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Bird Hazard Mitigation Training For General Aviation Pilots - A Prospective Research Study

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Bird Hazard Mitigation Training For General Aviation Pilots - A Prospective Research Study

FLAVIO A. C. MENDONCA - Ph.D.
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OVERVIEW

Introduction

Case Study

Prospective Research Study

INTRODUCTION

- ✈ General aviation industry
 - ✈ 446,000 aircraft worldwide
 - ✈ 211,000 in the U.S.
 - ✈ Supports \$219 billion in total economic output and 1.1 million jobs in the U.S
 - ✈ Flies approximately 25 million flight hours (U.S.)
 - ✈ Flies to more than 5,000 public airports
 - ✈ Primary training ground for most commercial airline pilots



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WILDLIFE STRIKES

✈ Some relevant statistics:

✈ 179,542 wildlife strikes in the U.S. (1990-2016)

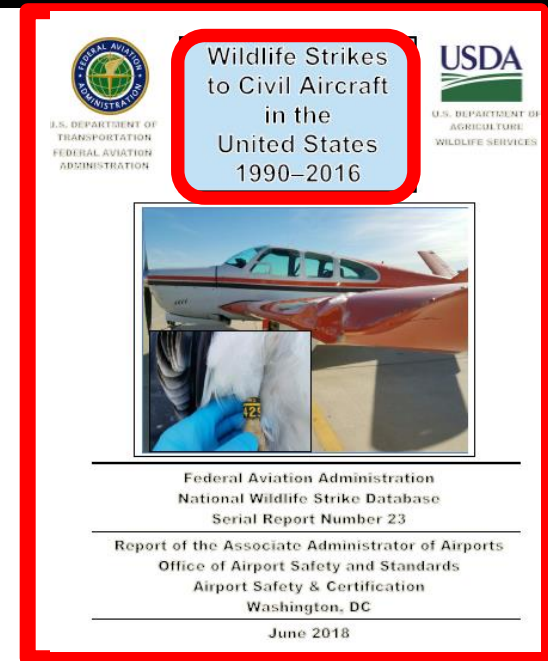
✈ 94.8% - involved birds

✈ **GA Aircraft** → 11% of total strikes

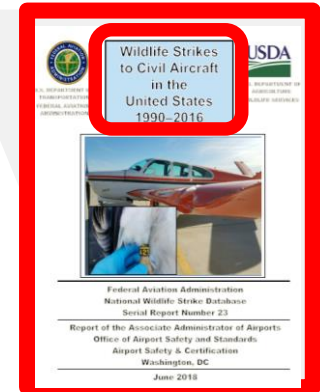
✈ 28% of these strikes caused damage to aircraft!

✈ 70% of the aircraft damaged or

destroyed involved small GA aircraft



WILDLIFE STRIKES



- ✈️ 73% (GA) occurred below 500 feet AGL
- ✈️ 88% within the airport environment (below 1,500 feet AGL)
- ✈️ 97% below 3,500 feet AGL (the Bird Rich Zone)
- ✈️ 27% of strikes occurred above 500 feet AGL
 - ✈️ Represented 50% of the damaging strikes
- ✈️ For GA aircraft the rate of damaging strikes has not declined since 2000
- ✈️ The rate of **DAMAGING STRIKES** has increased outside the airport environment

CASE STUDY

- ✈ On March 4, 2008, about 1515 central standard time, a Cessna 500, N113SH, entered a steep descent and crashed about 2 minutes after takeoff from Wiley Post Airport (PWA) in Oklahoma City
- ✈ The pilot, the second pilot, and the three passengers were killed
- ✈ The airplane was destroyed by impact forces and post-crash fire
- ✈ Pilot → ATP certificate & 6,100 total flight hours
- ✈ Second pilot → commercial pilot certificate & 1,378 total flight hours



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- ✈ Probable cause → airplane wing-structure damage sustained during impact with one or more large birds, which resulted in a loss of control of the airplane
- ✈ The FAA Airport Facilities Directory entry for PWA included the remark, “Flocks of birds on [and in the vicinity of] the airport in ... all quadrants”.
- ✈ The Bird Avoidance Model (BAM) indicated a medium-risk of bird strikes in the PWA area...



American White Pelicans



Source: NTSB 2009

CASE STUDY

- ✈ Was the flight crew aware of the high-risk of bird strikes at PWA airport, at that time of year, and altitude?
 - ✈ If not, why not?
- ✈ Considering pilots had this information, did they have the technical competence to mitigate the risk of a mishap due to birds?

$$KE = \frac{M \times V^2}{2}$$

M = Bird Mass

V = Speed of Bird Relative to Aircraft

- ✈ In hindsight, it is reasonable to postulate that with adequate planning and actions by the flight crew, the risk of this deadly aircraft accident due to bird strikes could have been mitigated

RESEARCH PROJECT

✈ Purpose – Enhance GA pilots' knowledge & skills to mitigate accidents due to birds

✈ Pretest Posttest Experimental Design

RANDOM ASSIGNMENT	GROUP 1	PRETEST	TREATMENT	POSTTEST
	GROUP 2	PRETEST	NO TREATMENT	POSTTEST

✈ Procedures

✈ 1. Initial orientation, random assignment to the control and experimental groups, and Pretest

✈ 2. Safety training → Interactive workshop

✈ 3. Posttest → Control Group

→ Experimental Group

✈ 4. Follow-up survey questionnaire

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✈ Population → GA community

✈ Variables

✈ Independent Variable → Training Protocol

✈ Dependent Variable → Pretest and Post-test Scores

✈ Validity

✈ Assessment questions were validated using the face validity (Borg & Gall, 1989; DeVon et al, 2007; Sartori, 2009) and the content validity index methods (DeVon et al, 2007; Lynn, 1986; Polit & Beck, 2006)

✈ Training protocol

✈ Developed by the researchers

TRAINING PROTOCOL OUTLINE

- ✈ SMS / Aeronautical Decision-Making / Safety Culture / Threat and Error Management
- ✈ Safety Management of Birds by GA Pilots
 - ✈ Pilots' actions to mitigate the risk of bird strikes
 - ✈ Wildlife (BIRD) hazard data acquisition and interpretation
 - ✈ Sources of wildlife strike data and information (FAA Serial and especial reports)
 - ✈ Planning and executing a safe flight (e.g., KE concepts)
 - ✈ Aircraft accident due to bird strikes – a case study

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- ✈ Expected Findings;
 - ✈ Pilots will have received little-to-no information about the safety management of bird hazards during ground and flight training
 - ✈ Participants will, in average, have a basic knowledge on the safety management of bird strikes
 - ✈ The safety training will significantly increase the participants' (GA Pilots) knowledge and skills to mitigate the risk of bird strikes



MILESTONES AND CHALLENGES

- ✈️ Attract seed funds to support this study
- ✈️ Recruit a diverse and large sample of GA pilots
- ✈️ Develop / update the questions to be used during the assessments
- ✈️ Develop different method(s) to deliver the safety training
- ✈️ **Develop Scenarios Incorporating Virtual Reality**

EXPECTED BENEFITS OF THIS STUDY

- ✈ Enhance the safety training of GA pilots
- ✈ Reduce costs associated with bird strikes
- ✈ Prevent human injuries and fatalities
- ✈ Improve the reporting of wildlife strikes by GA pilots
- ✈ Support the sustainable growth of the aviation industry

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PURDUE
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