

**FATALITIES AND DESTROYED CIVIL AIRCRAFT DUE TO
BIRD STRIKES, 1912 – 2002**

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Abstract

At the 1996 London Meeting of the International Bird Strike Committee, an illustrated Working Paper was presented that provided brief details of **all** fatalities and destroyed aircraft due to bird strikes during the period 1912 to 1995. 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 the original paper was published, information has come to light on a number of previously unknown accidents as well as information on recent accident.

It is now believed that the number of fatal accidents has risen to 42 killing 231 people. In addition the total of aircraft destroyed is now 80. These are as follows:

- Airliners and Executive Jets – 10 fatal accidents killing 164 and destroying 30 aircraft.
- Aeroplanes 5,700 kg and below – 27 fatal accidents killing 58 and destroying 42 aircraft.
- Helicopters – 5 fatal accidents killing 9 people and destroying 8 helicopters.

The paper provides brief details on all the above accidents together with some photographs. Anyone with further information on these or other accidents should contact the Author.

Analysis reveals that the major threat (77% 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.

Although not a major cause of fatalities, bird strikes are a serious safety and economic hazard. Bird strike accidents are rare events that can occur out-of-the-blue even at airports that may consider they have appropriate measures in place.

Complacency is the enemy of safety.

Key words: civil aviation, general aviation, mishap investigation, statistics

WORLD-WIDE BIRD STRIKE ACCIDENTS INVOLVING DESTRUCTION OF AIRCRAFT OR FATALITY, 1912-2002



1. Introduction

1.1 The earliest known bird strike to a powered aircraft was on 7 September 1908 when Orville Wright was demonstrating their progress by flying complete circles near Dayton, Ohio. He chased a flock of birds and killed one. The first fatal bird strike accident was in 1912 at Long Beach in California, when a gull (*Larus* sp.) lodged in the flying controls of a Wright Flyer, killing Cal Rodgers. He was the first person to fly across the USA.

1.2 In the November 1925 issue of the Royal Aeronautical Society Journal, the then Director of Civil Aviation Sir Sefton Brancker wrote the following in an article entitled 'The Lessons of Six Years Experience in Air Transport'

"There is one form of collision which must not be altogether forgotten; the possibility of colliding with birds in flight. We have had one mysterious incident in which the pilot lost control of his aircraft flying over the sea at a low height, the pilot's opinion was that he had been struck on the head by a sea bird, several were flying nearby, but nothing was ever clearly proved. In the East, propellers of aircraft taking off have been broken by kites flying over the aerodrome. I have never heard of an aeroplane encountering a flock of ducks at night; such an eventuality might lead to danger of injury to the pilot, the propeller or wing structure. The best precaution to meet such a danger will be good screening for the pilot and robust metal construction".

As we near the Centenary of powered flight these are prophetic words from 78 years ago.

1.3 A Working Paper (WP1) was presented at the 1996 London Meeting of the International Bird Strike Committee. It provided brief details of all the fatalities and destroyed aircraft due to bird strikes during the period 1912 to 1995. The paper was felt to be **useful for Public Relations purposes** and in drawing attention to **the scale of the problem**, especially when dealing with those who **know little about the subject or who have been newly appointed to decision-making positions**. Since the original paper was published, information has come to light on a number of older accidents, particularly light aeroplanes and helicopters, as well as on recent ones. These are marked with a marginal line. Where available, the opportunity has been taken to include more comprehensive information on some of the accidents.

1.4 The paper contains brief details of each case of loss of life or destruction of the aircraft divided into three Sections:

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

2. Scale of the Problem

Birds are known to have caused at least:

- 42 fatal accidents
- 231 deaths
- the destruction of 80 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.**

3. Analysis and Discussion

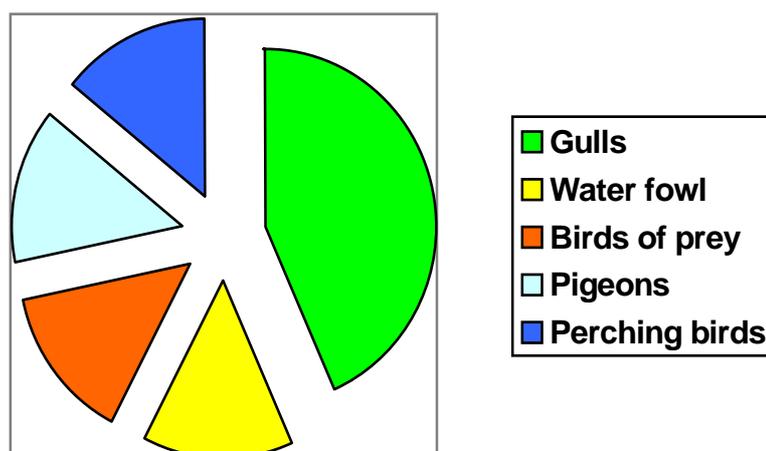
In general the sample sizes are too small for any in-depth analysis, however a number of points are noteworthy:

3.1 Transport Aircraft & Executive Jets -

10 fatal accidents, 164 deaths and 30 write-offs.

- The 10 fatal accidents to the aircraft above is quite modest however 30 have been destroyed and 164 people killed. Surprisingly, there has only been **one** fatal accident to a jet powered airliner in over 1,000 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 77% of the accidents in this group, followed by windshields with 10%. The identified birds were:

Bird Species (where known):



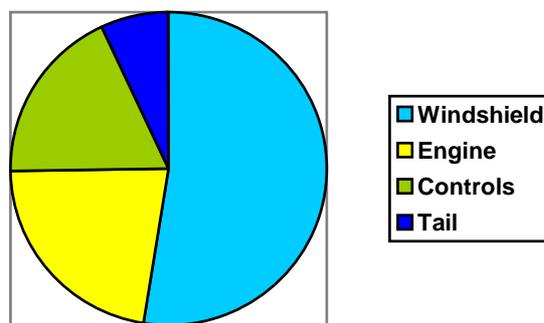
- Although not included in this Paper, there have been many cases of multiple engine damage, fortunately with either enough runway length to abandon take-off, or sufficient power to return. European airlines continue to experience about 20 cases per year where **more** than one engine ingests birds.

- Business jets comprising 37% of the accidents in this section, often operating from aerodromes with little or nothing in the way of bird control measures, also 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 – 27 fatal accidents, 58 deaths, and 42 write-offs.

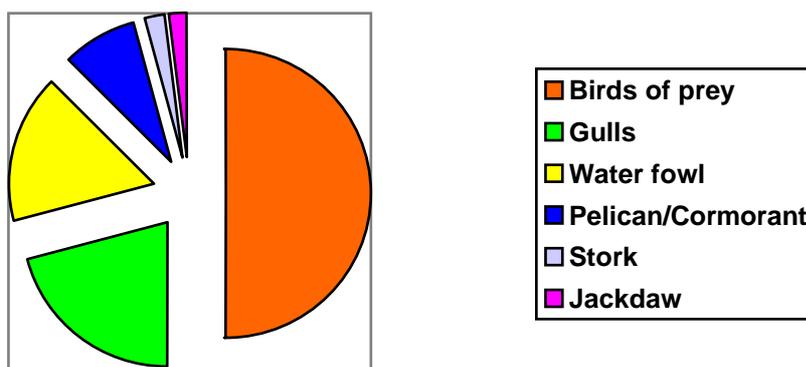
- Twenty seven of the fatal accidents involve general aviation aeroplanes. These aircraft are **not** required to be designed to withstand bird strikes and are therefore more vulnerable, particularly the windshield, holed in 52% of accidents. These can be holed by a bird as small as a Swift (*Apus apus*, 40 gm).

Part Struck (where known):



- The birds struck are markedly different from those of transport sized aeroplanes, the major threat is clearly birds of prey which have little or no fear of other airspace users.

Bird Species (where known):



- 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 – 5 fatal accidents, 9 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 Similar Papers

Similar papers covering 'serious' incidents have been published as follows:

1912 to 1982	WP16 and 16A BSCE16, Moscow, August 1982
1981 to 1984	WP27 BSCE17, Rome, October 1984
1984 to 1985	WP4 BSCE18, Copenhagen, May 1986
1985 to 1987	WP22 BSCE19, Madrid, May 1988
1987 to 1989	WP29 BSCE20, Helsinki, May 1990
1989 to 1991	WP31 BSCE21, Jerusalem, May 1992
1992 to 1993	WP26 BSCE22, Vienna, August 1994
'Bird Strikes to Airliner Turbine Engines'	WP63 IBSC 23, London, May 1996
'Implications of Recent Serious Bird Strike Accidents and Multiple Engine Ingestions'	WP3 IBSC24, Slovakia, September 1998

In the papers above 'serious' has been defined as:

Loss of life	Fire
Injury to occupants	Significant sized holes, e.g. windshield, radome
Destruction of aircraft	Major structural damage
Loss of, or damage to, more than one engine	Particularly unusual or dangerous features, e.g. complete obscuring of vision, multiple or significant system loss, propeller damage, helicopter rotor or transmission damage
Damage to one engine, together with ingestion in another engine	
Uncontained engine failure	

5. Conclusions

5.1 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

5.2 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 43% of the accidents. This underlines the importance of thorough aerodrome bird control measures.

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

5.4 'General aviation' aeroplanes are most vulnerable to the windshield being holed, the cause of 52 % of the accidents. Birds of prey (*Accipitriformes*) were responsible for half of the accidents. This group of aircraft mostly fly at heights where birds are most prevalent.

5.5 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.

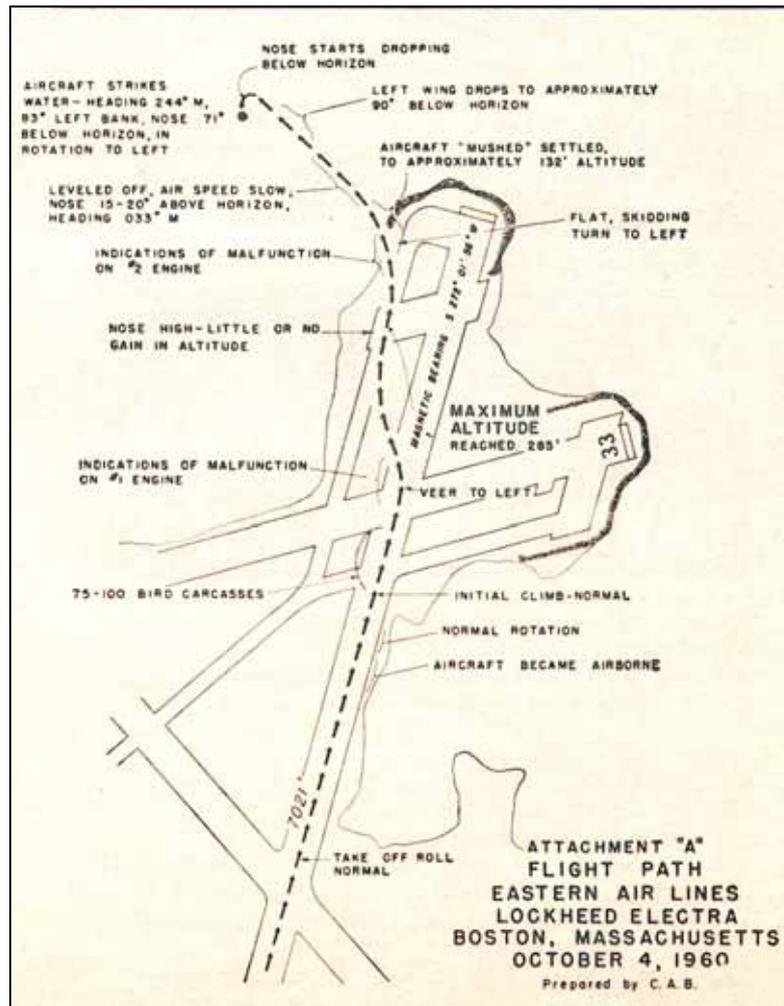
5.6 Bird strike accidents are a rare event that can occur out-of-the-blue even at airports which may consider that adequate measures are in place to minimise the risk. It should be borne in mind that **complacency is the enemy of safety**.

6. Acknowledgements

- Bird weights from 'Average Weight of Birds' - Trevor Brough, UK
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Section 1 – TRANSPORT AIRCRAFT AND EXECUTIVE JETS

Date/ Regn.	Aircraft Engine	Location/ Country	Part Struck/ Birds	On Board/ Deaths
04.10.60 N5533	Lockheed L188 Electra 4 Allison 501 turboprop	Boston Airport Mass, USA	Engines Starlings	72 62 fatal 9 serious injury



A few seconds after the Eastern Airlines flight became airborne from runway 09, the aircraft passed through a flock of **Starlings** (*Sturnus vulgaris*, 80 gm). A number were ingested in engines 1, 2 and 4. Engine 1 was shut down and its propeller auto-feathered. Numbers 2 and 4 experienced substantial intermittent loss of power which resulted in the aircraft yawing and decelerating to the stall speed, the left wing dropped, the nose pitched up and the aircraft rolled left into a spin and fell almost vertically into the water. About 75 carcasses were scattered over a large area. At least 4 birds were ingested in engine 1, about 6 in engine 2, which flamed out and re-lit and with less in number 4. This was the worst ever bird strike accident, 59 passengers and 3 crew died, and 9 passengers were seriously injured.

15.07.62	Douglas DC3	Nr Lahore	Windshield	3
VT-AUS	2 P&W R1830 piston	Pakistan	Vulture	1 fatal

The Indian Airlines freight flight from Kabul to Amritsar was in the cruise when the crew spotted a **vulture** (*Gyps sp.*, wt up to 10 kg) above and to one side of them. The co-pilot was killed when it attacked the aircraft and penetrated the windshield.

23.11 62	Vickers Viscount	Ellicott City	Tailplane	17
N7430	4 RR Dart turboprop	Maryland, USA	Whistling Swan	17 fatal



While the United Airlines flight was in the cruise at 6,000 ft en-route from New York, Newark to Washington at night, the aircraft struck **Whistling swans** (*Cygnus columbianus*, 6 kg). Two were struck, one holed the leading edge of the tailplane and exited from the rear surface damaging the elevator, weakening the structure causing the tailplane to detach and the aircraft to crash. As a result of this accident aircraft tail areas are now required to withstand impact with a 3.7 kg bird.

28.07.68	Falcon 20	Lake Erie	Engines	3
N367E	2 GE CF700 turbine	USA	Gulls	Nil

During take-off from Burke Lakefront Airport, **gulls** (*Larus sp.*, 280 gm to 1.7 kg.) were ingested into both engines causing severe damage. The aircraft hit a fence and crash landed in the lake where the three crew were rescued by a pleasure boat. 315 dead birds were found on the runway and engine 1 was 20% filled with debris and number 2 by 17%.

23.07.69	Douglas DC3	Nr Khar, Ambadu	Engines	4
F-OCKT	2 P&W R1830 piston	India	Cranes	Nil

The Air Djibouti aircraft was operating a freight flight from Tadfour to Djibouti. While flying at 300ft the aircraft struck a flock of **Cranes** (*Grus sp.*, up to 6 kg). There were multiple propeller strikes and debris blocking both carburettor intakes. The aircraft was ditched in the sea 9 nm from Khar Ambadu, a passing boat rescued the four crew.

26.02.73	Lear 24	De Kalb, Chamblee	Engines	7
N-454RN	2 GE CJ610 turbine	Georgia, USA	Cowbirds	7 fatal, 1 3 rd party injury

Just after take-off there was severe loss of power on both engines after the aircraft collided with a flock of **Cowbirds** (*Molothrus ater*, 44 gm). The aircraft crashed into buildings and burned. The left engine had 14 strikes and the right at least 5. The birds were from a landfill near the end of the runway. (Litigation against the airport was unsuccessful).

04.12.73	BAC 1-11	Bahia Blanca	Engine	74
LV-JNR	2 RR Spey turbine	Argentina	–	Nil

Shortly after rotation on take-off and while retracting the landing gear there was loss of power and severe vibration from the left engine and the aircraft lost height. The pilot had seen a large bird on the left side of the aircraft. He attempted to land back on the remaining 950 metres of runway and was slowed by arrester cables used for the operation of navy fighters. The cables broke damaging the aircraft and causing a fuel leak that resulted in a fire. The aircraft was damaged beyond economic repair.

12.12.73	Falcon 20	Norwich, Norfolk	Engines	9
LN-FOE	2 GE CF700 turbine	UK	Gulls	3 minor injury



Photo – Eastern Counties Newspapers, Norwich

The co-pilot a qualified commander on the type was flying the aircraft from the left hand seat. The aircraft took off for Gothenburg, Sweden at 15.37 hrs. As it became airborne about half way down the runway the pilot avoided two flocks of birds but between 1 and 200 ft collided with a third flock extending from the ground to well above the aircraft. There were multiple strikes and both engines were heard to run down and fail. The landing gear was still down and avoiding trees he force landed in a field about 1,000 metres off the runway end. All three landing gear legs were torn off and it came to rest on its belly. The two pilots and cabin attendant suffered cuts and bruises but the passengers were uninjured. A total of 35 gull carcasses (**Common gulls** *Larus canus*, 420 gm, **Black-headed gulls** *Larus ridibundus*, 275 gm) were found towards the end of the runway. Both engines had been damaged by one or more birds. Visibility from the Control Tower was restricted by the onset of darkness, and by condensation and rain on the windows. (Litigation was awarded against the airport).

24.04.74	Ilyushin Il-18D	Tashkent	Engine	115
CCCP-75405	4 Ivchenko AI 20M t'prop	Uzbekistan	–	1 fatal

During the initial climb No 4 engine ingested a bird and lost power. The Aeroflot aircraft crashed and was destroyed. One passenger died as a result of the accident.

14.06.75	NA265 Sabreliner	Watertown	Engines	6
N67KM	2 P&W JT12A turbine	USA	Gulls	3 serious injury

Shortly after take-off the pilot informed ATC there was a problem. Moments later the aircraft crashed after the right wing tip struck the ILS installation, the wreckage ending up about 150 metres from the initial ground contact. The aircraft was destroyed by fire. As the aircraft had rotated and become airborne, the pilot saw a flock of **Franklin's gulls** (*Larus pipixcan*, 260 gm), that went through the engines, which lost power and they force landed straight ahead. 13 young gulls were found dead near the runway and there were bird remains in the left engine. (Litigation)

12.11.75	McDonnell Douglas DC10	Kennedy Airport	Engine	139
N1032F	3 GE CF6 turbine	New York, USA	Gulls	2 serious, 11 minor

At 13.10 hrs local the Overseas National Airways DC10 on a company positioning flight crashed while taking off from runway 13R. As the aircraft accelerated past 100 kts, but before reaching V1, gulls (**Great black-backed**, *Larus marinus* 1.7 kg, **Ring-billed gulls**, *Larus delawarensis* 385 gm and **Herring gulls**, *Larus argentatus* 1.1 kg) rose from the runway. The aircraft struck many birds and the take-off was abandoned on the wet runway. As the aircraft was being decelerated on the wet runway, number 3 engine disintegrated and caught fire. Several wheels and tyres failed and the captain steered the aircraft onto a taxiway where the landing gear collapsed and ultimately the aircraft was destroyed by fire. All on board were airline employees who escaped successfully although two received serious injuries.



Due to the loss of No 3 hydraulic system, number 2 brake system, number 3 engine thrust reversers and number 3 spoiler system were all unavailable. Engine imbalance caused the epoxy abrasion fan shroud to catch fire due to blade rub. Engine 3 ingested at least one Great black-backed gull and 9 more were found on the runway together with 13 Herring gulls. An Airworthiness Directive required replacement of the fan shroud material.

20.11.75	BAe 125	Dunsfold, Surrey	Engines	9
G-BCUX	2 RR Viper	UK	Lapwings	6 fatal 3rd party



Photo – Southern News Service, Guildford

At about 75 ft just after becoming airborne on a dusk demonstration flight the aircraft encountered a flock of **Lapwings** (*Vanellus vanellus*, 215 gm). Both engines lost power and surged and the pilot attempted to land back on the runway. It over-ran the runway end and crossed a road and deep ditch into a field before being destroyed by fire. The two pilots were slightly injured, the seven passengers were unhurt. As it crossed the road, it had struck a car killing the lady driver and five children. Subsequently, traffic lights were installed to stop vehicles when aircraft were taking off.

06.02.76	Lear 24	Bari Airport	Engines	2
I-AMME	2 GE CJ610 turbine	Italy	Gulls	2 minor injury

Just before lift-off **gulls** (*Larus sp.*) were ingested in both engines, power was lost and during the attempt to land on the remaining runway the aircraft ended up in a field.

12.11.76	Falcon 20	Naples, Florida	Engines	11
N27R	2 GE CF700 turbine	USA	Gulls	11 serious injury

Airport employees had been dispersing a flock of **Ring-billed gulls**, (*Larus delawarensis*, 485 gm) by driving a luggage cart along the runway. The majority went away but about 30 returned. As the aircraft took off, just after becoming airborne it passed through the flock, the engines lost power and it crashed heavily, the fuselage breaking apart. The two over-wing exits could not be opened and the occupants escaped via the fuselage break and the left forward cabin door. Gull remains were found about 1,400 ft from the end of the 5,000 ft runway and in the engines.

04.04.78	Boeing 737	Gossellies	Engine	3
OO-SDH	2 P&W JT8D turbine	Belgium	Pigeon	Nil



A trainee co-pilot was making touch and go landings under the supervision of an instructor. As the aircraft was about to lift-off, a flock of **Woodpigeons**, (*Columba palumbus*, 465 gm) were seen ahead. Because he believed both engines might have ingested birds, the pilot abandoned the take-off even though the speed was beyond V1. The aircraft over-ran into an industrial estate with a collapsed right landing gear and the right engine torn from the wing. The wreckage ended up 300 metres from the runway on the extended centre-line and was destroyed by fire. Only the left engine was found to have suffered bird strike damage.

25.07.78	Convair 580	Kalamazoo	Engine	43
N4825C	2 Allison 501 turboprop	Michigan, USA	Sparrowhawk	3 serious



As the North Central Airlines aircraft was taking off at 07.02, a **Sparrowhawk** (*Falco sparverius*, 105 gm) struck the left engine just as the aircraft passed V1. The left propeller auto feathered as the aircraft lifted off and it turned to the left and flew for 79 seconds before crashing in a cornfield. One crew member and two passengers were seriously injured. Investigation found that the probable cause was the failure of the captain to follow the prescribed procedures, allowing the aircraft to decelerate into a flight regime from which he could not recover, whilst inadequate cockpit co-ordination also contributed.

26.07.78	Douglas DC3	St. Elena Peten	–	–
TG-ATA	2 P&W R1830 piston	Guatemala	–	–

The Aviateca aircraft was taking off when it collided with birds; a forced landing was attempted at the end of the runway but the aircraft ended up in a swamp.

07.04.81	Lear 23	Lunken, Cincinnati	Windshield	2
N400PG	2 GE CJ610	USA	Loon	1 fatal



While climbing through 4,000 ft in a left turn, a **Loon** (*Gavia immer*, 3.7 kg) penetrated the right windshield killing the co-pilot and seriously injuring the pilot. Windshield debris damaged engine 2 which had to be shut down. Loss of hydraulics resulted in the flaps and brakes being inoperative. Wind-blast caused communication difficulties. The injured pilot demonstrated a high standard of airmanship in successfully returning to Lunken Airport.

06.12.82	Lear 35A	Paris Le Bourget	Nil	4
HB-VFO	2 Garrett TFE731 turbofans	France	Gulls	1 crew injury



As the aircraft was taking off on a wet runway, a flock of **Black-headed gulls**, (*Larus ridibundus* 275 gm) was encountered when the speed was above V1. Take-off was abandoned and the aircraft over-ran the runway by 56 metres into the ILS installation, which

penetrated the cockpit injuring the co-pilot. The brake chute had failed and the emergency brake source was not used. Neither engine had suffered bird damage.

17.08.83	Lear 25	Wilmington	Engines	2
N108PA	2 GE CJ610 turbine	USA	Starlings	–



At 500 ft after take-off, the aircraft passed through a flock of 200 **Starlings**, (*Sturnus vulgaris*, 80 gm). Both engines failed and the aircraft force landed, struck a tree between industrial buildings and bounced across a road into a field. There was no fire. The pilot reported it was only 10 seconds from the bird encounter to ground impact.

29.09.86	Airbus A300	Madras	Engine	196
VT-ELV	2 GE CF6 turbine	India	Black kite	11 minor

The Indian Airlines flight to Bombay had 11 crew and 185 passengers, the co-pilot was handling. During the take-off run both pilots saw a large bird to the right hand side and the Commander told the co-pilot to continue with the take-off. At about 150 kts the co-pilot reportedly saw another large bird on the runway centreline so he rotated the aircraft. When it had attained 5 to 8° nose-up attitude a loud noise was heard from the right side followed by severe vibration. The Commander took control and abandoned take-off. Reverse thrust and brakes could not stop the aircraft, which over-ran sustaining damage beyond economic repair. During the evacuation 4 crew and 10 passengers sustained minor injuries. The bird was identified as a **Pariah kite** (*Milvus migrans govinda*, 680 gm).

15.09.88	Boeing 737	Bahar Dar	Engines	104
ET-AJA	2 P&W JT8D turbine	Ethiopia	Pigeon	35 fatal 21 injured



During the take-off run of the Ethiopian Airlines aircraft at the airport 5,800 ft amsl, at a speed between V1 and VR the aircraft encountered a flock of **Speckled pigeons** (*Columba guinea*, 320 gm). These were ingested in both engines, which started to surge and lose power with loss of EPR and very high EGT. The gear was retracted, full power applied and a slow climb made in order to complete a circuit and return. The aircraft reached a maximum of 7,100 ft and 190 kts. On base leg about 3 ½ minutes after take-off both engines failed and a wheels up forced landing was attempted in open country about 10 km SW of the airport. The aircraft encountered a small riverbank disintegrated and caught fire. The airport only has 2 or 3 jet movements per week. It is believed 10 to 16 birds were ingested in each engine causing the fan damage and surging. The pigeons had been feeding on grass seed that had grown from soil brought to the airport to fill in trenches that had been dug for cable laying.

25.07.90	Boeing 707	Addis Ababa	–	5
ET-ACQ	4 P&W JT3D turbine	Ethiopia	Pigeon	1 serious injury

As the Ethiopian Airlines aircraft was taking off a flock of **pigeons** (*Columba* sp.) was encountered. Take-off was abandoned after V1 and the aircraft over-ran and was damaged beyond economic repair.

20.08.93	Antonov An-12	Slavgorod	Engines	7
CCCP-11375	4 Ivchenko AL20 turboprop	Russia	–	Nil

During a freight flight, as the aircraft climbed through about 150 ft, engines 2 and 4 failed. The crew attempted to return but had to force land beyond the end of the runway. It touched down with the landing gear retracted and slid for about 460 metres before it caught fire and was destroyed. At the time of the take-off a large flock of birds was reported in the vicinity of the runway and it is believed the engine failures were the result of multiple ingestion.

20.01.95	Falcon 20	Paris Le Bourget	Engine	10
F-GHLN	2 GE CF700	France	Lapwings	10 fatal

Just after the aircraft rotated on take-off on a charter flight to Romania from runway 25 at Paris, Le Bourget, it encountered a flock of **Lapwings** (*Vanellus vanellus*, 215 gm). A number were ingested in engine 1. The aircraft was climbing but the pilot reported he was returning due to an engine fire. A number of witnesses saw the rear of the aircraft engulfed in flames. A tight left hand circuit was flown at a height of about 500 ft agl in an attempt to land back on the runway. The aircraft was about 30° off the runway heading and landed heavily with 15° of left bank in a nose-down attitude just to the right of the runway close to the intersection with runway 21. The aircraft was destroyed by impact and fire. About 15 dead birds were found on the runway close to the point where the aircraft lifted off.



The engine rear cowling, exit guide vanes and a number of fan blades were found further along the runway whilst the fan disc with most of the blades sheared off at the root was found about 500 metres to the side of the runway. The fan had separated and shrapnel had penetrated the rear fuselage puncturing the engine feeder tank and fire had immediately broken out. The cockpit voice tape revealed that while taxiing the pilots had remarked 'look at those birds there'. The person responsible for airport bird control had gone off duty due to illness. There was considerable litigation involving the Airport Authority, and the aircraft and engine manufacturers. (The full 76 page Report is available in French on the French Accident Investigators web site <www.bea-fr.org>).

04.04.96	SA227 Merlin III	Ushuaia	Windshield	2
	2 Garrett TPE 331	Argentina	–	Nil

While landing the aircraft struck several large birds, one breaking the windshield and others striking the left engine. Control was lost and the aircraft ran off the side of the runway and was damaged beyond repair.

27.07.98	Antonov An-12	St Petersburg	Engine	9
	2 Ivchenko AI-20 turboprop	Russia	–	1 serious

The aircraft was taking off at 03.42 in the morning with 13 tonnes of freight, 7 crew and 2 passengers. Immediately after lift-off one engine suffered bird ingestion and the pilot lost control. The aircraft descended from about 600 ft onto the runway and caught fire. All occupants were lucky to escape but one suffered severe burns. Crows and gulls frequent the area.

14.09.98	Antonov An-32	Lokichar	Engines	4
4K-66759	2 Ivchenko AI-20	Kenya	–	1 serious

Just after rotation on a flight to Kigali the aircraft suffered multiple bird strikes with ingestion and power loss in both engines. After touching down on the remaining runway it overran into rough ground and trees. The right gear collapsed and it caught fire and was destroyed. The accident was in daylight, VMC and with a wind of 14 kts.

19.04.00	Antonov An-8	Pepa	Engine	24
TL-ACM	2 Ivchenko AI-20	Zaire	–	24 fatal

The Central African Airlines aircraft reportedly suffered a bird ingestion shortly after take-off on a flight to Kigali. It could not maintain height on one engine and crashed while attempting to return to the airstrip. All on board were killed.

30.04.02	Antonov An-12	Heglig	Engine	–
ST-AQP	2 Ivchenko AL20 turboprop	Sudan	–	–

At about 60 ft on finals of a daylight visual approach following a freight flight from Khartoum, the crew saw a flock of birds rising from the right and it is believed engine 4 failed due to ingestion. The aircraft yawed to the right, descended and undershot, the right main gear struck the top of earthworks and was torn off. It landed on the runway and veered to the right with the remaining gear collapsed.

End of Section1

Section 2 – AEROPLANES OF 5,700 kg and BELOW

03.04.12	Wright Flyer	Long Beach	Controls	1
–	1 piston	California, USA	Gulls	1 fatal



Cal Rogers the first person to fly across the USA was making a demonstration flight along the beach when he encountered a flock of **gulls**, (*Larus sp.*). One of them jammed the rudder control causing the aeroplane to dive into the surf breaking the pilots neck.

10.02.39	Arado (Ar79?)	Madras Airport	–	2
D-	1 piston	India	large	2 fatal

The aeroplane had recently flown from Benghazi and was giving a demonstration flight. Witnesses stated that just after take-off the pilot lost control attempted to avoid a large bird and the aircraft crashed killing the pilot, the passenger died in hospital.

---.55	Cessna	Aberdare Mtns	Controls	1
	1 piston	Kenya	Vulture	1 fatal

While flying en-route the pilot attempted to avoid a **vulture (Gyps sp.)**. The bird hit the wing tip jamming the ailerons causing the aircraft to crash.

10.01.59	–	Serengeti	–	1
	–	Tanganyika	Griffon vulture	1 fatal

The aircraft struck a **Griffon vulture** (*Gyps fulvus*, 5.4 kg) and crashed.

--.03.63	Beech 35 Bonanza	Bakersfield	Tailplane	1
	1 piston	California, USA	Common Loon	1 fatal

Collision with a **Common loon** (*Gavia immer*, 3.7 kg) removed the tailplane.

(Note: This one does not appear to be on the NTSB database so it cannot be confirmed)

01.02.64	D31 Turbulent	Nr Belfast	Windscreen	1
	1 piston	UK	Gull	1 fatal

The single seat open cockpit aircraft spun into the ground after striking or attempting to avoid a **gull**. A dead gull was found 60 metres away and avian blood was found on the windscreen.

16.08.70	Stampe SV4	Nr Wicklow	Cockpit	2
	1 piston	Ireland	Jackdaw	1 serious

While filming aerial sequences low over a lake with the windshields removed from the open cockpit biplane, a **Jackdaw** (*Corvus monedula*, 230 gm) passed through the propeller disc. The pilot was struck in the face and almost knocked unconscious. He pulled up sharply to avoid the water and hit power lines. There was a flash and the aircraft dived into the lake, both occupants escaping. The pilot suffered severe facial cuts needing 50 stitches.

02.07.71	Cessna 180	British Columbia	–	3
	1 piston	Canada	Bald eagle	2 fatal

While en-route the aircraft struck a **Bald eagle** (*Haliaeetus leucocephalus*, 5 kg).

16.04.72	Mitsubishi MU2	Nr Atlantic City, NJ	Windshield	3
N132MA	2 turboprop	USA	Geese	3 fatal

While in the climb on a flight from Atlantic City to Philadelphia, PA the aircraft struck a flock of **geese** (*Anser sp.*) destroying the windshield. One or both pilots were incapacitated resulting in an uncontrolled descent into the sea.

28.12.75	Mooney M20	Stockton, California	–	5
	1 piston	USA	Geese	5 fatal

The aircraft crashed shortly after take off following a collision with three **geese** (*Anser sp.*). **In previous Papers this had been quoted as a bird strike accident, the NTSB records do not mention this, it is given as an in-flight failure of the fin and rudder with evidence of rot due to improper maintenance.**

30.08.76	Saab MFJ15	Nr Awassa	–	2
	1 piston	Ethiopia	Vulture	2 fatal

Climbing through 200 ft, struck a **vulture** (*Gyps sp.*), control lost and crashed vertically.

23.04.77	Aero Command 690	Meigs Field, Chicago	Engine	4
N847	2 turboprop	USA	Gulls	4 fatal

During take-off from the lakeside airport, a **gull** (*Larus sp.*) was ingested in one engine causing loss of power. Emergency procedures were incorrectly executed, the flaps were left down and the aircraft spun into the water.

19.10.79	Fairchild SA26 Merlin	Palo Alto, California	Engine	4
N65103	2 turboprop	USA	Gulls	2 fatal, 1 injured

During the approach, a flock of **gulls** (*Larus sp.*) clogged an engine intake, although the engine was not damaged. Pilot attempted a go-around but lost control crashing inverted into a parking area destroying or damaging 7 other aircraft.

06.08.81	Cessna 402	Nr Musiars	Windshield	1
	2 piston	Kenya	Griffon vulture	1 fatal

A **Ruppell's griffon vulture** (*Gyps rueppellii*, 7.5 kg) holed the windshield killing the pilot.

---.81	Callair A9	–	Controls	1
	1 piston	Australia	Black kite	1 minor injury

While glider towing, a **Black kite** (*Milvus migrans*, 780 gm) became lodged between the strut and the left wing top surface causing loss of aileron control. The aircraft was forced into a turn descending into woodland where it was destroyed by fire.

11.07.83	Boeing Stearman 1 piston	Webb, Texas USA	None –	1 1 serious injury
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Just before flying under wires during a dusk agricultural spray run, a bird broke a plastic fuel gauge under the centre section of the upper wing. Fuel sprayed onto the windshield and pilot's face restricting visibility. In an effort to miss power lines, the aircraft struck trees destroying the aircraft and seriously injuring the pilot.

21.07.84	Piper PA18 Cub 1 piston	Seboomook Lake USA	Windshield Cormorant	– 1 minor injury
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As the floatplane was on final approach to a water-landing a bird, believed to be a **Cormorant** (*Phalacrocorax sp*, up to 2.4 kg) holed the windshield. The pilot was stunned and his face cut by his glasses, he came-to in the water. He released himself from the submerged, inverted aircraft and was rescued by a nearby boat.

30.08.84	Boeing Stearman 1 piston	Kalispell, Minnesota USA	Canopy Red-tailed hawk	1 1 fatal
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While turning during an agricultural spray run at about 15 ft and 55 kts, struck a bird believed to be a **Red-tailed hawk** (*Buteo jamaicensis*, 1 1 kg). The impact broke the canopy, distracted the pilot and the aircraft struck the ground and overturned killing the pilot.

25.11.84	Ercoupe 415 1 piston	Wixom, Minnesota USA	None –	2 1 fatal 1 serious
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Turning finals into a low sun a large flock of birds flew in front, the pilot dived to avoid them and collided with power lines. The crash killed the pilot whose blood alcohol level was 0.11%.

29.01.87	Cessna 150 1 piston	Vancouver, Washington USA	None –	2 2 fatal
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Returning from an instructional flight the aircraft passed through an area of heavy bird activity and the student made a nose-down avoidance manoeuvre. The instructor took control with a rolling pull-up, overstressed the right wing which failed, and the aircraft crashed.

--.08.87	Hang glider Nil	Flinders Ranges Australia	Wing tip Wedge-tailed eagle	1 1 serious
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While thermalling at 2,700 ft a **Wedge-tailed eagle** (*Aquila audax*, 3.5 kg) attacked the hang-glider, on it's third attack it dislodged the wing tip tensioner slackening one wing. It spiralled down and was wrecked hospitalising the pilot. There had been similar incidents in the area.

17.09.87	Schweizer 164 1 piston	Weiner, Arizona USA	None –	2 1 fatal 1 serious
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During an agricultural flight to chase birds from a rice field, the aircraft struck a large flock of birds. The pilot was distracted and the wheels touched the crop and the aircraft overturned. Neither occupant was restrained, the passenger of the single seat aircraft was found dead outside the cockpit. Several dead birds were found at the accident site.

24.11.87	Osprey Homebuild 1 piston	Cape Liptrap Australia	Windshield –	1 –
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At 70 kts just after take-off, the windshield was shattered by a bird, wind blast impairing the pilot's vision. After landing and shutting down, the back of the aircraft was found to be on fire. The pilot escaped but the aircraft was burnt out. It is believed the bird damaged a fuel line allowing fuel to spray onto the hot exhaust.

11.02.88	Cessna 172P 1 piston	East Hampton, NY USA	– –	1 1 fatal
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Shortly after take-off on a local flight the pilot radioed that he had struck birds and could not maintain control, the aircraft crashing into the sea about 1 mile off-shore killing the pilot.

26.12.91	Piper PA31 Navajo 5Y-SRV 2 piston	Musiara, Maasi- Mara, Kenya	Windshield Vulture	9 9 fatal
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A DC3 had suffered a collapsed landing gear and had over-run. The PA 31 flew over the site, which was not its destination, probably to show the passengers. At about 250 ft and a fairly high cruise speed it struck a **White-backed vulture** (*Gyps africanus*, 5.4 kg). It oscillated, banked and pitched down uncontrollably before crashing and burning just beyond the end of the runway killing all occupants. Witnesses had seen a black object fall from the aircraft, these were found to be the vulture and part of the windshield. The autopsy on the pilot revealed pre-impact spinal injuries.



25.01.92	Cessna 401	Maasi-Mara	Controls	7
5Y-BGW	2 piston	Kenya	Marabou stork	7 fatal

While in the cruise another aircraft heard a radio transmission " I have been hit by a large bird and I'm having difficulty flying it, I can hardly control the aircraft". It crashed killing all occupants. The wing tip fuel tank and aileron were found about one mile from the main wreckage. Avian blood believed to be from a **Marabou stork** (*Leptopilos crumeniferus*, 5.9 kg) was found on the wing leading edge.



05.06.92	SA300	Willis Point, Texas	–	1
N5649	1 piston	USA	–	1 fatal

During low-level aerobatics over a field, the aircraft collided with a large black bird. The pilot lost control, the aircraft crashed and was destroyed by fire.

10.06.92	Grumman G164	Klamath Falls	None	1
	1 turboprop	Oregon, USA	–	1 minor, 3 3 rd party minor

At the end of a crop spraying flight the pilot was paralleling a road on which his son was driving a pick-up. As he reached down to turn off the spray pump the truck disturbed a flock of birds. The pilot took evasive action, the aircraft struck the truck cab and was destroyed when it crashed in a ditch.

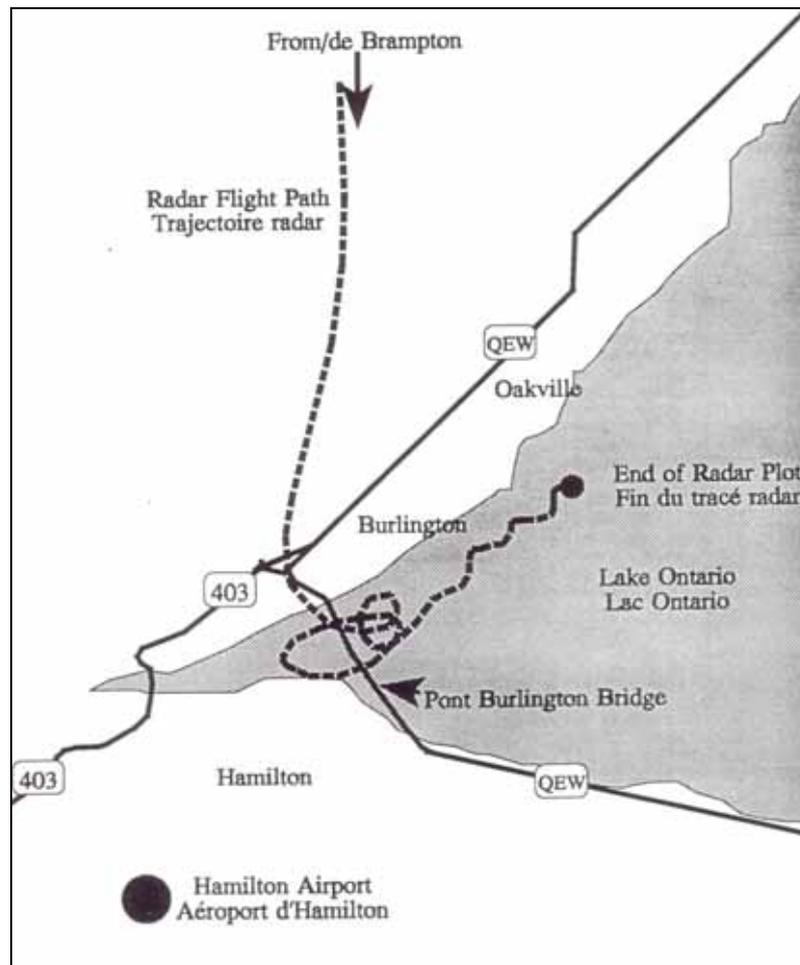
10.08.92	Cessna 441 Conquest	Gainesville	Engine	1
	2 turboprop	Georgia, USA	–	1 serious

At about 50 ft after take-off a flock of birds caused power loss on the right engine. The aircraft lost height and crashed about 1½ miles beyond the runway. The pilot had failed to feather the right propeller or raise the flaps and landing gear. The NTSB Report states there was a partial loss of power and evidence of ingestion in the right engine, he shut down the wrong engine and did not follow the Emergency Check List. The pilot had over 8,000 hours with 2,500 multi.

06.05.93	Cessna 207	Holy Cross	Windshield	1
	1 piston	AK, USA	–	Nil

While cruising the pilot was looking at birds out of the left side cockpit window when peripherally he saw a white flash fill the right side of the windshield. The aircraft began an uncontrollable descent and right yaw. The engine continued to run smoothly but adding power did not arrest the descent. The aircraft was destroyed in the crash landing. No evidence of a bird strike was found.

24.02.94	Piper PA28 Warrior	Lake Ontario	Windshield	1
C-GXGB	1 piston	Canada	–	1 fatal



While flying from Brampton to Hamilton Airport, Ontario, at 13.22 the 17,000-hour pilot was instructed to hold over the bay because of IFR traffic. At 13.34 he told ATC that something had come through the windshield, that he could hardly see and was disoriented. Six minutes later radar showed the aircraft in an 'S' pattern over the lake before it disappeared 14 miles NE of Hamilton airport. An aviation witness on the ground reported the weather was sunny, visibility unlimited and cloud base 5,000 ft. There has been no trace of the aircraft.

18.06.94	Cessna 441 Conquest	Fort Frances	Engine	7
N441C	2 turboprops	Ontario, Canada	Gulls	Nil

The aircraft was making a night take-off at 04.25 hrs. As the pilot rotated the aircraft at 98 kts he saw a bird flying towards the left side of the aircraft and it yawed to the left as the engine torque reduced. He lost control and it crashed ending up sliding backwards to the left side of the runway. He got the passengers out and ran to the Terminal Building to raise the alarm. The left engine, nose gear and right flaps and aileron were torn off and the left gear was driven through the wing. The aircraft was found to be 620 lbs overweight and with the c of g 2 inches behind the aft limit. **Gull** (*Larus* sp.) feathers and a wing were found on the runway and a gull or gulls had been ingested in the left engine.

15.07.94	Cessna 172XP	Indian Shores	Windshield	1
N2827V	1 piston	Florida, USA	Pelican	1 fatal

At 16.10 hrs the aircraft was flying south along the coast at about 200 ft and about 300 metres off-shore. A witness had videoed it and what appeared to be a large bird collided with the windshield area, the aircraft rolled inverted and crashed into the water. Enhancement showed two dark objects in front of the aircraft just before it pitched up and rolled inverted, one appeared to strike the aircraft. The video showed numerous **Pelicans** (*Pelecanus occidentalis*, 7 kg) in flight and on the water. The pilot's facial injuries were consistent with the windscreen shattering. The Commercial pilot who had flown at least 596 hours was ferrying the aircraft to a new owner.

18.10.94	Beech B58 Baron	Fort Wayne, Indiana	Windshield	2
N83KK	2 piston	USA	geese	Nil

Just after take off the pilot spotted **geese** (*Anser* sp.) but one penetrated the windshield and hit the pilot. He cut the power and attempted to re-land but went off the end of the runway into a building. The aircraft was destroyed.

22.10.95	DHC-6 Twin Otter	Bole Airport	Windshield	20
ET-AIO	2 turboprop	Ethiopia	Vulture	4 serious



About 20 miles from Addis Ababa, the aircraft collided with a **White-backed vulture** (*Gyps africanus*, 5.4 kg). It struck the windshield causing the support structure and both windshields to fail and collapse into the cockpit. The crew, although injured, maintained some control and continued to Bole airport. On arrival they were unable to position the aircraft correctly for landing and rather than go-around force landed some 300 metres south of the runway. During the ground run it fell into a depression and sustained damage beyond economic repair.

18.07.96	Robin DR380	Nr. Ciriza, Navarre	–	3
F-BRVF	1 piston	Spain	Vulture	3 fatal

About 10 minutes after taking off from Pamplona, the three occupants were killed when the mainly wood and fabric aircraft crashed, apparently after colliding with a **vulture** (*Gyps* sp.). The accident was at 10.40 hrs. The wreckage was spread over a wide area.

15.11.97	–	Pic du Midi	–	4
F-	–	France	–	4 killed

The aircraft collided with a bird and crashed in the Pyrenees near the Pic du Midi observatory killing the 2 adults and 2 children on board. A rescue helicopter which had dropped a medical team at the site struck wires on take-off and crashed killing the two pilots.

24.11.97	GAF N24A Nomad	La Ceiba	engine	12
HR-AQY	2 Allison 250 turboprop	Honduras	vulture?	1 serious

The aircraft was returning due to bad weather at destination Roatan. At 10.15 hrs while on the approach the aircraft hit a **buzzard** (*Buteo sp*) or **vulture** (*Gyps sp.*). The right engine suffered an uncontained failure and fire, partially breaking away and moving down and inboard with the propeller cutting into the fuselage. The aircraft was force landed on a football field short of the airport. Three passengers and the pilot suffered serious injury.

04.03.98	Piper PA23 Apache	Somerville, New Jersey, USA	Tail	2
N3374P	2 piston		–	2 fatal

The aircraft was in the cruise, radar data showing it to be at about 1,500 ft agl and 146 kts. Witnesses saw the top of the fin start to oscillate and the entire tail section separate from the aircraft, which crashed into the roof of a family housing unit and exited through the front wall into the street. The pilot and his pilot passenger were killed. The tailplane and rudder were 670 ft from the main wreckage. Several witnesses had seen a large number of birds in the area. Laboratory tests on the tailplane leading edge showed impact evidence with a relatively soft object. There was no sign on it of blood, feathers or remains and nothing was found on the ground in the surrounding rural area populated by small animals and carnivores.

14.06.98	Lake LA-4	St Mary's, AK USA	Nil	1
	1 piston		Ducks	Nil

The commercial pilot was taking off from a river, at about 15 ft two **ducks**, (*Anser sp.*) flew in front distracting his attention. They passed on the right about 6 ft from the windshield. The next thing the pilot remembered were trees filling the windshield. The aircraft collided with the trees resulting in substantial damage to almost certainly beyond economic repair.

15.10.99	Cessna 208 Caravan	Ranger Lake Canada	None	1
	1 turboprop		–	1 fatal

While on a VFR cargo flight to Red Lake Airport, the pilot was asked to remain clear of controlled airspace, as the weather had deteriorated such that Special VFR was required. Another aircraft on an IFR approach saw the Caravan through the broken cloud layer and queried ATC on his intentions. The Caravan pilot descended to about 300 ft agl where he reportedly encountered a flock of birds and took evasive action. It appears that the pilot lost directional control and a wingtip touched the lake surface causing the aircraft to cartwheel and come to rest submerged.

22.04.01	Edge 360	Barksdale AFB USA	Propeller	1
	1 piston		–	1 serious

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 a bird flew into the propeller. The aircraft bounced off the grass infield bending the fixed landing gear and into the air before the pilot turned back to avoid culverts and land on the runway. The pilot suffered two cracked vertebrae and the aircraft was damaged beyond repair.

04.02.02	Piper PA28 Saratoga	Mocimboa da Praia, Mozambique	Windshield	4
	1 piston		Vulture	2 fatal, 2 serious

The South African registered aircraft was on final approach to the airport in the eastern coastal port town near the Tanzanian border. It collided with a **vulture** (*Gyps sp*), which came through the windshield breaking the pilot's neck. The aircraft crashed and burned killing the front seat passenger and resulting in severe burns to the passengers in the rear seats.

End of Section 2

Section 3 – HELICOPTERS

02.03.81	Bell 206 Jet Ranger 1 turbine	Vancouver State Canada	Windshield Raven	4 4 fatal
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The helicopter went missing during a wildlife research flight involving bighorn sheep. The helicopter was flying low over a mountainous area. It crashed in dense timber and snowfall covered the wreckage delaying its discovery until 8 June. At least one **Raven** (*Corvus corax*, 1.2 kg) had struck the plexiglass front windshield and probably entered the cockpit. The four occupants were dead. The pilot had over 9,600 hours on type.

29.01.83	Bell 47 1 piston	Riverview, Florida USA	– –	2 1 minor
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The helicopter was flying at about 45 kts 15 ft above the water when a bird came through the door opening and hit the pilot's right temple. He lost control and it crashed into the sea. The passenger suffered minor injuries.

20.01.85	Hughes 369 1 turbine	Honolulu USA	Rotor –	1 Nil
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While flying at about 400 ft about ½ mile offshore the pilot was unable to avoid a large flock of birds. An extreme vibration developed so he ditched the helicopter, which rolled over and sank. The pilot swam ashore.

30.05.90	Schweizer 269C 1 piston	Tallulah, Louisiana USA	– –	1 Nil
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While en-route from Meridian to Shreveport at 800 ft, the helicopter struck a flock of birds resulting in severe vibration so the pilot made a precautionary landing. During the flare the main rotor blade flexed and struck the tail boom causing the helicopter to become uncontrollable and roll over.

24.03.93	Bell 47 1 piston	– USA	Tail rotor –	2 1 fatal
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The helicopter was being used for fish spotting with the ship's captain on board as passenger. When in the cruise there was a loud bang and all yaw control was lost. The pilot thought the tail rotor had been struck by one of the many large sea birds in the area. He was able to maintain directional control at 60 kts and small boats were lowered from the ship so that the captain could jump out (there were language/communication difficulties). While slowing and without being instructed the captain at about 75 ft and 45 kts dived out head first but sustained fatal injuries. The pilot made a run-on landing on the water and was hoisted onto the ship. The tail rotor blades showed impact damage.

16.05.94	Bell 47 1 piston	Tulsa, Oklahoma USA	– –	1 1 fatal
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Witnesses heard a loud noise and saw an object separate from the second of two helicopters, which then inverted and crashed into the back yard of a house. The left synchronized elevator and end cap were found 240 ft away. The pilot of the lead helicopter said he warned the other pilot about a flock of birds and had banked sharply to avoid hitting them. Investigation determined that improper use of the cyclic and collective controls when he manoeuvred abruptly to avoid birds had caused the in flight separation. The 3,919-hour pilot had only flown 87 hours on helicopters.

27.01.00	Bell 407 Long Ranger	Nr Playa Leona	Windshield	5
HP-2599	1 turbine	Nr Panama City Panama	Buzzard	2 fatal, 3 serious

While about 25 nm SW from Panama City, Panama and at about 1,500 ft and 90 kts, a bird, identified as a **Black vulture** (*Coragyps atratus*, 1.7 kg), penetrated the windshield and struck the pilot knocking him unconscious. He fell across the controls and the co-pilot attempted to take over but the helicopter crashed onto a hillside and rolled down a slope. The pilot and one passenger were killed and the co-pilot and two passengers were seriously injured. The dead bird was found in the cockpit.



19.03.00	Bell 212	Nr Snelling, California	–	1
N-415B	2 turbine	USA	–	1 fatal

The helicopter was being positioned from Fresno to Sacramento, California in company with another helicopter. The lead pilot reported they were cruising at about 4 to 500 ft agl over rolling terrain at about 100 kts with the other helicopter echelon right and about 8 rotor discs to the rear. They had been communicating regularly on a common frequency. Nearing Merced the lead pilot did not get an answer to his call and turned to look for the other helicopter. He saw a column of smoke and found the Bell 212 had crashed and was engulfed in flames. He landed in an attempt to rescue the other pilot but was driven back by the fire. He reported that he had an encounter with a large bird about a mile back from the accident site. The wreckage trail was nearly 1,000 ft long one of the first pieces was a 12 ft section of main rotor blade. The complete right windshield was found by the main wreckage but the left windshield was not found.

END