



# Human Fatalities and Destroyed Civil Aircraft Due to Wildlife Strikes, 1912 to Present

North America Birdstrike Conference, August 2017

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Acknowledgement: John Thorpe



# Data included For this Analysis

Publicly available database:

<http://www.avisure.com/about-us/fatalities-and-destroyed-aircraft-due-to-wildlife-strikes-1912-to-present/>

- All accidents where reasonable evidence supports wildlife being a major contributing factor
- Civil registration (even when used for military contracts)
- Mammals – this is new
- Not UAS's (Drones)

# Destroyed UAS

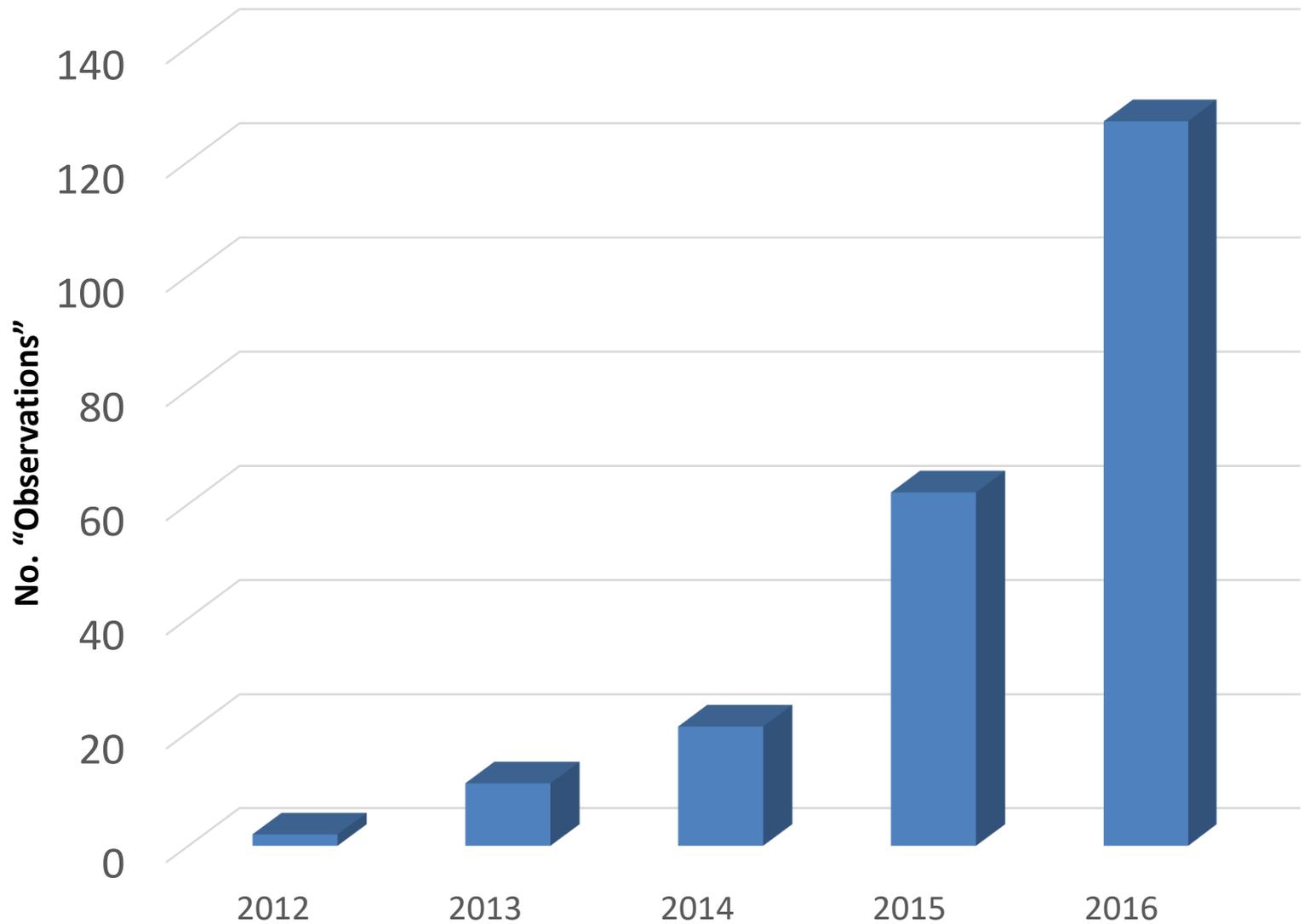
Gatewing X100 remotely piloted aircraft  
Source: Wiki Commons



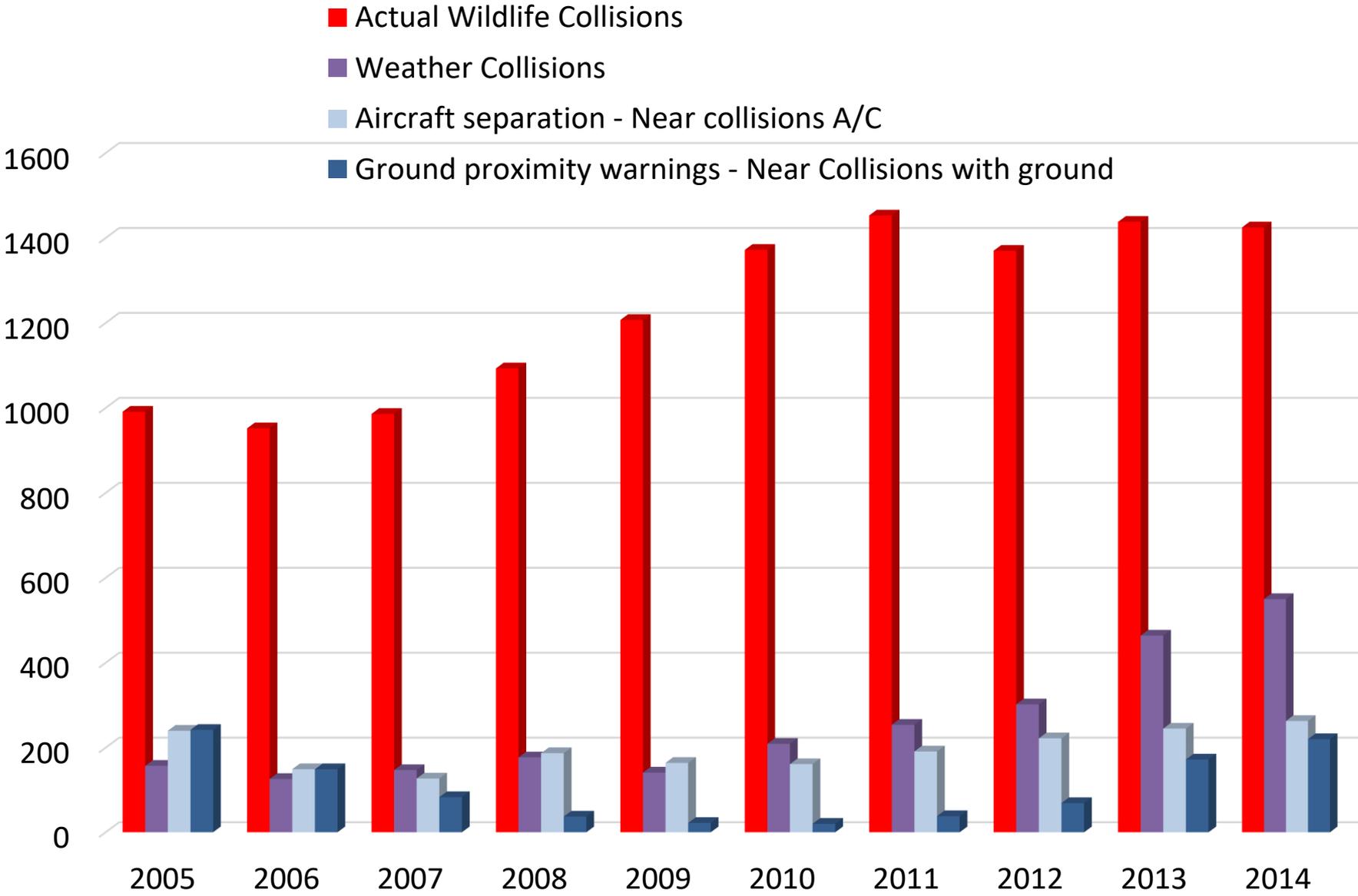
# Trained UAS Destroyer



# UAS “Observations” by Pilots



# Wildlife Incidents Vs Other Incident Categories: Australia 2005 -2014



# Fatalities and Destroyed Aircraft - Civil

	No. Hull Losses	No. Fatalities
<b>Bird</b>	<b>141</b>	<b>321</b>
<b>Mammal</b>	<b>58</b>	<b>9</b>
<b>Total</b>	<b>199</b>	<b>330</b>

# First Fatal Strike 1912



GALBRAITH ROGERS

1<sup>ST</sup>. AVIATOR TO CROSS THE CONTINENT



HIS FATAL WRECK - LONG BEACH

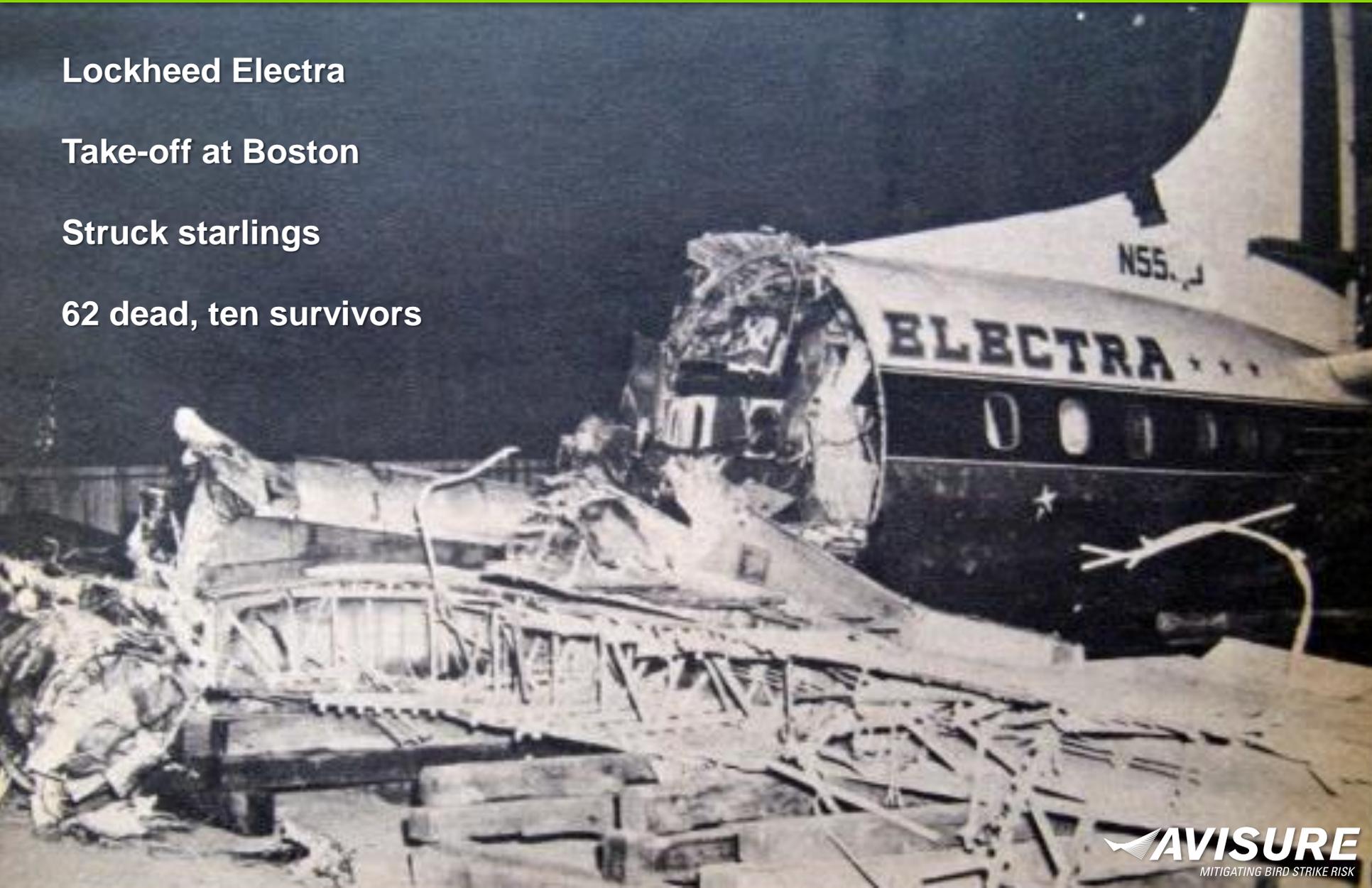
# Worst Accident – 1960

Lockheed Electra

Take-off at Boston

Struck starlings

62 dead, ten survivors



# Worst Jet Aircraft Accident – 1988



Image source: Wikipedia 2012

**Bahir Dar Airport, Ethiopia**

**Ethiopian Airlines B737 struck a flock of Speckled Pigeons on takeoff**

**Both engines ingested multiple birds, losing thrust**

**The aircraft caught fire during a gear-up landing**

**35 fatalities**

# Hull Loss Involving the Biggest Animal - 2003



Cessna 182 1,338 kg

Botswana

Giraffe 1,192 kg

# Hull Loss With Largest Aircraft to Bird Mass Ratio – 2008



**Zaventem Airport (Brussels), Belgium**

**Kalitta Air B747 struck a European Kestrel during takeoff**

**The aircraft overran the runway during the rejected takeoff, and broke into three pieces**

**MTOW 747 378,000 Kg**

**MTOW European Kestrel 0.2 Kg**

**Ratio – 1.88 million to 1**

Image source: Wikipedia 2012



**AVISURE**  
MITIGATING BIRD STRIKE RISK

# Most Famous Hull Loss – 2009



Details not required

See the movie!

# Most Recent Commercial Accident– 2012



**Kathmandu Airport, Nepal**

**Sita Air (Donier 228) struck a Black Kite on takeoff**

**Attempted to return to airport for an emergency landing**

**Landed on the bank of the Manohara River**

**Caught fire shortly after impact**

**19 fatalities**



# Recent Accidents



**Date:** 23 November 2015

**Location:** Katra, India

**Aircraft:** AS 350B3 Ecureuil  
(Helicopter)

**Wildlife Species:** Vulture  
(Old World)

**Fatalities:** 7

# Recent Accidents

**Date:** 18 January 2016

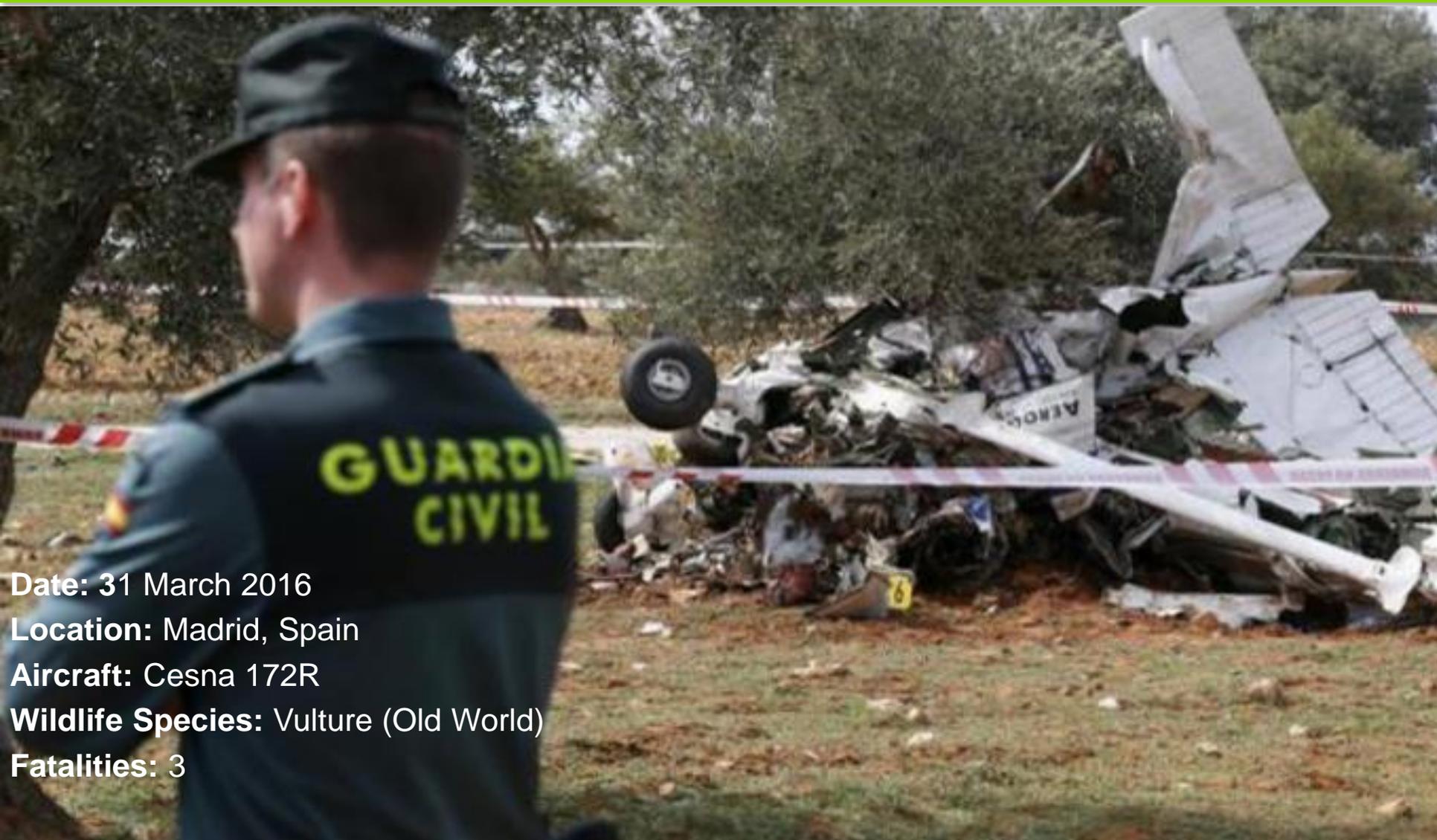
**Location:** Cuenca, Spain

**Aircraft:** Socata TB20

**Wildlife Species:** Vulture  
(Old World)

**Fatalities:** 4

# Recent Accidents



**Date:** 31 March 2016

**Location:** Madrid, Spain

**Aircraft:** Cessna 172R

**Wildlife Species:** Vulture (Old World)

**Fatalities:** 3

# Recent Accidents



## NATIONAL TRANSPORTATION SAFETY BOARD

Alaska Regional Office  
222 West 7<sup>th</sup> Ave., Room 216, Box 11  
Anchorage, AK 99513  
(907) 782-4848

May 8, 2017

To the wonderful people at the Feather Identification Lab:

Thank you for the excellent support and assistance in the investigation of a fatal accident near Chugiak, Alaska in April, 2016. We could not have done it without you!

Sincerely,

A handwritten signature in blue ink, appearing to read "Shaun Williams".

Shaun Williams  
Investigator-in-Charge  
National Transportation Safety Board  
222 West 7<sup>th</sup> Ave, Room 216, Box 11  
Anchorage, AK 99513  
Office: (907) 782-4846

**Date:** 20 April 2016

**Location:** Alaska, USA (near Birchwood Airport)

**Aircraft:** Cessna 172P

**Wildlife Species:** Bald Eagle

**Fatalities:** 4

# Recent Accidents



**Date:** 11 May 2016

**Location:** Keene, New Hampshire, USA

**Aircraft:** Vans Aircraft RV-8

**Wildlife Species:** Deer

**Fatalities:** 0 (Aircraft Destroyed)

# Recent Accidents



**Date:** 19 May 2016

**Location:** Cuenca, Spain

**Aircraft:** Robin Dr400 (helicopter)

**Wildlife Species:** Vulture (Old World)

**Fatalities:** 3

# Recent Accidents



**Date:** 18 September 2016

**Location:** Queensland, Australia

**Aircraft:** Robinson R22 Beta  
(Helicopter)

**Wildlife Species:** Cattle

**Fatalities:** 0 (Aircraft Destroyed)

# Recent Accidents



**Date:** 28 January 2017

**Location:** Delaware USA

**Aircraft:** Piper PA 22-150 Tri-Pacer

**Wildlife Species:** Unknown Bird

**Fatalities:** 0 (Aircraft Destroyed, 1 Injured)

# Recent Accidents

**Date:** 29 July 2017

**Location:** São Tomé and Príncipe

**Aircraft:** Antonov 74TK-100 (Cargo)

**Wildlife Species:** Unknown Bird

**Fatalities:** 0 (Aircraft Destroyed)



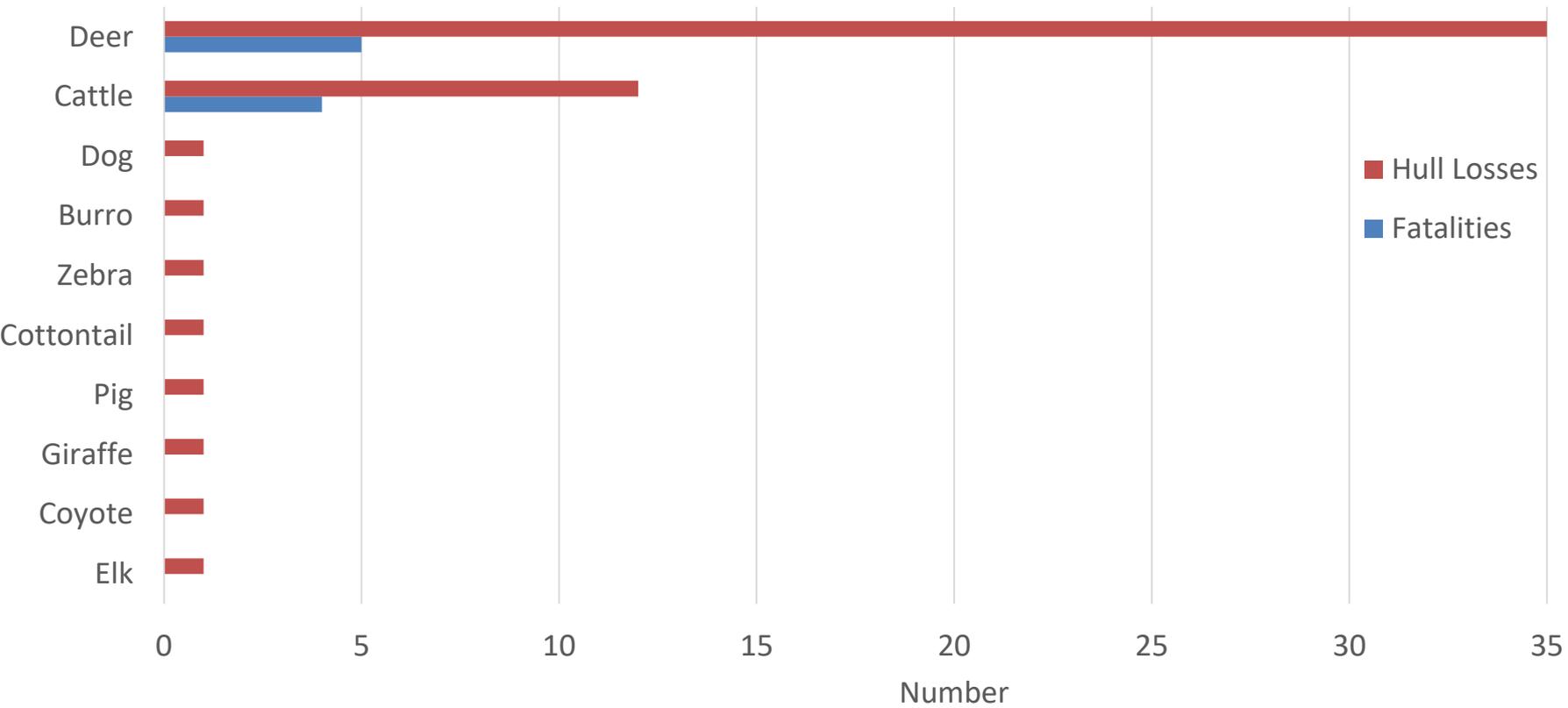
# Number of Wildlife Caused Accidents by Country/Continent

World Map with Continents

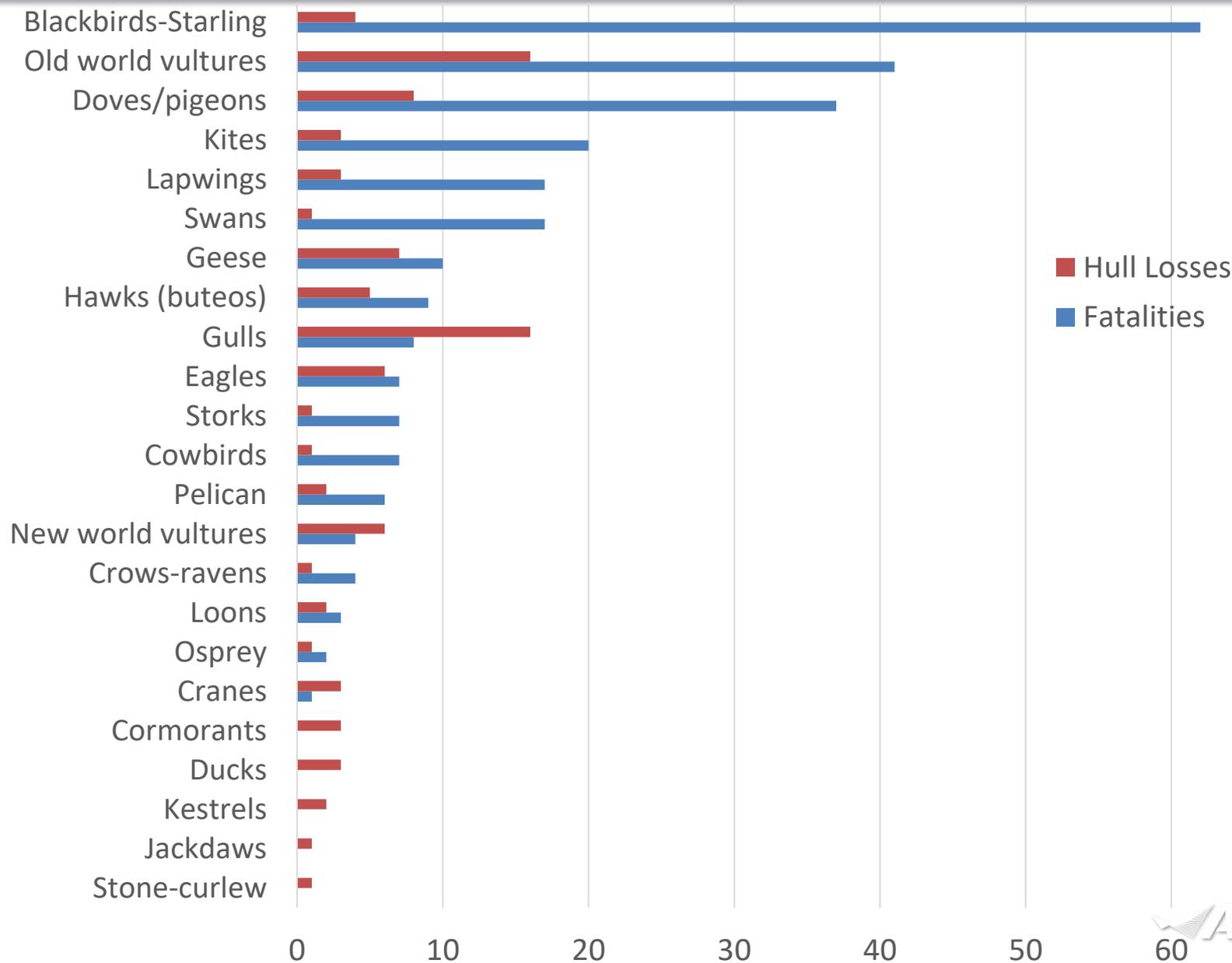


**HL = Hull Losses**  
**FAT = Fatalities**

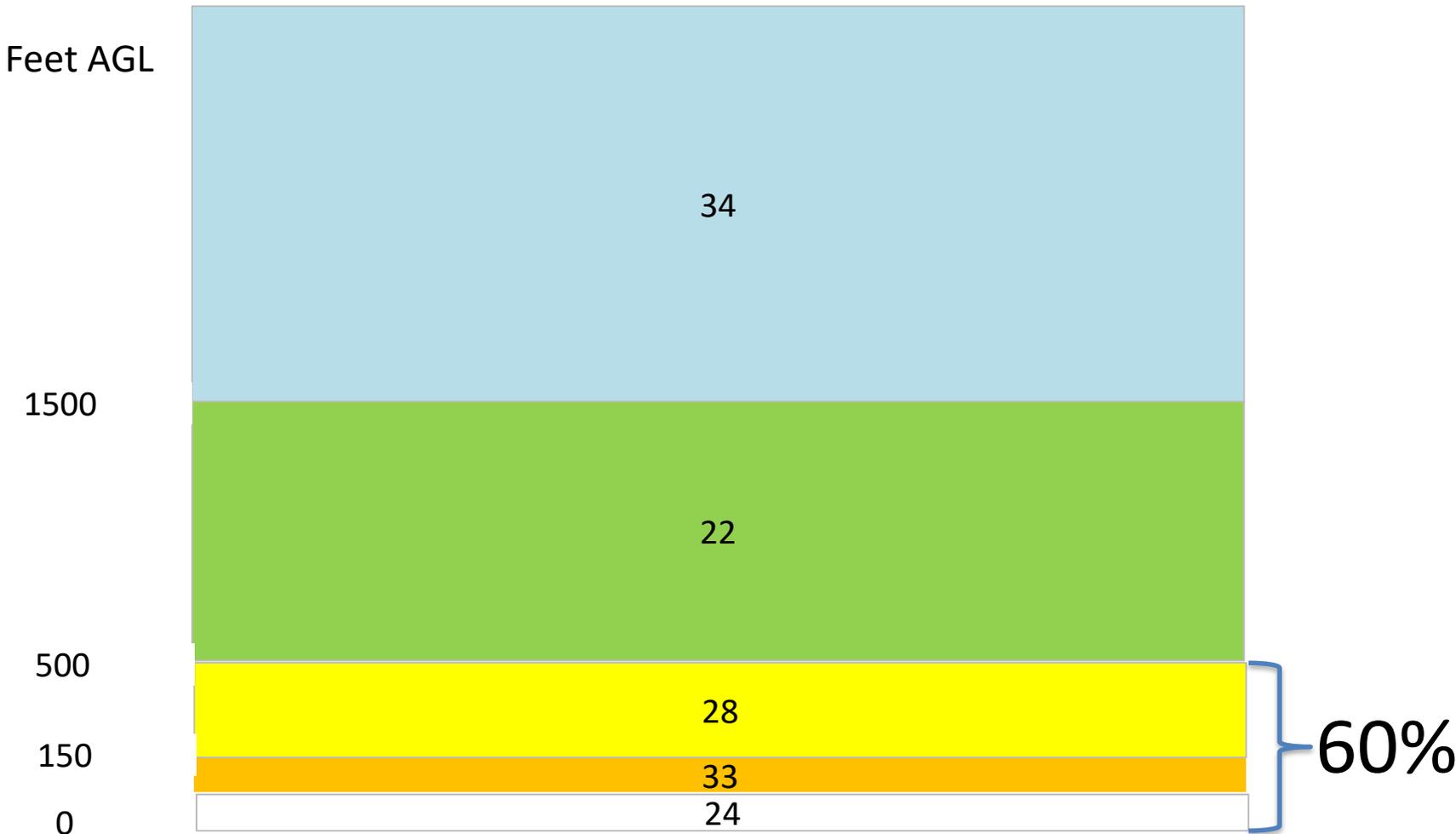
# Mammal Species (where known) Involved in Accidents



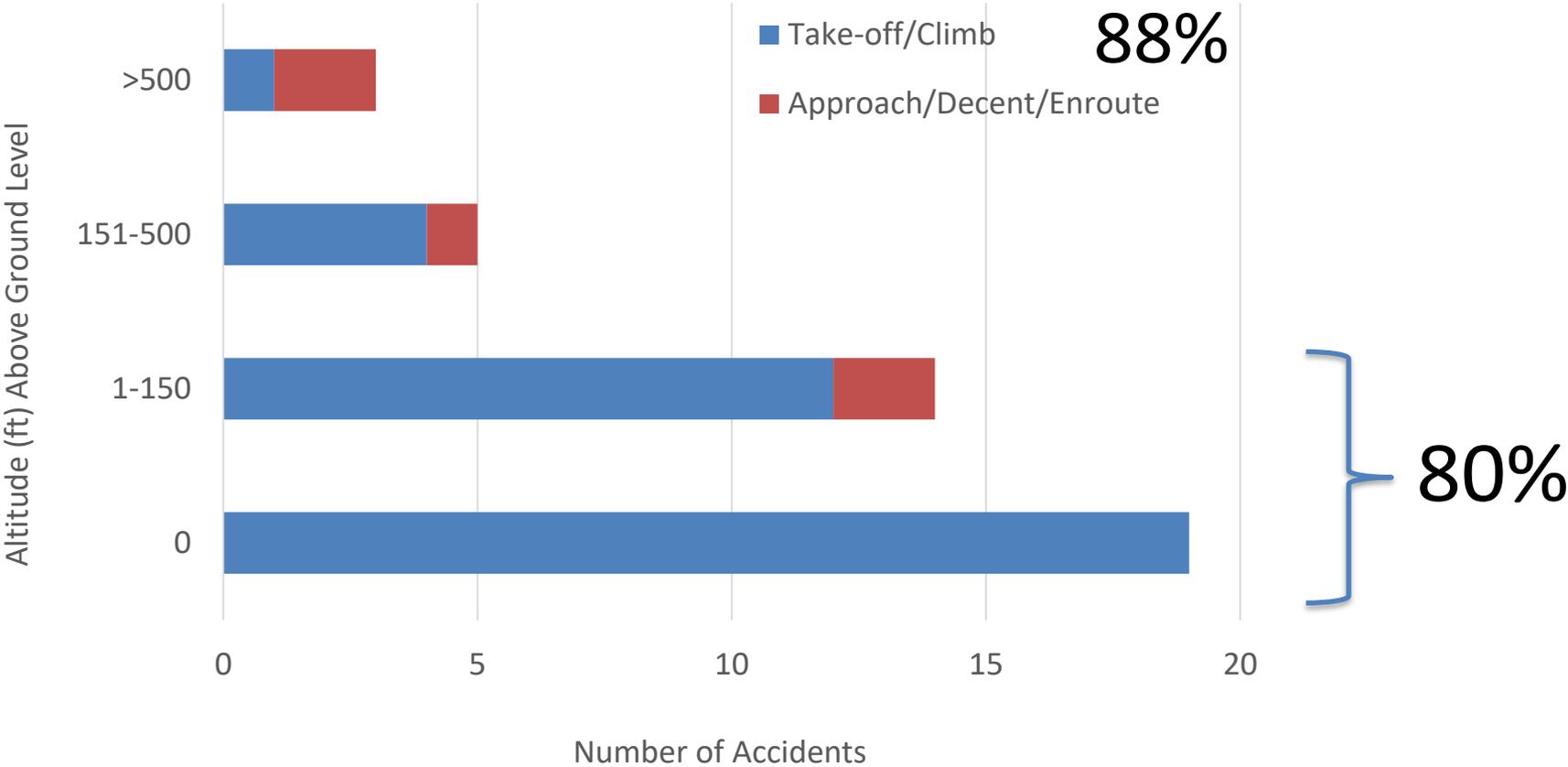
# Bird Species (where known) Involved in Accidents



# Altitude of Birdstrike to all Civil Aircraft Causing Hull Loss &/or Fatalities

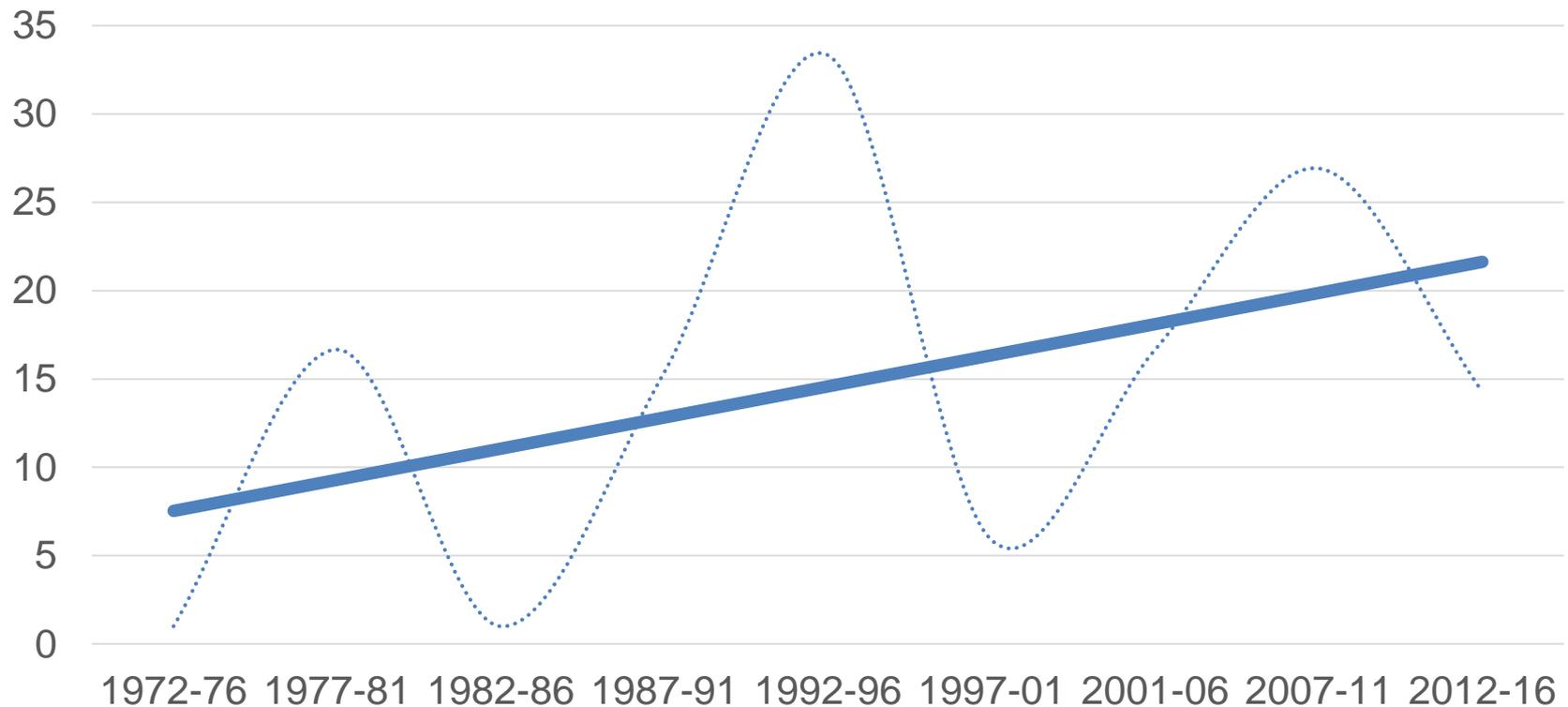


# Altitude of Birdstrikes to Turbine Heavy Civil Aircraft Causing Hull Loss

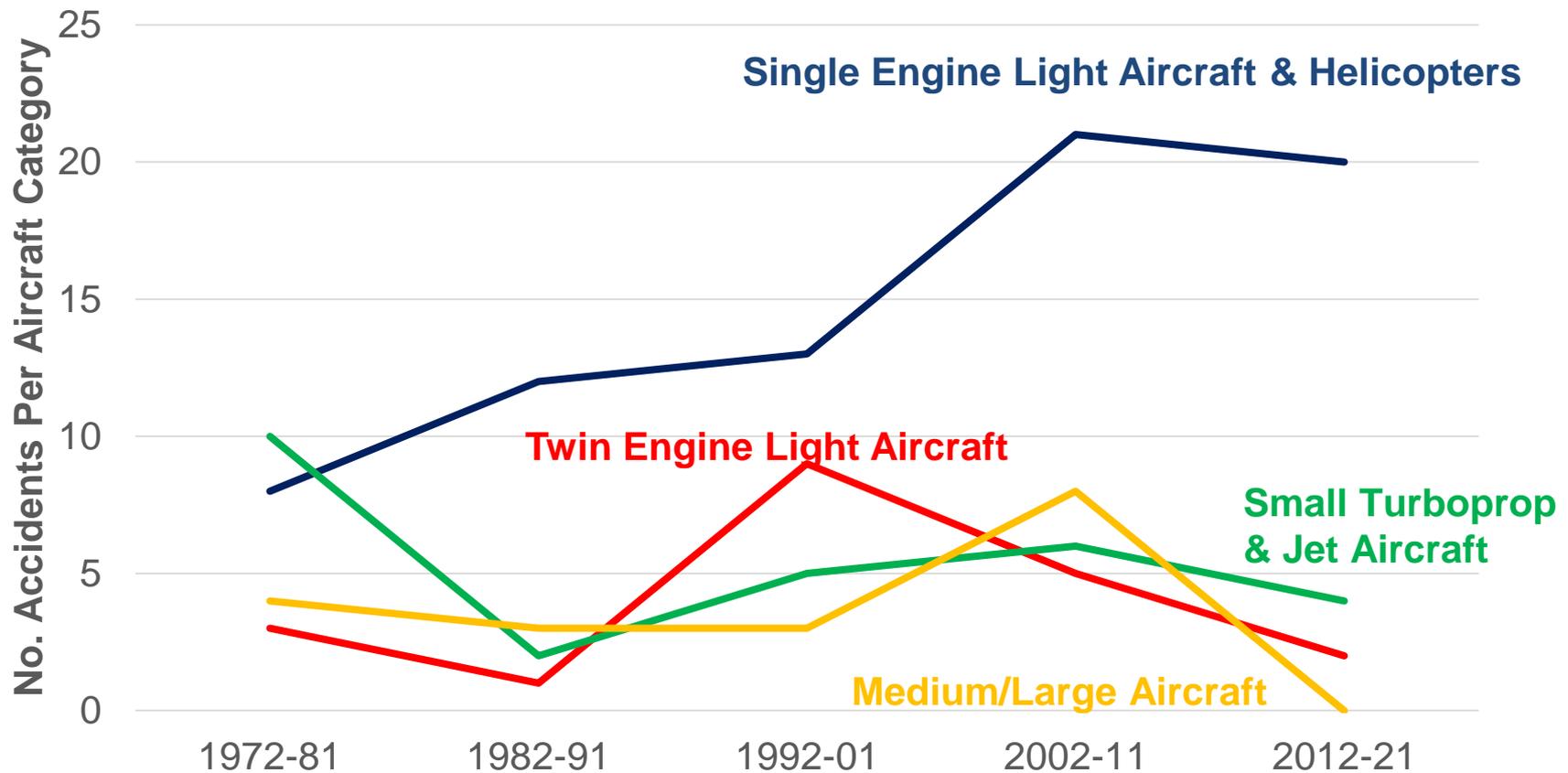


# Accidents Caused by Birdstrike at >1500'AGL 1972-2016

Is on-airport wildlife management improving?

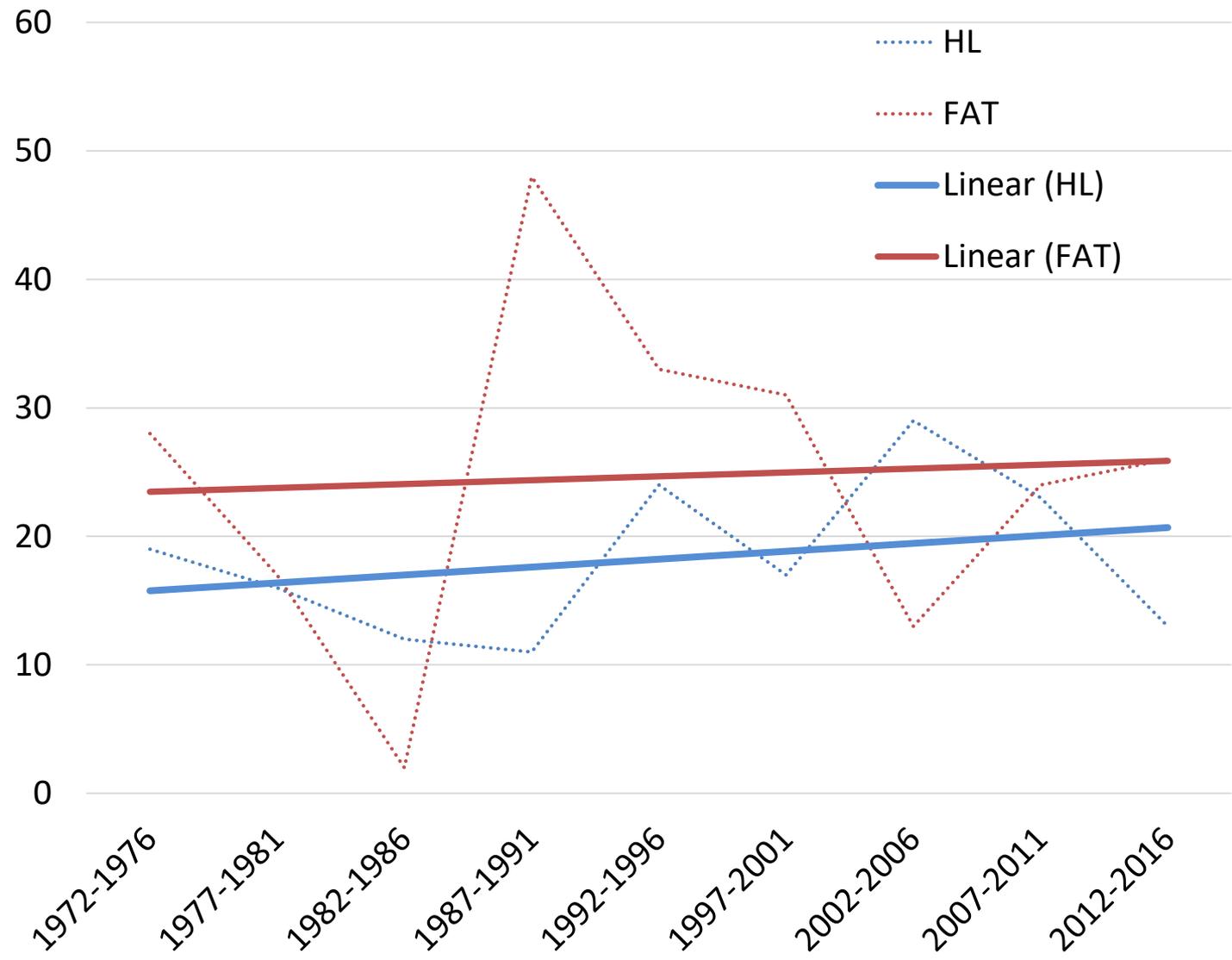


# Accidents Caused by Wildlife Strike for Different Aircraft Categories



# Hull Loss and Human Fatalities Due to Wildlife Strikes 1972 - 2016

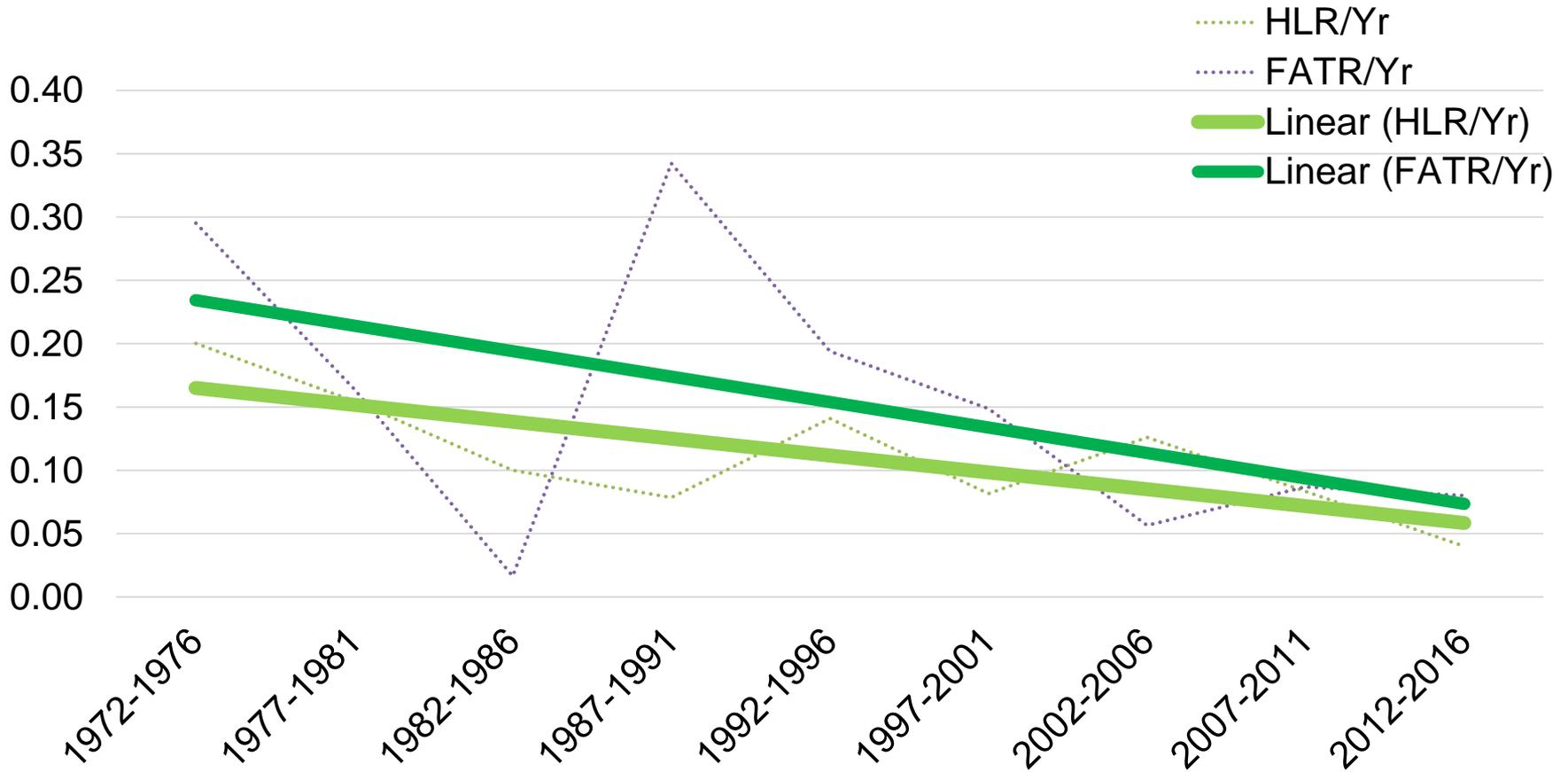
DATE	HL	FAT
1972-1976	19	28
1977-1981	16	17
1982-1986	12	2
1987-1991	11	48
1992-1996	24	33
1997-2001	17	31
2002-2006	29	13
2007-2011	23	24
2012-2016	13	30



# Hull Loss and Human Fatalities Due to Wildlife Strikes 1972 – 2016 Normalised for Aircraft Movements

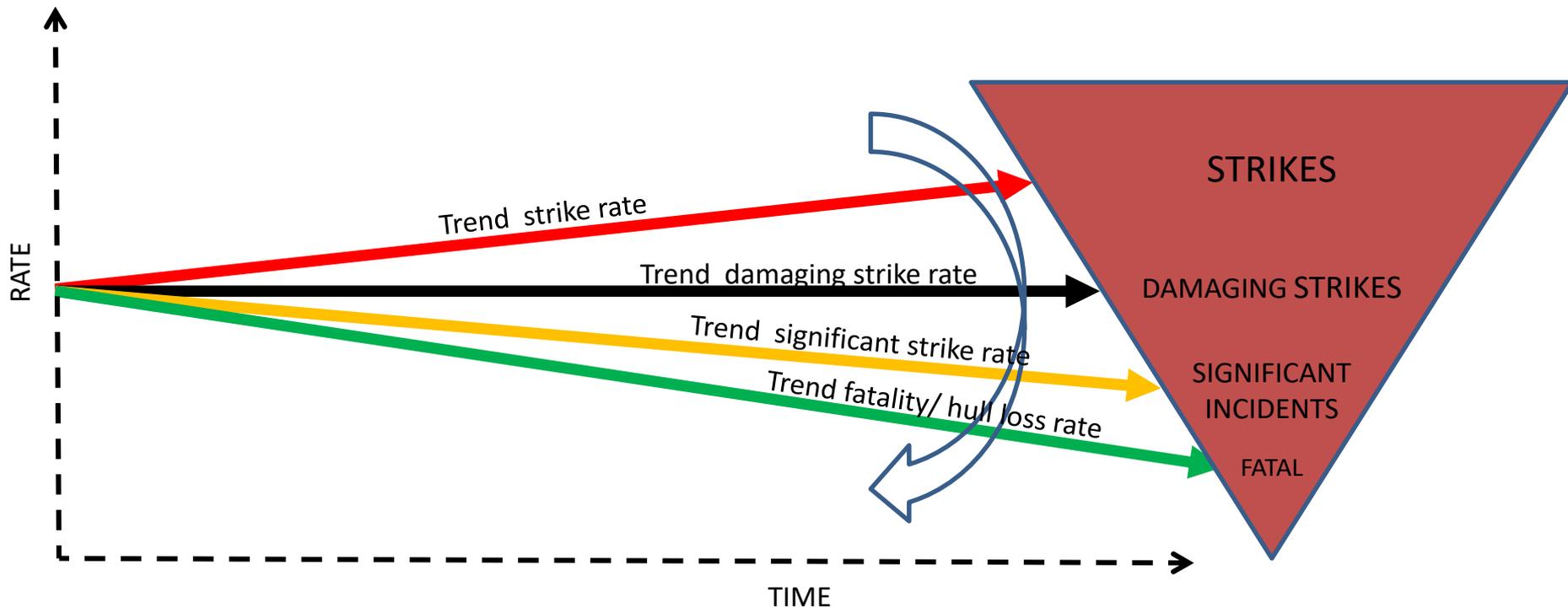
DATE	HL	FAT	MOVE *10 <sup>6</sup>	HLR/Yr	FATR/Yr
1972-1976	19	28	94.9	0.20	0.30
1977-1981	16	17	103.5	0.15	0.16
1982-1986	12	2	120.0	0.10	0.02
1987-1991	11	48	140.2	0.08	0.34
1992-1996	24	33	170.2	0.14	0.19
1997-2001	17	31	208.4	0.08	0.15
2002-2006	29	13	229.8	0.13	0.06
2007-2011	23	24	275.7	0.08	0.09
2012-2016	13	30	324.7	0.04	0.09

# Hull Loss and Human Fatalities per 10<sup>6</sup> Aircraft Movements 1972 – 2016: Downward Trend



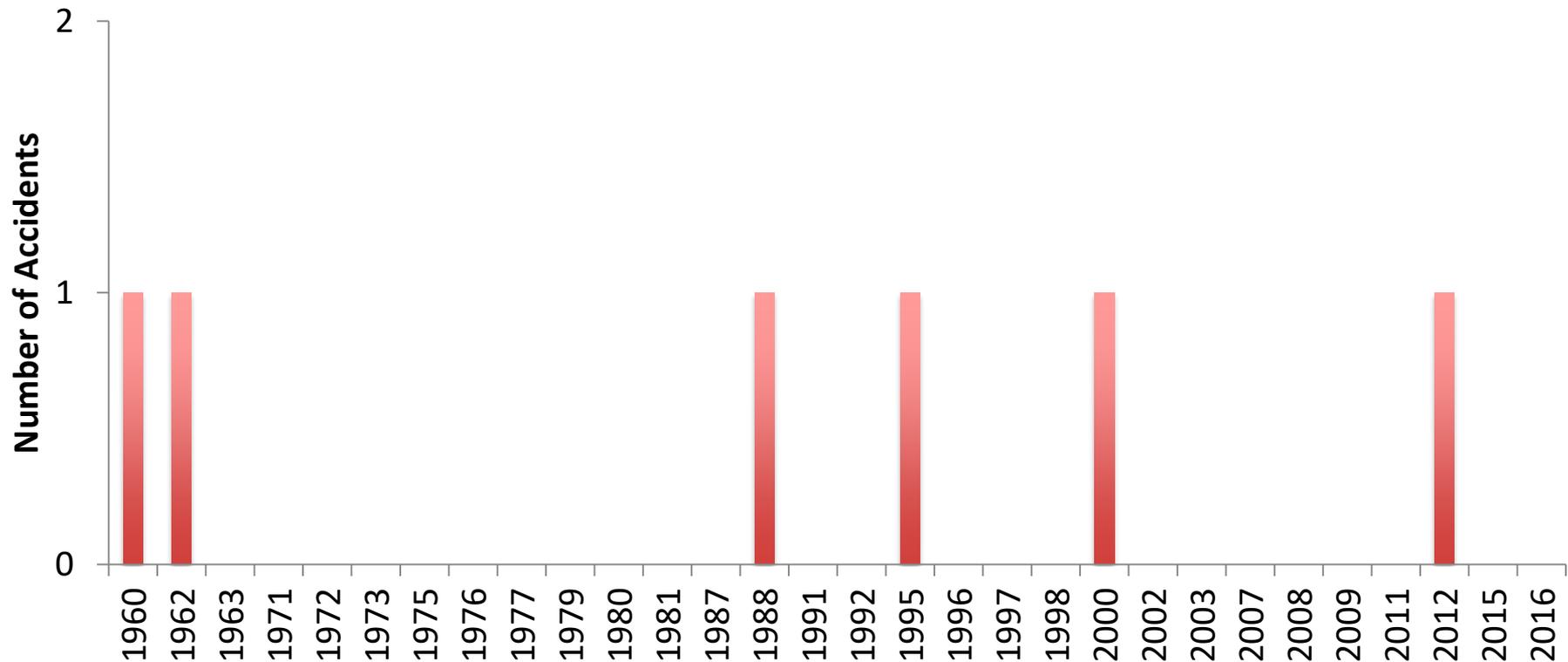
# Hull Loss and Human Fatalities Trend Compared With Other Indices

## Clockwise rotation of the trend slope?



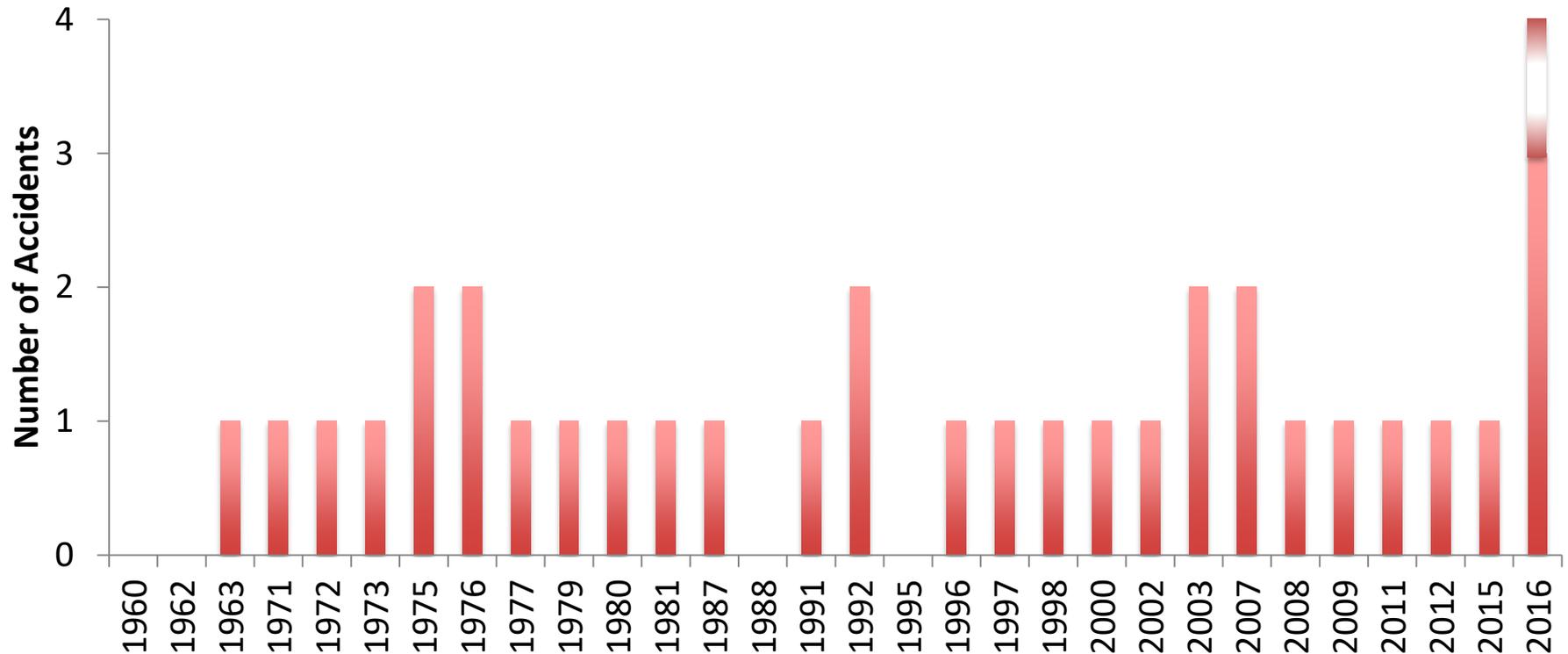
# Accidents with Greater Than 10 Fatalities 1960 - 2016

Rare occurrence but continuing to happen



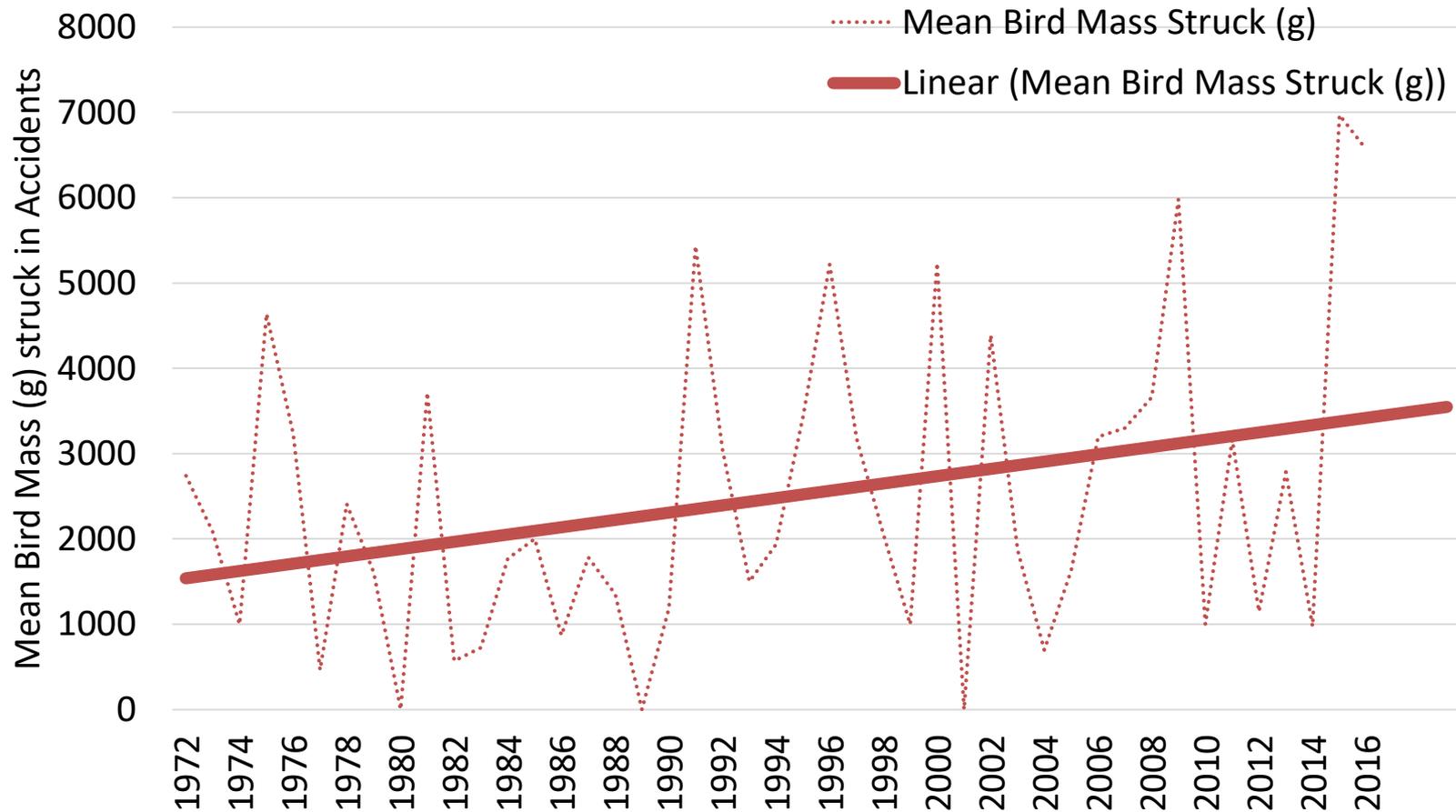
# Accidents with 2 - 10 Fatalities 1960 - 2016

Evenly distributed but not decreasing



# Trend in Average Mass of Birds Struck in Accidents 1972-2016 – All Aircraft categories

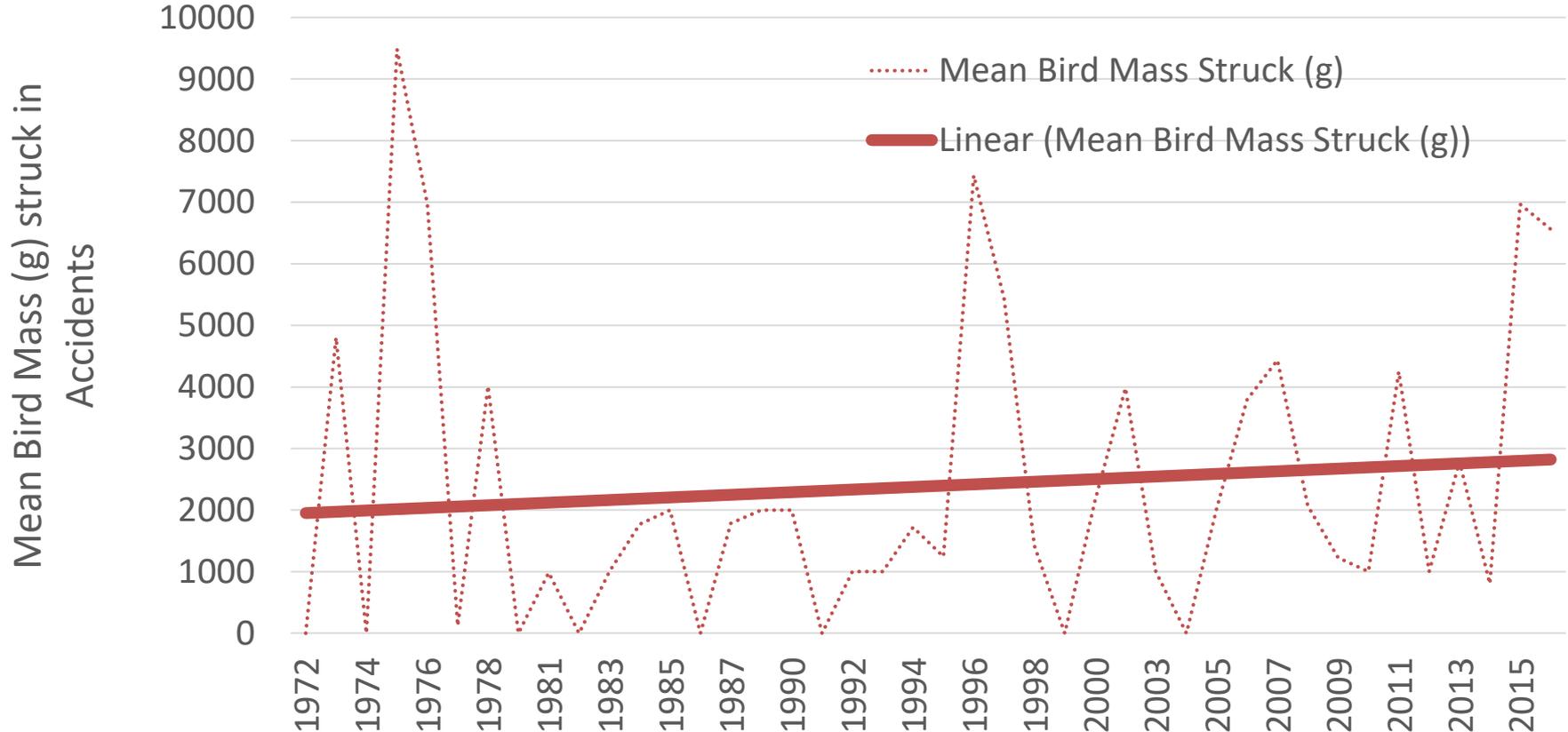
Increasing trend of mass – better engineering?



# Trend in Average Mass of Birds Struck in Accidents 1972-2016 – ICAO Aircraft Category A (Light Single Engine)

Better engineering?

Perhaps not.....Light aircraft not subject to same engineering advances, but still an increasing trend



# Average Cost of a Wildlife Strike: Includes all strikes (damaging and non-damaging)

Airline	Area of Operation	Fleet Size	Data Years	Estimated Average total Cost /Strike (USD 2016)	Data Reliability
A	Global	>300	2	\$54,758	****
B	Europe	<100	2	\$ 33,681	***
C	South America	100-300	4	\$26,348	*
D	Global	100-300	2	\$8,813	*
E	Global	100-300	10	\$69,883	****
F	Global	>300	10	\$110,752	**
G	Global	>300	10	\$7987	**
H	Global	>300	10	\$70555	**
				MEAN USD \$47847	

\*\*\*\* Complete cross referenced internal data sets supplied. Clearly well maintained database with only a few minor anomalies or incomplete fields

\*\*\* Incomplete dataset or a presentation summarising the data in a relatively comprehensive and logical fashion

\*\* Poorly maintained data sets with large gaps and incomplete fields where approximations and assumptions were made to help normalise

\* Unsupported statement about costs but presented by an airline in a formal setting

- In civil aviation, wildlife strikes (birds and mammals) have resulted in 330 human fatalities and 199 destroyed aircraft.
- We estimate the average cost of a wildlife strike to be \$69,000USD per incident.

If quoting this, please acknowledge all authors:

Shaw P., Dolbeer R., McKee J., & Patrick K., 2017. "Human Fatalities and Destroyed Civil Aircraft Due to Wildlife Strikes, 1912 to Present" In *Proceedings of the 2017 North American Birdstrike Conference, Dallas Texas USA*.

# Note: Recent Accident Not Included in the Above Analysis



**Date:** 16 August 2017

**Location:** Barbate, Spain

**Aircraft:** Piper PA36

**Wildlife Species:** Stork

**Fatalities:** 1





# AVISURE

THE BIRDSTRIKE SOLUTION

[www.avisure.com](http://www.avisure.com)

*Phil Shaw*