Embry-Riddle Aeronautical University

From the SelectedWorks of Paul F. Eschenfelder

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Aviation Wildlife Hazard - UK Flight Safety Committee

Paul F. Eschenfelder

Available at: https://works.bepress.com/paul_eschenfelder/15/
Air Berlin B737-700 vs. geese
April 2010
Hong Kong – 2010
Second helo destroyed in two years
IBSC estimate:
Cost to operators worldwide: $1-1.5 Billion

Annual cost: direct repair, out of service, Customer accommodation
Bird strikes can cause severe damage to CFM56-3/-5A/-5B/P/-5C and -7B engines.

- Aborted take off due to engine failure:
  - They are usually caused by bird ingestion, with severe fan damage.
  - Fan blade failure due to bird impact.
  - Excessive noise emitted by the engine due to bird impact.
  - Engine failure due to bird ingestion at high altitudes (92K and 12K ft).

50% of unscheduled engine removals show bird ingestion damage.
Engine Cost Impact 2009

- Blended / Replaced Blades
  - $2.3 Million (Est.)

- Engines Pulled
  - $85 Million (Est.)

- Engine Cowl Damaged
  - $17.5 Million (Est.)

Total = $113 Million
2009 Out of Service Events
FOD & Wildlife

• 37 aircraft out-of-service

• Peak months due to bird migration

• Out-of-service time cost $1.2 Million

Out of Service A/C (Wildlife)
Corporate Strategy

Corporate

- Responsible of maintaining the Corporate Policy
- SME support to station management
- Helping to Develop mediation plans
- Recommendations & guidance for mitigation
- Event reporting tools (Damage, FAA)
- Communications, data analysis, trends
- Interaction with Airport Authorities & Government Agencies
Summary

- easyJet are seen to be taking a very pro-active stand in relation to these activities, and driving the airports towards best practice. Other carriers are now looking to adopt a similar approach, and a recent presentation of our strategy at the UK Flight Safety Committee is resulting in increased liaison with other airlines. We anticipate that we will see an increased number of airlines all putting similar pressures on airport authorities, and we would work with them both corporately, and locally at airport level, in relation to this safety issue.

- We are actively engaged with airport authorities and regulators across the network at both a local, national, and corporate level. E.g. Our Spanish airport management team are engaged corporately with AENA regarding the Spanish airports.

September 2009
Brussels Bird Control Unit:

• Part-time leader

• NO training for bird control people – hunting license only
Rome 2007 – Delta B767

*Crew saw the birds on taxiout

• Crew discussed the birds
• Crew never reported the birds
• Crew never asked for a bird scare before takeoff
• Crew took off anyhow, damaged both engines severely
ETOPS/LROPS?

- Cyprus Air – A330 Lanarca-Heathrow
- Qantas - B767 Melbourne-Sidney
- Thomas Cook – B757 Istanbul-London
- Arik Air – B737 Owerri-Lagos
- BA 747 – Orlando-Gatwick
- Delta 767 – Madrid-Madrid
- PAL 777 – Manila-Vancouver
<table>
<thead>
<tr>
<th>Date</th>
<th>Location</th>
<th>Aircraft Type</th>
<th>Aircraft Damage</th>
<th>Injuries</th>
</tr>
</thead>
</table>

Following major modifications and an extensive maintenance check, the Airline Express flight was undergoing a functional check flight at night with three flight crew members and three maintenance technicians aboard. The U.S. National Transportation Safety Board (NTSB) said that airplane flight data recorders showed that the pilot was on a climb and had been cleared to the cloud deck. The crew applied full power, but the pilot was in the cockpit, and the plane descended rapidly and struck a mountain. The pilots previously had experienced DC-8 stalls in a simulator that did not replicate the pronounced stall break characteristic of the airplane. (NTSB report AA09R005, Accident Prevention, 9/5/09) Oct. 14, 2009 | Jefferson City, Missouri, U.S. | Bombardier CRJ200 | destroyed | 2 fatal  |

The captain told a controller that he had “decided to have a little fun” and climb to the airplane’s maximum altitude, Flight Level 410, during a night positioning flight for Pinnacle Airlines. The CRJ was in a very low energy state when it reached that altitude, and the first officer kept increasing angle-of-attack in an attempt to keep the airplane from climbing. Both engines failed when the airplane finally stalled. The pilots regained control at FL 340, but were unable to reset the engine due to procedural nonadherence and possibly because of engine core lock. The CRJ crashed in a residential area 2.5 mi (4.0 km) from the emergency hospital that the crew was trying to reach. NTSB said that the accident was caused in part by the pilots’ unprofessional behavior, deviation from standard operating procedures and poor airmanship. (NTSB report AA10A001, ASW, 7/10, p. 44) Nov. 27, 2008 | Perpignan, France | Airbus A320-232 | destroyed | 7 fatal  |

The A320, leased by XL Airways, was undergoing functional checks required before its return to air New Zealand. The French Bureau d’Enquêtes et d’Analyses (BEA) said that the flight crew was unaware that the wings had accumulated and frozen inside the angle-of-attack sensors. The airplane stalled during low-speed checks conducted at a lower-than-authorized altitude and descended into the Mediterranean Sea. BEA said that among the factors contributing to the accident was the flight crew’s lack of training and experience in performing functional check flights. (BEA report D-IA081227, ASW, 11/10, p. 22) Jan. 12, 2009 | Norwich, Norfolk, England | Boeing 737-700 | none        | 4 none   |

Observers from the aircraft owner and the airline described the situation in the 737 as being too early for the first or second maintenance check flights. The U.K. Air Accidents Investigation Branch (AAIB) said that the elevator control tab had been adjusted improperly, and when the flight crew isolated hydraulic power from the flight controls for a manual reversion check, the aircraft pitched nose down and descended out of control from 15,000 ft to 5,000 ft, reaching 429 ft and 20,000 fpm. The AAIB said that the crew did not use the aircraft maintenance manual test procedure, which requires that a further boost be maintained during a manual reversion check. (AAIB Bulletin 92/2010) Nov. 11, 2009 | Kent, England | Dassault Falcon 2000 | substantial | 6 none   |

Although not trained to conduct functional check flights, the flight crew was asked to perform “high-speed taxi tests” following maintenance to correct a tendency of the airplane to pull left when the wheel brakes were applied. A flight attendant and three maintenance personnel were aboard the NetJets Europe airplane when the crew performed eight accelerating stop tests within about 15 minutes, causing the brake assemblies to overheat severely and ignite hydraulic fluid released under pressure from melted seals on the left main landing gear. (AAIB Bulletin 12/2010, ASW, 2/11, p. 57)

Table 1

- USAir 320 – destroyed, 2009
- Ryanair B737 – destroyed, 2008
- KLM B737 – destroyed 2004
- Falcon 20 – destroyed, 2007
- Citation – destroyed, 2009
- Sikorsky helo – destroyed, 2009
FAA’s position?

Mike O’donnell, Director, Airport Safety and Standards: “The FAA at no time considers birds a severe or serious hazard”. Summer, 2010

*Last four years: 11 dual engine ingestions*
Resident Canada Goose populations – North America

No. of Geese (x 1 Million)
Engine standards today

• **Single** four (4) pound bird
• Can’t blow up
• Can’t catch fire
• Can’t tear off the wing
• Must be able to be shut down

• **What’s missing?**
The 36 Bird Species in N. America with Mean Body Masses >4 lbs

<table>
<thead>
<tr>
<th>Rank</th>
<th>Species</th>
<th>Mass (lbs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mute swan</td>
<td>26.01</td>
</tr>
<tr>
<td>2</td>
<td>Trumpeter swan</td>
<td>25.13</td>
</tr>
<tr>
<td>3</td>
<td>California condor</td>
<td>22.28</td>
</tr>
<tr>
<td>4</td>
<td>Wild turkey</td>
<td>16.31</td>
</tr>
<tr>
<td>5</td>
<td>Tundra swan</td>
<td>15.65</td>
</tr>
<tr>
<td>6</td>
<td>American white pelican</td>
<td>15.43</td>
</tr>
<tr>
<td>7</td>
<td>Whooping crane</td>
<td>12.84</td>
</tr>
<tr>
<td>8</td>
<td>Sandhill crane</td>
<td>12.78</td>
</tr>
<tr>
<td>9</td>
<td>Yellow-billed loon</td>
<td>12.13</td>
</tr>
<tr>
<td>10</td>
<td>Bald eagle</td>
<td>11.79</td>
</tr>
<tr>
<td>11</td>
<td>Golden eagle</td>
<td>10.83</td>
</tr>
<tr>
<td>12</td>
<td>Canada goose</td>
<td>9.22</td>
</tr>
<tr>
<td>13</td>
<td>Common loon</td>
<td>9.11</td>
</tr>
<tr>
<td>14</td>
<td>Brown pelican</td>
<td>8.16</td>
</tr>
</tbody>
</table>
\[ F = \left( \frac{1}{2} \text{ mass} \right) \times (\text{velocity squared}) \]
DH- 8 blades
4. SAFETY RECOMMENDATIONS

REC 21/05. It is recommended to The Boeing Company that supplementary training instructions are provided to operators of Boeing 737 to allow flight crews to quickly identify a possible NWS malfunction during landing and to advise them of the expected performance of the aircraft and of the measures that should be taken to avoid losing directional control at high speeds.
Is wildlife a hazard to aviation?
Is wildlife a hazard?

• “Cleared to land – mind the truck on the runway”

• “Cleared to land – mind the birds on the runway”
The ‘Swiss cheese’ model of an accident (Crash of SA 227 in Scotland 2002)
Use caution for the birds!

Uhhhh, how do we do that?
• USAir 320 – destroyed, 2009
• Ryanair B737 – destroyed, 2008
• KLM B737 - destroyed, 2004
• Falcon 20 – destroyed, 2007
• Citation – destroyed, 2009
• Sikorsky helo – destroyed, 2009
• Defined the problem
• Developed mitigation
• Developed policy for mitigation integration
• Trained the policy
• Implemented policy
Search the FAA Wildlife Strike Database

Start your search by selecting a "State", "Airport", or "Airline". You may limit your search to a specific date range and / or optional search criteria. Click the "Submit" button to view your results in a table.

The table may be sorted by any column, by clicking on the column name. Click once to sort ascending, and again for descending. Results can be exported to Microsoft Excel using the "Export to Excel" button beneath the table.

View Strike Reports by:
- State
- Airport
- Airline

Date Range:
From: 1/1/2011  To: 4/1/2011

Optional Search Criteria:
- Aircraft Type
- Engine Type
- List of Damage
- Species

Results:

Note: This table includes only 8 out of a total of 94 fields of data. To view all 94 fields use the "Export to Excel" button.
Real Time Bird Migration Observation and Warning

3-D Long Range Radar

Central Analysis Expert System

Real Time Data Collection

Real Time Warning

©Wilhelm Ruhe, BGIO, 2009
Application of Knowledge

Combining ornithological knowledge and using meteorological forecasts...
We are looking to you for help

We need:
Training, policy guidance and oversight
How to ‘use caution for the birds’

• Give **SPECIFIC WARNINGS** – ‘Use caution for flock of gulls at 18L touchdown zone’

• Name the threat (gulls, geese, starlings)

• Give the **location!**

• Statement? Or **Warning?**
• Where are the birds – what altitude?
• 95% of birdstrikes happen below 3,000’
• Why aren’t we using segregation & avoidance?
“Use Caution” – On approach

- Remain above 3,000’ until necessary to descend to land
- Reduce airspeed
- Reduce engine speed
“Use Caution” – on departure

- **DON’T TAKEOFF INTO HAZARDS!**
- Climb on ICAO NADP 1 or best angle of climb until 3,000’
- Skip the sightseeing – watch out for hazards
Where can we find this guidance?

• Transport Canada – ‘Sharing the Skies’
• UK CAA AIC 28/2004
• EU EASA ‘Skybrary’ – ‘Operator’s Checklist’
• Airbus – Briefing Notes
What’s needed?

1. Industry standards/policy/regulation
2. Training
3. Integrated comprehensive plan
Flight Safety Awards

WG CDR SMYTH, RAF Cottesmore

On 28 Jun 09, Wing Commander Harvey Smyth was the pilot of a Harrier GR9 conducting a low level training sortie as the No 2 of a 4 ship formation conducting a simulated attack profile against 2 hostile aircraft in the north of England. Shortly after the first target run, having just rejoined his element lead at 250 feet and flying at 420 knots, his aircraft hit a bird which struck the inside of the left hand intake and entered the engine, causing it to flame out.

Wg Cdr Smyth immediately used the energy he had to climb to 1000 feet; he stabilised the aircraft at reight speed, and commenced the reight drills. He transmitted a Mayday call to all elements of the formation explaining the situation as he maintained reight speed in a descent. At approx 200 feet the engine relit, and Wg Cdr Smyth was able to fly the aircraft away from the ground reaching approx 100 feet at his lowest point. Although this was extremely low, Wg Cdr Smyth carefully managed height, speed and rate of descent throughout the emergency to ensure that he retained an ejection option.

Wg Cdr Smyth turned towards Newcastle airport, his nearest diversion, setting a fixed power to ensure no further loads were put on the engine, dumped fuel and positioned the aircraft for an approach. During this time, he calmly ensured that ATC clearly understood the nature of the emergency and, once established long finals, he configured the aircraft, carried out a landing speed handling check and continued with a flawless fixed throttle approach and landing using the nozzles to control his speed.

Faced with a potentially catastrophic emergency, losing his only engine at such low altitude, Wg Cdr Smyth