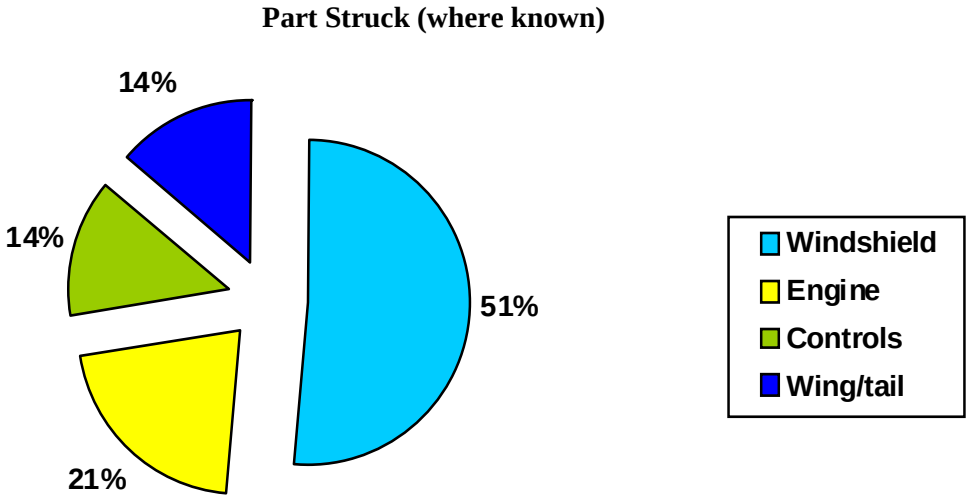
- Business jets comprising 34% of the accidents in this section, often operating from aerodromes with little or nothing in the way of bird control measures, and appear to be vulnerable as in many cases their engines are of an age which pre-dates bird ingestion testing.

3.2 Aeroplanes of 5,700 kg & Less – 31 fatal accidents, 61 deaths, and 53 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.

3.3 Helicopters – 6 fatal accidents, 10 deaths and 8 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.

4 Conclusions

4.1 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

4.2 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 case 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.

4.3 Business jets appear to be particularly vulnerable especially when operated from aerodromes with little or no bird control measures.

4.4 Early Russian aircraft operating from 'remote' areas where bird control measures are unlikely are the major group in recent years.

4.5 '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 hard to spot birds are most prevalent.

4.6 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.

4.7 Bird strike accidents are a rare event that can occur 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

4 March 2008	**Cessna 500 Citation**	Nr Wily Post Airport	Engines	5 on board
N113SH	2 x P & W JT15D	Oklahome City, USA	N/K	**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 sucked through and landed right in the lake. Another experienced aviation witness heard a sound like a compressor stall and saw it descending 60 to 70 degrees nose down with grey smoke trailing from one engine. The aircraft appeared to spin and turn almost upside down.

8 Nov 2007	**Antonov 12**	Khartoum,	Engine	4 on board
ST-JUA	4 x Ivchenko AI-20	Sudan	N/K	**2 third party deaths**

At about 08.00 hrs the aircraft was taking off from Khartoum for Juba, Sudan carrying 11 tons of cargo. One engine failed shortly after take off according to the Juba Air Cargo President due to a bird strike. The pilot attempted to return to land but crash landed on the military part of the airport killing two soldiers. The aircraft was destroyed by fire but the crew, three Russians and a Sudanese escaped.

29 July 2007	**Antonov 12**	Moscow Domodedovo,	Engines	7 on board
RA-93912	4 x Ivchenko AI-20	Russia	N/K	**7 Fatal**

The aircraft was flying from Domodedovo to Komsomol via intermediate stops at Omsk and Bratsk. Engines were started at 04.01 hrs and 6 minutes later the aircraft taxied to runway 32C for departure. As they were lining up the crew commented on the presence of birds in the area. They took off at 04.15 and the landing gear was retracted. At about 230 ft and an airspeed of 159 kts there was the sound of an engine surge. Engine 4 propeller auto-feathered, almost simultaneously No 3 also auto-featherd. The aircraft at a weight of 60,500 kg lost height, the airspeed decreased and in a right bank of more than 100 degrees the aircraft struck trees disintegrated and burned about 4 km from the runway end. The temperature was 14°C, wind less than 2 kts and visibility 100 m in fog. It was concluded that full rudder and aileron was insufficient to counteract the turn and bank due to loss of power on two engines due to birds. Small parts of organic origin as well as feathers were found in the exhaust ducts of engines 3 & 4. There are three previous cases in which AN-12s have crash landed after encountering birds immediately after take off which affected two or more engines.

28 March 2006	**Antonov 12**	Payam Airport	Engines	12 on board
EK-46741	4 x Ivchenko AI-20	Iran	N/K	Nil Injuries

The aircraft was taking off on a cargo flight to Sharjah when it encounterd a flock of birds causing engines 1,3 and 4 to fail. An attempt was made to return to Payam but an emergency landing had to be made about 3 miles from the airport. The aircraft broke up and caught fire.

Section 2 – General Aviation Aeroplanes

11 Sept 2008	**Air Tractor AT-502B**	Nr Caledon, Western Cape	1 on board
ZS-NZU	Lycoming I0-360	South Africa	**1 killed**

During an agricultural spraying operation a Blue Crane (*Anthropoides paradisea* wt. 4 kg)struck the windshield and apparently incapacitated the pilot as feathers were found in the cockpit. The aircraft flew into the ground, bounced and overturned.

2 May 2008	**Vans RV-7A**	Frazier Lake, California	2 on board
N269SD	Lycoming I0-360	USA	**destr'yd, 2 minor inj**

At about 50 ft while climbing from a touch and go, the left wing struck a Canada Goose (*Branta Canadensis* wt. 3.6 kg). The pilot lost control and the aircraft was destroyed after cartwheeling and crashing in a field 500 ft south west of the runway.

23 October 2007	**Piper PA44 Seminole**	Browerville, Minn.	2 on board
N327ND	2 x Lycoming 0-360	USA	**2 killed**

The University of North Dakota aircraft was on a routine late evening night training flight from St Paul to Grand Forks. It was flying normally when according to stored memory on cockpit devices (from GPS?) it went out of control and 26 seconds later crashed into a swampy area killing the 22 year old instructress and the 20 year old student. The Preliminary NTSB Report states it was likely to have been caused by two or more Canada geese (*Branta canadensis* wt. 3.6 kg) hitting the aircraft. There was a large dent on the left wing along with Canada goose DNA and another on the tail section which when peeled back revealed goose remains.

21 July 2007	**Cessna 150**	Woodland, California	2 on board
N531M	1 x Continental 0-200	USA	**destroyed**, Nil inj

Shortly after take off on a student training flight a 'hawk' came through the windshield causing minor injuries. The drag prevented the aircraft from maintaining level flight resulting in a forced landing in a field. The aircraft overturned in the soft ground and was damaged such as to be a write off.

4 Feb 2007	**Cessna 152**	Nr Nadergul	2 on board
VT-	1 x Lycoming 0-235	India	**destroyed, 1 minor inj**

Whilst returning to the airfield an 'eagle' struck the windshield smashing it and causing the aircraft to 'spin out of control'. The aircraft crash landed in a field, the student suffering a deep cut on her forehead. The aircraft was very badly damaged in the forced landing. It was the first case in 10 years.

2 October 2006	**Piper PA32 Saratoga**	Nr Pinheiros	3 on board, **3 fatal**
	1 x Lycoming IO-540	NE Brazil	**destroyed**

As the aircraft was approaching to land after an air taxi flight transporting money for the Brazil Central bank from Maranhao 50 miles away, it collided with a Black vulture, (*Coragyps atratus* wt 1.7kg). The aircraft crashed in dense forest 100 metres from the airfield killing the 3 occupants. The airfield is near a garbage dump and it is common to have birds swarming around.

26 Sept 2006	**Cessna 206**	over Okavanga Reserve,	5 on board
A2-	1 x Continental TSIO-520	Botswana	**destroyed,** Nil injuries

The aircraft was flying at 2,500 ft agl over the Okavango nature reserve en-route from Nxabega to Tsigaro when a vulture smashed through the pilot's windshield destroying some of the instruments panel and becoming entangled in the flight controls. The pilot managed to shove the bird aside and regain control but the excessive drag from the holed windshield prevented the aircraft from maintaining height. The pilot force landed in the swamp resulting in the aircraft overturning. All five on board escaped with minor injuries thanks in part to the 4 point harnesses fitted to all seats by FMS. The ELT signal was picked up by Cape Town and the Rescue Co-Ordination centre alerted. The bird was identified as an African white–backed vulture (G*yps africanus* wt 5.8 kg).

3 May 2003	**Cessna 150G**	over Montgomery, Alabama	1 on board
N2938J	1 x Continental O-200	USA	**destroyed,** 1 minor

While in cruise VFR from Columbus to Montgomery at 4,500 ft amsl the aircraft collided with a flock of geese (*Anser sp.)* causing bad vibration so the pilot decided to land in a field. On touchdown the pilot realised the field was marshy and rough and attempted a go-around but the engine did not produce full power. He guided it into a clearing but clipped trees and crashed and overturned. After transmitting a distress call an Air National Guard helicopter took the pilot to hospital. The aircraft suffered buckled wing spars and was a write-off.

Section 3 – Helicopters – Nil

References:

- Working Paper WP-SA1 p.87 'Fatalities & Destroyed Civil Aircraft due to Bird Strikes 1912 to 2002, Proceedings of IBSC26, May 2003 Warsaw Poland.
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