Enhancing the Safety Training of Aviators to Mitigate the Risk of Bird Strikes: A Scientific Approach

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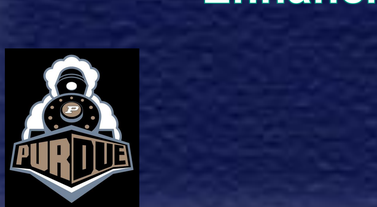
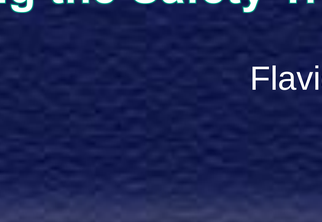
INTRODUCTION

There are basically four strategies to mitigate the risk of bird strikes: standards by aviation authorities, technology, safety programs by airport operators, and actions by crewmembers. The integration of these strategies, based on safety risk management concepts, is expected to further improve the safety of the aviation industry. Pilots play an important role as stakeholders in the prevention of bird strikes, especially outside the airport environment, where safety strategies by airport operators have little to no effect. Thus, safety efforts require enhanced risk management and decision-making training for flight crews.





WILDLIFE STRIKES TO AVIATION - FACTS

- Globally, 262 people were killed and 247 aircraft destroyed (1988-2016);
- In the U.S. – there were 25 fatalities, 365 people injured, and 42 aircraft damaged beyond repair (1990-2015);
- Costs to the U.S. civil aviation industry, on average, 112,536 hours of aircraft downtime and $191 million in monetary losses ($156 million in direct costs and $35 million in other costs;
- The Mississippi North American Flyway overlies Indiana state.

METHODOLOGY

Utilizing "Sharing the skies: An aviation industry guide to the management of wildlife hazards" as a foundation, the researchers developed a guidance protocol to enhance aviators' safety training incorporating information from the Federal Aviation Administration (FAA) Serial Report 22, and previous studies addressing the safety management of wildlife hazards to aviation.

RESULTS

Currently, no safety program or tool successfully mitigates the risk of bird strikes in all locations, in every phase of flight or altitude, and for every species. Therefore, safety efforts require enhanced safety training for aviation professionals, especially pilots. Some situations, such as bird ingestion after takeoff, generally require immediate crew response using standard operating procedures (SOPs). However, there is usually sufficient time prior to, and during a flight for pilots to gather information, analyze hazardous situations that may occur, assess the risk, reach a decision, and then take appropriate actions.

Suggested Techniques - Guidance
Review available information on the risk of bird hazards related to the entire flight (departure; enroute; arrival);
Consider strategies to reduce the risk of bird strikes (P and/or S). Examples include reducing airspeed and/or flight time, while flying in the bird-rich zone.
Use the aircraft external lights during takeoff, initial climb-out, approach, and landing.
Descend with idle-power and avoid sustained low-altitude level flight, when operationally possible.
Consider asking for an alternate runway when bird activity has been reported on or near a specific runway (takeoff and/or landing).
Consider aborting the landing, if birds are encountered on final approach, but only if the go-around can be initiated without striking birds after power is increased.

LITERATURE REVIEW

Bird strikes - 1990 through 2015

- 169,856 wildlife strikes (96% of the strikes involved birds);
- 60% occurred during the day and 30% at night;
- 53% between July and October;
- Approximately 72% within the airport environment;
- Approximately 95% below 3,500 feet AGL (the bird-rich zone);
- 61% during the arrival phases of flight;
- The risk of damaging strikes is higher during the departure phases of flight;

Other Studies

- Use of aircraft external lights can enhance the escape behavior of certain species of birds;
- Aircraft airspeed is more critical than the mass of the bird, in case of a bird strike.

Kinetic energy (KE) = ½ mV^2
m = Bird Mass
V = Speed of Bird Relative to Aircraft

- Safety Risk Management (SRM):
  - Risk (R) = Probability (P) x Severity (S)

SELECT REFERENCES

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