Helicopters and bird strikes

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Air Patrol Squadron

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Gränsbevakningsväsendet
The Finnish Border Guard

Bird strike 27.7.2008

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Air Patrol Squadron

- 11 helicopters, 2 fixed wing aircraft
- Civil aviation rules with exemptions
- Special equipment (EO/IR, winch, NVG, SAR)
- Multirole units

Main tasks:

- Responsible of the FBG Flight Operations
- Responsible of Maritime Helicopter SAR
- Responsible of Pollution Control Flights
- Support of Police and Rescue and Health Service
- Flight Training (FBG personnel)

Border Guard Fleet of Aircrafts

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AB/B 412 (2)

H215 (AS332L1e) (2)
AS332 Super Puma (3)

AW 119 Ke Koala (4)

Dornier DO 228-212 (2)

FBG helicopter bird strikes 2006-2017

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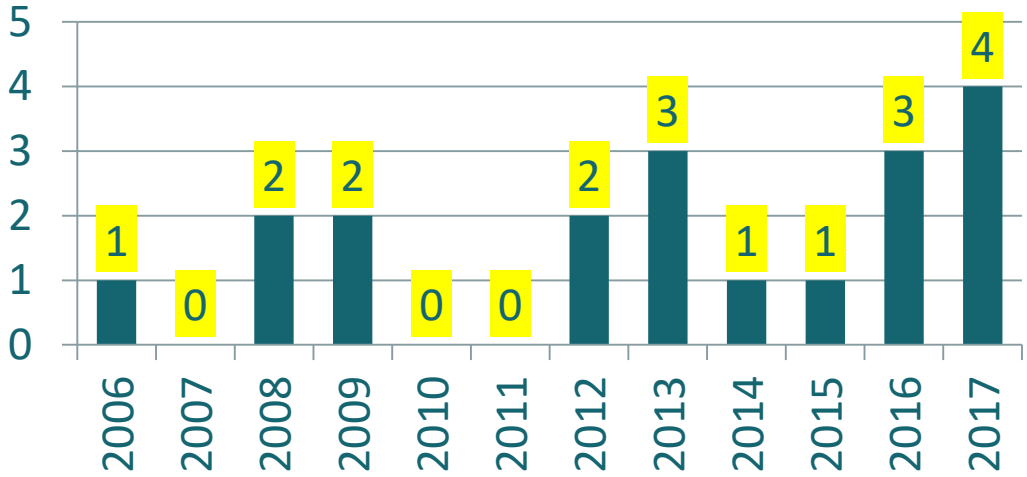
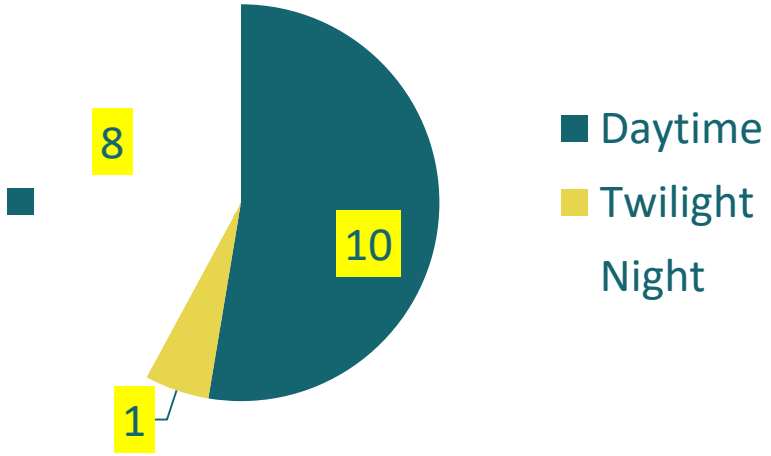
Bird strikes total 19



Bird strikes: time of day



- After bird strike helicopter have to land for inspection
- No big damages

Bird strike 1.11.2005

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Bird strike 7.6.2010

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Bird strikes around the world

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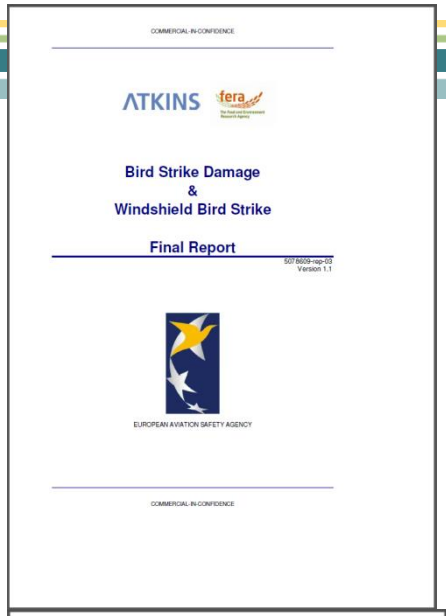
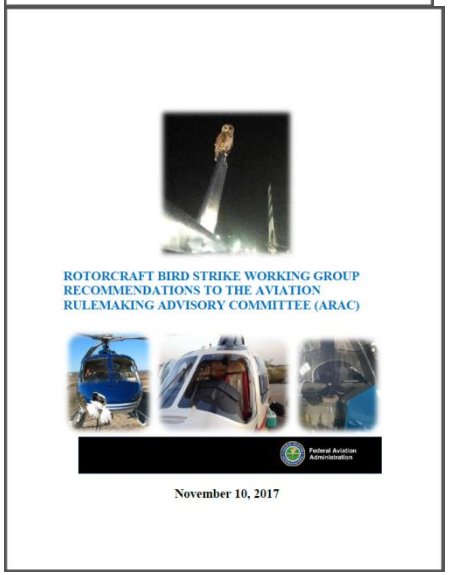
Research of bird strikes

- EASA: Bird Strike Damage & Windshield Bird Strike (2008)



- FAA: ROTORCRAFT BIRD STRIKE WORKING GROUP RECOMMENDATIONS TO THE AVIATION RULEMAKING ADVISORY COMMITTEE (ARAC) (2017)



Highlights from researches

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- Helicopters are more likely to bird strikes than aeroplanes
- Over one thirds hits the windshield
- Over 1kg bird will penetrate the windshield
- Bird strikes are 50/50% day/night
- Most of bird strikes happens during level flight
- The risk of bird strike will only decrease flying altitudes over 2500ft
- Using visor can save your life!

EASA views on Rotorcraft bird strike threat

Helicopter fatal accident due to bird strike

4th Jan 2009: Sikorsky S-76C++ helicopter (N748P) crash (Louisiana), 8 fatalities.

A Red-tailed hawk of 1.1kg/2.4lbs fractured the windshield and interfered with engine fuel controls causing a sudden loss of power to both engines.

Factors having contributed to the accident:

- Windshield not certified to bird strike requirement
- Lack of protections on engine fuel control handles.
- Lack of a warning system to alert the flight crew of a low-rotor-speed condition.
- Lack of flight crew training for simultaneous dual-engine failure.

EASA views on Rotorcraft bird strike threat

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Helicopter serious incident due to bird strike

5th July 2011-A109C left windshield shattered by a Herring Gull (aw. 1.1kg/2.4lbs) impact. Pilot minor injuries. The co-pilot took control for an Emergency landing.
Source : AAIB Bulletin 3/2012

13th June 2016: Robinson R44, similar event.
The rotorcraft lost approximately 700ft in altitude whilst the crew dealt with the incident. They declared a MAYDAY and returned to base for an uneventful landing. No injury.
Source : AAIB Bulletin 11/2016

<u>Factors having contributed to the serious incidents:</u>
Windshield not certified to bird strike requirement

EASA views on Rotorcraft bird strike threat

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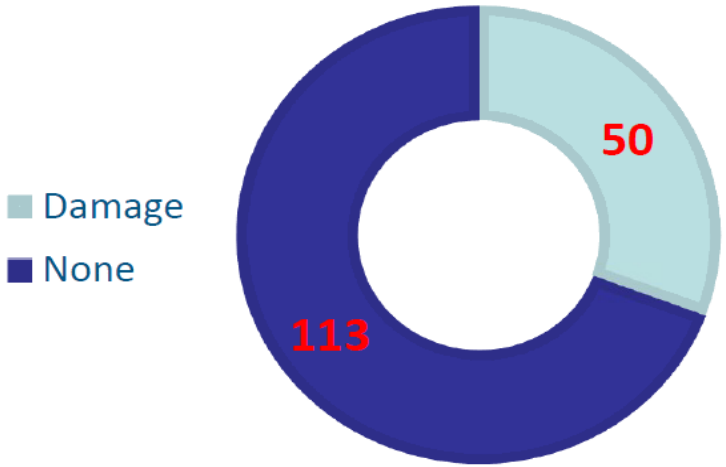
EASA database: Bird strike consequences

- 163 occurrences with reliable reporting

BIRD STRIKE DAMAGE OCCURENCES



« Safe landing » can be questionable

Emergency landing	4.2%
Aborded take-off	3.0%
Mission aborded	11.5%
Precautionary landing	16.4%
Helicopter shut down for inspection	18.2%
None	46.7%

CONSEQUENCE ON FLIGHT

Small rotorcraft are more likely to suffer from damage compare to large rotorcraft (even if not certified). In 3 cases, windshield vulnerability to bird strike has caused pilot incapacity due to minor injuries (co-pilot took control).

No accident recorded since the Atkins report (9 accidents /7 acc.with fatalities).

Bird strike is not a major cause of accident but it is a growing safety and economic hazard.

EASA views on Rotorcraft bird strike threat

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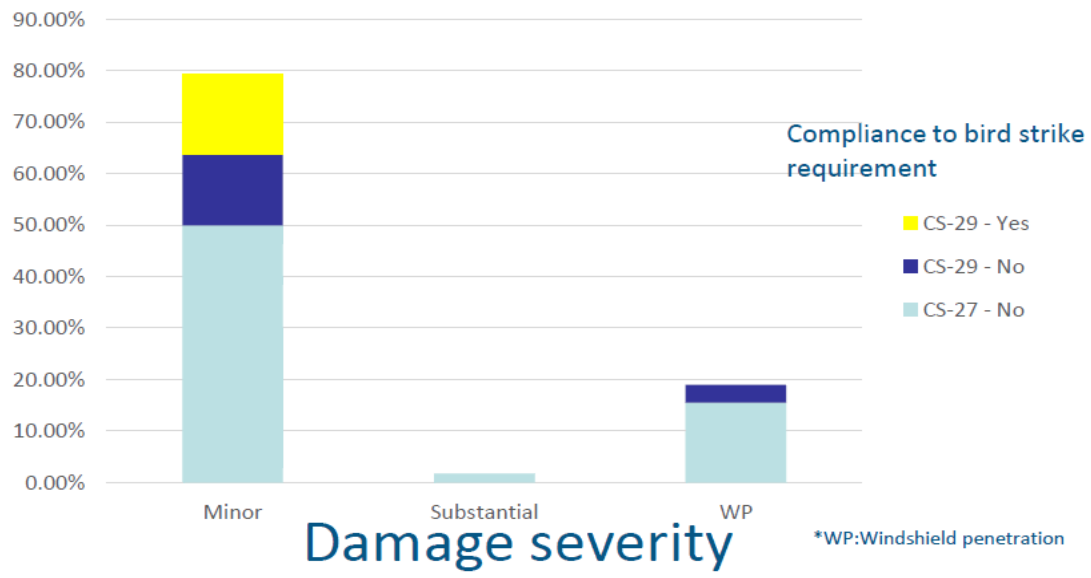
EASA database :Bird strike damage location and severity

Damage location

Front Windshield	28%
Radome/nose/fuselage	20%
Main rotor	13%
Tail rotor/structure	5%
Others	34%



Bird strike impact have mainly caused minor damages aside from 2 substantial damages recorded (see definition ICAO annexe 13 in appendix).

Certified rotorcraft suffer from minor damages only.

On non-certified rotorcraft, when the front windshield is damaged, bird penetration occurs almost systematically (19 % of the damages).

EASA views on Rotorcraft bird strike threat

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EASA database: Lesson learned from data scrutiny

- Bird strike is not a major cause of accident but it is a growing safety and economic hazard
- Front fuselage section (including windshield) and the main rotor are mostly damaged.
- The lack of requirement for CS-27 rotorcraft category is reflected in a higher rate of damage with frequent vulnerability of the windshield.
- Risk of occupant/crew injury on non-certified rotorcraft is a concern due to windshield vulnerability.
- Introduction of bird strike requirement for CS-27 aircraft categories would reduce statistics on bird strike damage rate and prevent windshield penetration (mostly with weight and cost penalties).
- Kinetic Energies is still a better indicator of damage likelihood than bird mass.
- Reporting in EASA database needs further fine tuning to confirm or not the increase tendency of having KE higher than CS29 certification values for impact with birds bigger>1kg.

Case Sweden: Type and mission

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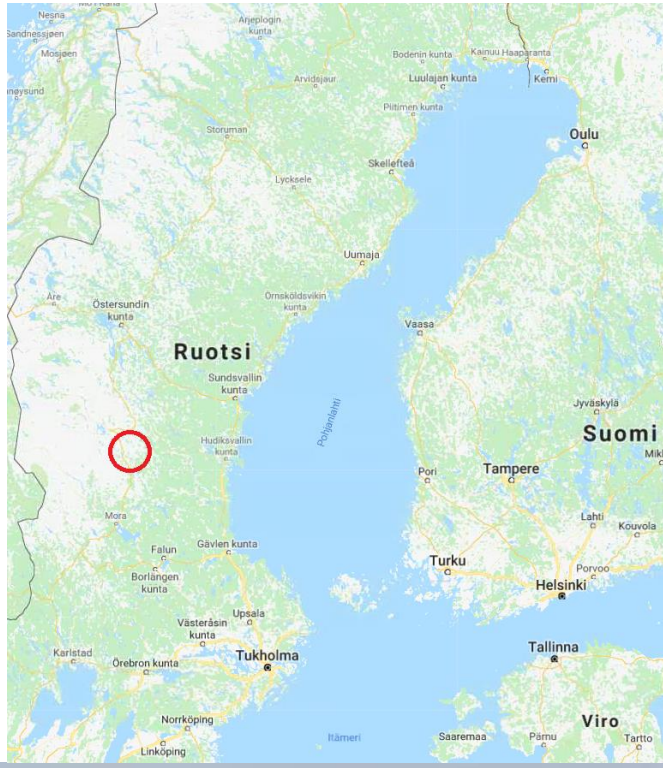
- A109LUH (light utility helicopter)
- NVG, "nap-of-the-earth" –training flight
  - tactical flight at low altitude
  - 2 helicopters formation
- RH pilot (student) PF



Case Sweden: Bird strike and immediate effects

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- Bird strike happened at 35ft, 100kts
- Wood grouse, apr. 4kg
- The helicopter's windshield and front door at right side were damaged
  - hit to the face of the student sitting RH seat – serious injuries
  - the helmet of the pilot was split partially
  - pilot has NVGs and eyeglasses, which were broken
- The instructor sitting LH seat were able to make landing
  - the other helicopter of the formation was able to pick up the injured pilot


Questions?