

8-2019

Wildlife Hazard Management: An Analysis of Wildlife Strikes Data From the Five Busiest Airports in Brasil: 2011-2018

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Mendonca, F. A., Keller, J., & Schonhardt, C. F. (2019). Wildlife Hazard Management: An Analysis of Wildlife Strikes Data From the Five Busiest Airports in Brasil: 2011-2018. , (). Retrieved from <https://commons.erau.edu/publication/1702>

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**Wildlife Hazard Management: An Analysis of
Wildlife Strikes Data From the Five Busiest
Airports in Brasil: 2011- 2018**

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2019 NORTH AMERICAN
BIRD STRIKE
CONFERENCE



PURDUE AVIATION TECHNOLOGY



OVERVIEW

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Management Implications

Wildlife Hazard Management: An Analysis of Wildlife Strikes Data From the Five Busiest Airports in Brasil – (2011-2018)

INTRODUCTION

- ✈️ Brazil → the largest country in Latin America - 8.514.876 Km²;
- ✈️ Booming aviation industry;
 - ✈️ From 2008 through 2017 → 7.1% per year;
 - ✈️ 104 million passengers in 2018;
 - ✈️ International destinations – 21.8 million (~20%);
 - ✈️ U.S. - 4.4 million passengers;
 - ✈️ Argentina – 3.8 million passengers;
 - ✈️ Portugal & Chile – 1.7 million passengers;
 - ✈️ Brazilian Airlines – 38.3%.
 - ✈️ Domestic Passengers → 200 million in 2030;
 - ✈️ International Passengers → 55 million in 2030.



INTRODUCTION

- ✈ Airports in Brasil – 125 for commercial and non-commercial operations;
- ✈ Thirty-two busiest commercial airports – 2,209,428 aircraft movements in 2018;
- ✈ Five busiest commercial airports in Brasil;
 - ✈ São Paulo (Guarulhos) International Airport (SBGR);
 - ✈ Congonhas International Airport (SBSP);
 - ✈ Brasilia International Airport (SBBR);
 - ✈ Rio de Janeiro International Airport (Galeao) (SBGL);
 - ✈ Santos Dumont International Airport (SBRJ).



Source: DECEA, 2019

INTRODUCTION

- ✈ The number and rate of wildlife strikes have increased in Brazil...Why?
 - ✈ Registered Aircraft – 18,710 in 2011 to 22,189 in 2018;
 - ✈ Total commercial aircraft movements increased 23% from 2011 through 2018;
 - ✈ Replacement of older and noisier aircraft fleets with more efficient and quieter, two-engine aircraft;
 - ✈ Inadequate and/or conflicting regulations and policies in the past impacting the safety management of wildlife;
 - ✈ Land-use practices (e.g., waste disposal operations); wildlife habitats, and human-activities near some Brazilian airports that potentially attract hazardous wildlife.



METHODOLOGY

- ✈ Two datasets were the primary sources of data (JAN 2011 through DEC-2018);
 - ✈ The Brazilian national wildlife database (NWSD), managed by the Brazilian Aeronautical Accidents Investigation and Prevention Center (CENIPA); and
 - ✈ The Air Traffic Operations Annual Reports, published by the Brazilian Air Traffic Control Department (DECEA).
- ✈ Data analysis;
 - ✈ Descriptive data analysis to provide an intuitive and overall trend of wildlife strikes at (and around) the five busiest airports in Brasil.

Wildlife Hazard Management: An Analysis of Wildlife Strikes Data From the Five Busiest Airports in Brasil – (2011-2018)

FINDINGS AND DISCUSSION

✈ There 967 reported wildlife strikes in **Guarulhos Airport** (2011-2018);

✈ 97.05% involved birds!

YEAR	AIRCRAFT OPERATIONS	WILDLIFE STRIKES	INDEX
2011	274,875	79	28.74
2012	279,036	117	41.93
2013	290,436	125	43.04
2014	310,690	80	25.75
2015	299,457	117	39.07
2016	272,141	151	55.49
2017	271,237	125	46.09
2018	299,961	173	57.67

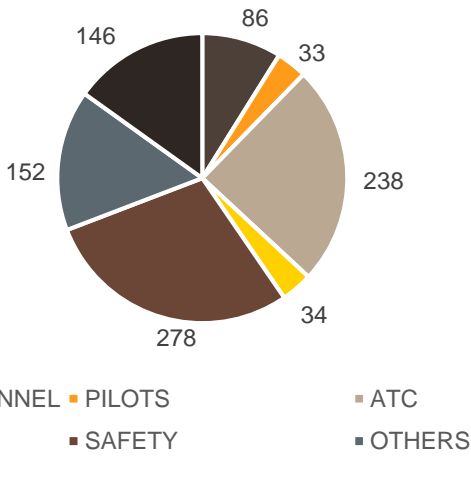
Note. Index refers to the number of wildlife strikes per 100,000 aircraft operations.

Note 2. One aircraft movement refers to one takeoff, one landing, one touch-and-go, one missed approach, and one itinerant traffic.

FINDINGS AND DISCUSSION

- ✈ There were 967 wildlife strikes in Guarulhos Airport (2011-2018);
 - ✈ 64% during the day;
 - ✈ 98% involved commercial aircraft;
 - ✈ 870 strikes below 1,500 feet AGL (88.97%).

Sources of Report

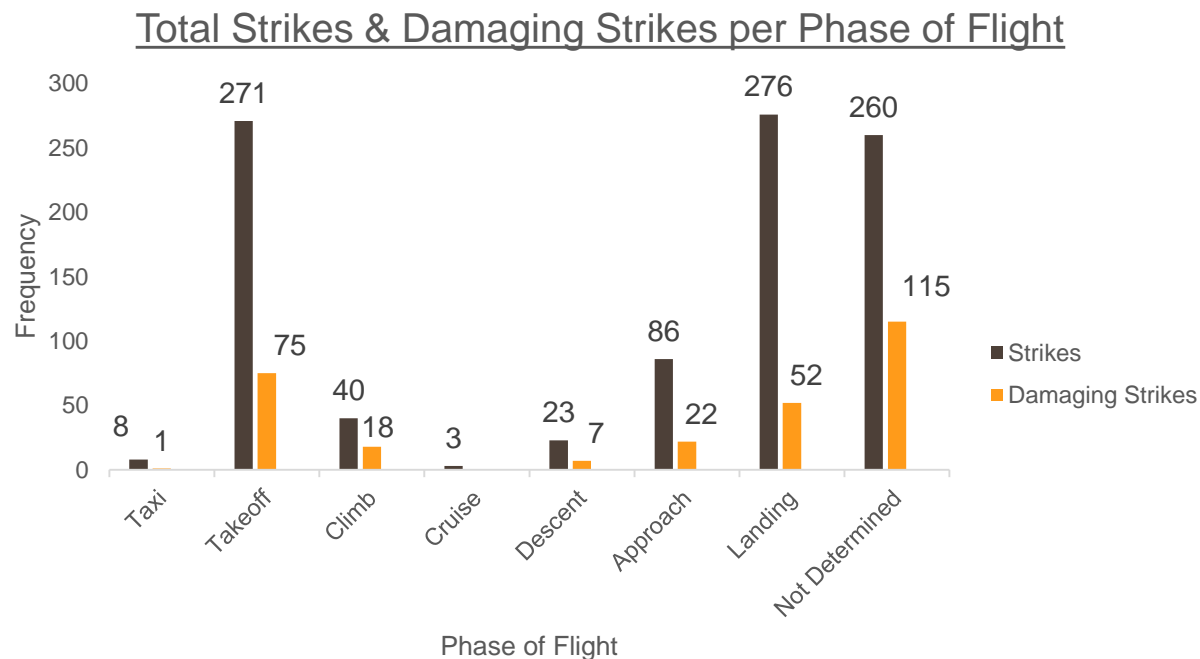


Strikes per Type of Aviation Operations

Branch	Strikes	Movements	Index
Commercial	889	2,117,385	41.99
GA	14	157,019	8.91
Military	3	23,966	12.52
Unknown	61	xxxxxxx	xxxxxxx

FINDINGS AND DISCUSSION

- ✈ There were 290 **damaging** wildlife strikes in **Guarulhos** (2011-2018);
 - ✈ 73% during the day / 20% at night;
 - ✈ 87% occurred below 1,500 feet AGL (259 damaging strikes).



Note. Damaging strikes included confirmed damaging strikes and strikes in which damage was not determined.

FINDINGS AND DISCUSSION

✈ There 547 reported wildlife strikes in Congonhas Airport (2011-2018);

✈ 97.58% involved birds!

YEAR	AIRCRAFT OPERATIONS	WILDLIFE STRIKES	INDEX
2011	221,247	85	38.41
2012	227,240	60	26.41
2013	222,902	57	25.57
2014	216,133	75	34.70
2015	221,534	53	23.92
2016	219,746	92	41.86
2017	223,989	56	25.01
2018	228,866	69	30.14

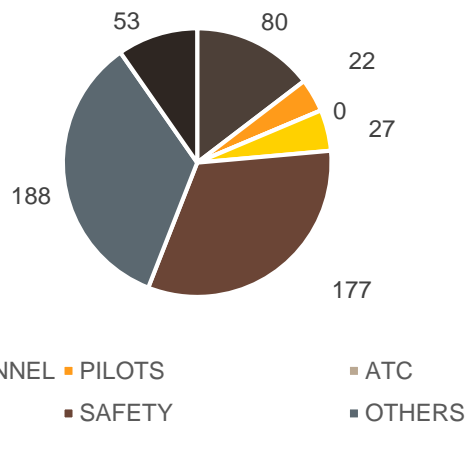
Note. Index refers to the number of wildlife strikes per 100,000 aircraft operations.

Note 2. One aircraft movement refers to one takeoff, one landing, one touch-and-go, one missed approach, and one itinerant traffic.

FINDINGS AND DISCUSSION

- ✈ There were 547 wildlife strikes in Congonhas Airport (2011-2018);
 - ✈ 74% during the day;
 - ✈ 94% involved commercial aircraft;
 - ✈ 480 strikes below 1,500 feet AGL (87.75%).

Sources of Report

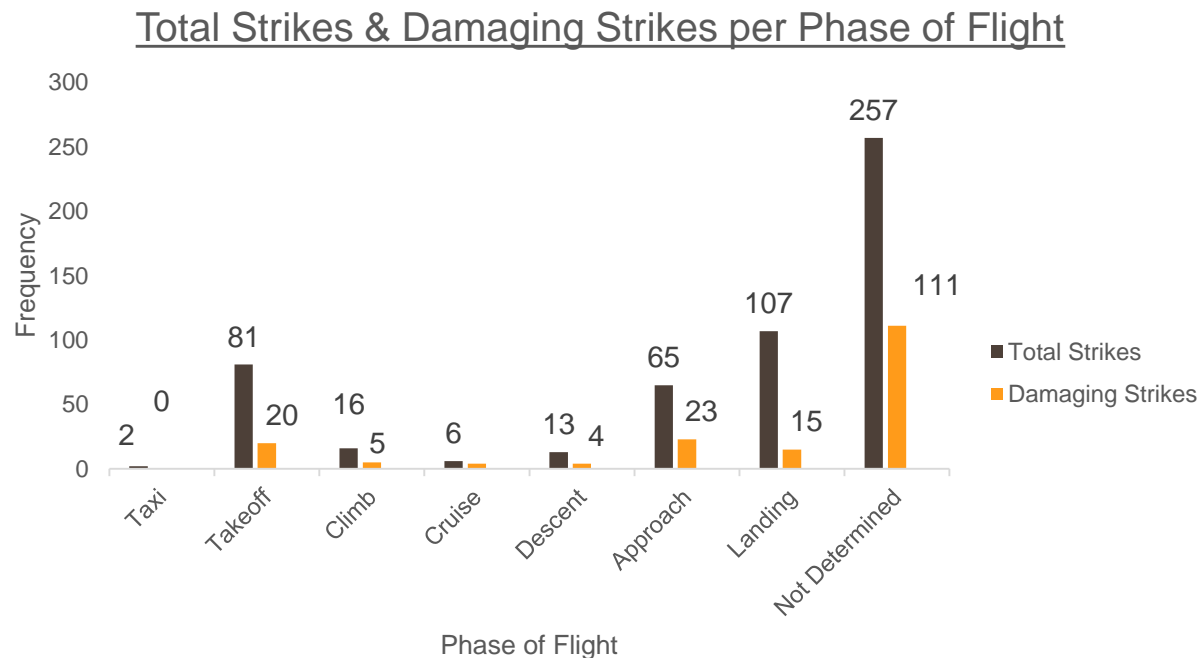


Strikes per Type of Aviation Operations

Branch	Strikes	Movements	Index
Commercial	474	1,342,047	35,31
GA	28	419,349	6.67
Military	2	20,171	9.91
Unknown	43	xxxxxxx	xxxxxxx

FINDINGS AND DISCUSSION

- ✈ There were 178 **damaging** wildlife strikes in **Congonhas Airport** (2011-2018);
 - ✈ 76% during the day / 21% at night;
 - ✈ 80% occurred below 1,500 feet AGL (142 damaging strikes).



Note. Damaging strikes included confirmed damaging strikes and strikes in which damage was not determined.

Wildlife Hazard Management: An Analysis of Wildlife Strikes Data From the Five Busiest Airports in Brasil – [2011-2018]

FINDINGS AND DISCUSSION

✈ There 899 reported wildlife strikes in **Brasilia Airport** (2011-2018);

✈ 88.69% involved birds!

YEAR	AIRCRAFT OPERATIONS	WILDLIFE STRIKES	INDEX
2011	201,052	81	40.19
2012	203,952	115	56.38
2013	195,260	104	53.26
2014	200,001	76	37.99
2015	199,246	98	49.18
2016	172,483	123	71.31
2017	158,507	151	95.26
2018	164,485	151	91.81

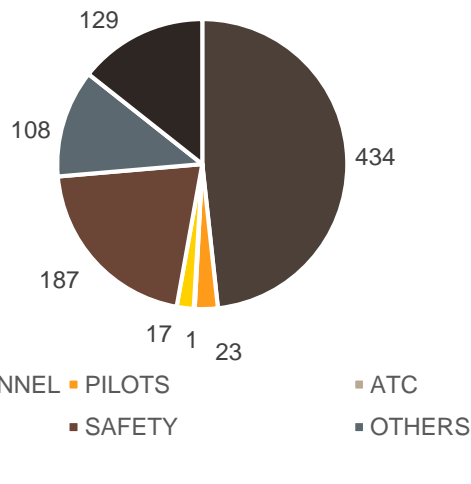
Note. Index refers to the number of wildlife strikes per 100,000 aircraft operations.

Note 2. One aircraft movement refers to one takeoff, one landing, one touch-and-go, one missed approach, and one itinerant traffic.

FINDINGS AND DISCUSSION

- ✈ There were 899 wildlife strikes in Brasilia Airport (2011-2018);
 - ✈ 73% during the day;
 - ✈ 73% involved commercial aircraft;
 - ✈ 858 strikes below 1,500 feet AGL (95.44%).

Sources of Report

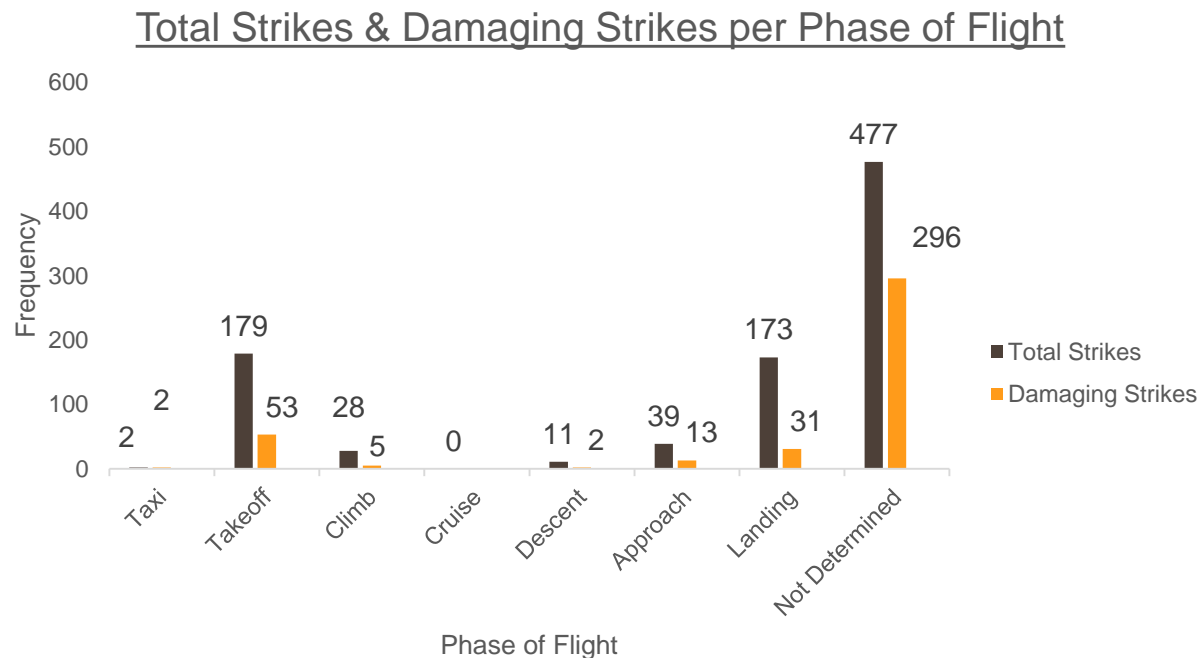


Strikes per Type of Aviation Operations

Branch	Strikes	Movements	Index
Commercial	494	1,186,259	41.65
GA	18	191,374	9.40
Military	15	117,803	12.733
Unknown	372	xxxxxxx	xxxxxxx

FINDINGS AND DISCUSSION

- ✈ There were 400 **damaging** wildlife strikes in **Brasilia Airport** (2011-2018);
 - ✈ 76% during the day / 21% at night;
 - ✈ 97% occurred below 1,500 feet AGL (387 damaging strikes).



Note. Damaging strikes included confirmed damaging strikes and strikes in which damage was not determined.

FINDINGS AND DISCUSSION

- ✈ There 296 reported wildlife strikes in Santos Dumont Airport (2011-2018);
 - ✈ 99.18% involved birds!

YEAR	AIRCRAFT OPERATIONS	WILDLIFE STRIKES	INDEX
2011	163,096	21	12.88
2012	169,744	23	13.55
2013	157,117	33	21.01
2014	150,575	29	19.26
2015	139,561	39	27.95
2016	120,265	37	30.77
2017	118,149	70	59.25
2018	117,740	44	37.38

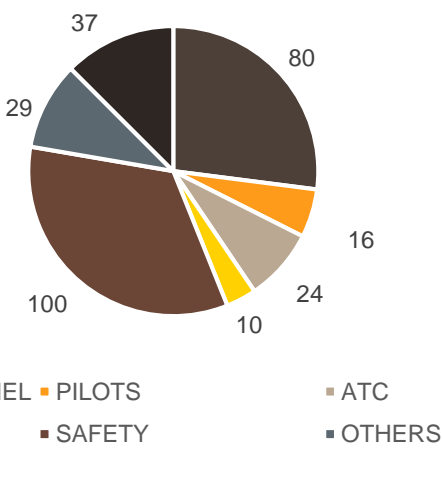
Note. Index refers to the number of wildlife strikes per 100,000 aircraft operations.

Note 2. One aircraft movement refers to one takeoff, one landing, one touch-and-go, one missed approach, and one itinerant traffic.

FINDINGS AND DISCUSSION

- ✈ There were 296 wildlife strikes in Santos Dumont Airport (2011-2018);
 - ✈ 66% during the day;
 - ✈ 73% involved commercial aircraft;
 - ✈ 273 strikes below 1,500 feet AGL (94.13%).

Sources of Report

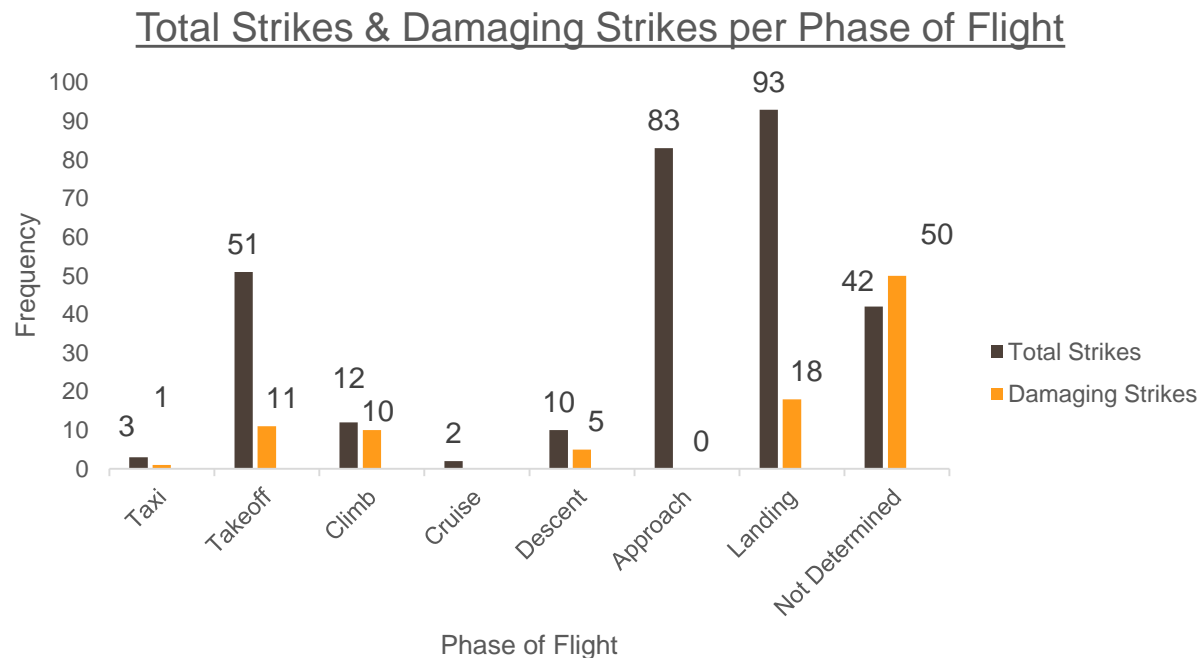


Strikes per Type of Aviation Operations

Branch	Strikes	Movements	Index
Commercial	265	785,215	33.75
GA	17	304,344	5.59
Military	6	46,688	12.85
Unknown	8	xxxxxxx	xxxxxxx

FINDINGS AND DISCUSSION

- ✈ There were 104 **damaging** wildlife strikes in **Santos Dumont Airport** (2011-2018);
 - ✈ 70% during the day / 22% at night;
 - ✈ 85% occurred below 1,500 feet AGL (88 damaging strikes).



Note. Damaging strikes included confirmed damaging strikes and strikes in which damage was not determined.

Wildlife Hazard Management: An Analysis of Wildlife Strikes Data From the Five Busiest Airports in Brasil – [2011-2018]

FINDINGS AND DISCUSSION

✈ There 692 reported wildlife strikes in Galeao Airport (2011-2018);

✈ 94.52% involved birds!

YEAR	AIRCRAFT OPERATIONS	WILDLIFE STRIKES	INDEX
2011	148,711	75	50.44
2012	166,053	67	40.35
2013	155,126	87	56.09
2014	151,282	64	42,31
2015	141,549	115	81.25
2016	131,168	93	70.91
2017	127,092	97	76.33
2018	116,717	94	80.54

Note. Index refers to the number of wildlife strikes per 100,000 aircraft operations.

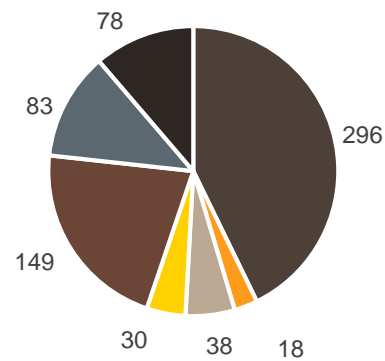
Note 2. One aircraft movement refers to one takeoff, one landing, one touch-and-go, one missed approach, and one itinerant traffic.

Wildlife Hazard Management: An Analysis of Wildlife Strikes Data From the Five Busiest Airports in Brasil – [2011-2018]

FINDINGS AND DISCUSSION

- ✈ There were 692 wildlife strikes in Galeao Airport (2011-2018);
 - ✈ 67% during the day;
 - ✈ 98% involved commercial aircraft;
 - ✈ 646 strikes below 1,500 feet AGL (95.73%).

Sources of Report



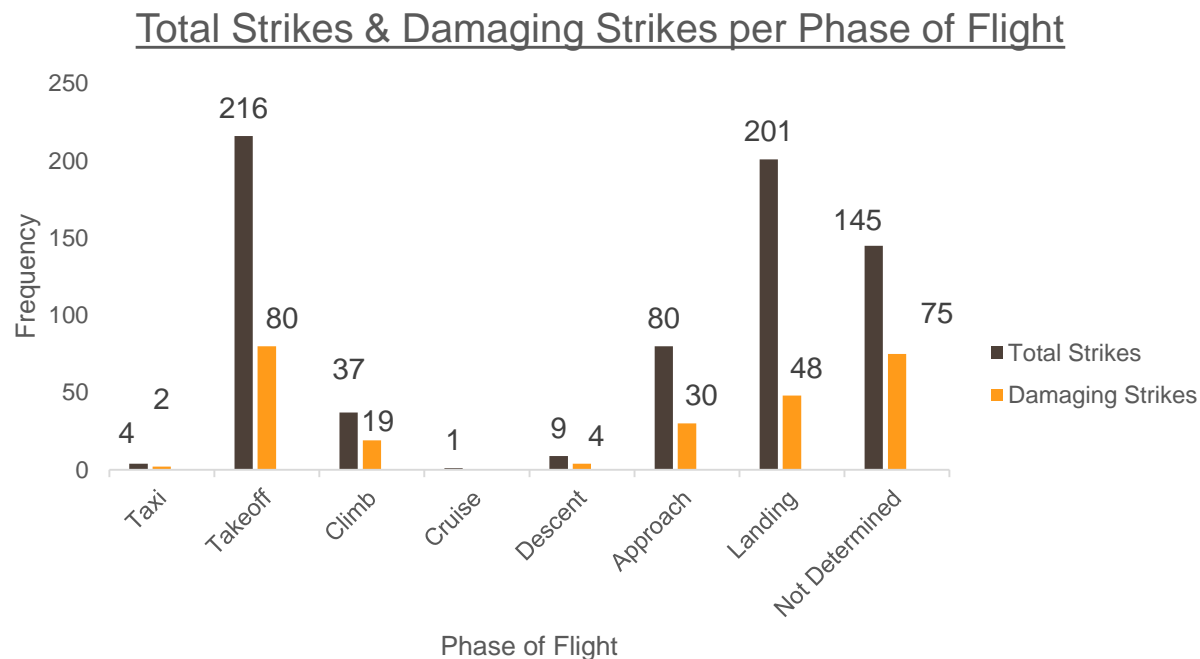
- AIRPORT PERSONNEL
- PILOTS
- ATC
- MAINTENANCE
- SAFETY
- OTHERS
- NOT INFORMED

Strikes per Type of Aviation Operations

Branch	Strikes	Movements	Index
Commercial	647	2,012,831	32.15
GA	11	71,378	15.42
Military	8	54,748	14.61
Unknown	26	Xxxxxxxx	xxxxxxx

FINDINGS AND DISCUSSION

- ✈ There were 258 **damaging** wildlife strikes in **Galeao Airport** (2011-2018);
 - ✈ 73% during the day / 20% at night;
 - ✈ 93% occurred below 1,500 feet AGL (229 damaging strikes).



Note. Damaging strikes included confirmed damaging strikes and strikes in which damage was not determined.

LIMITATIONS OF THE STUDY

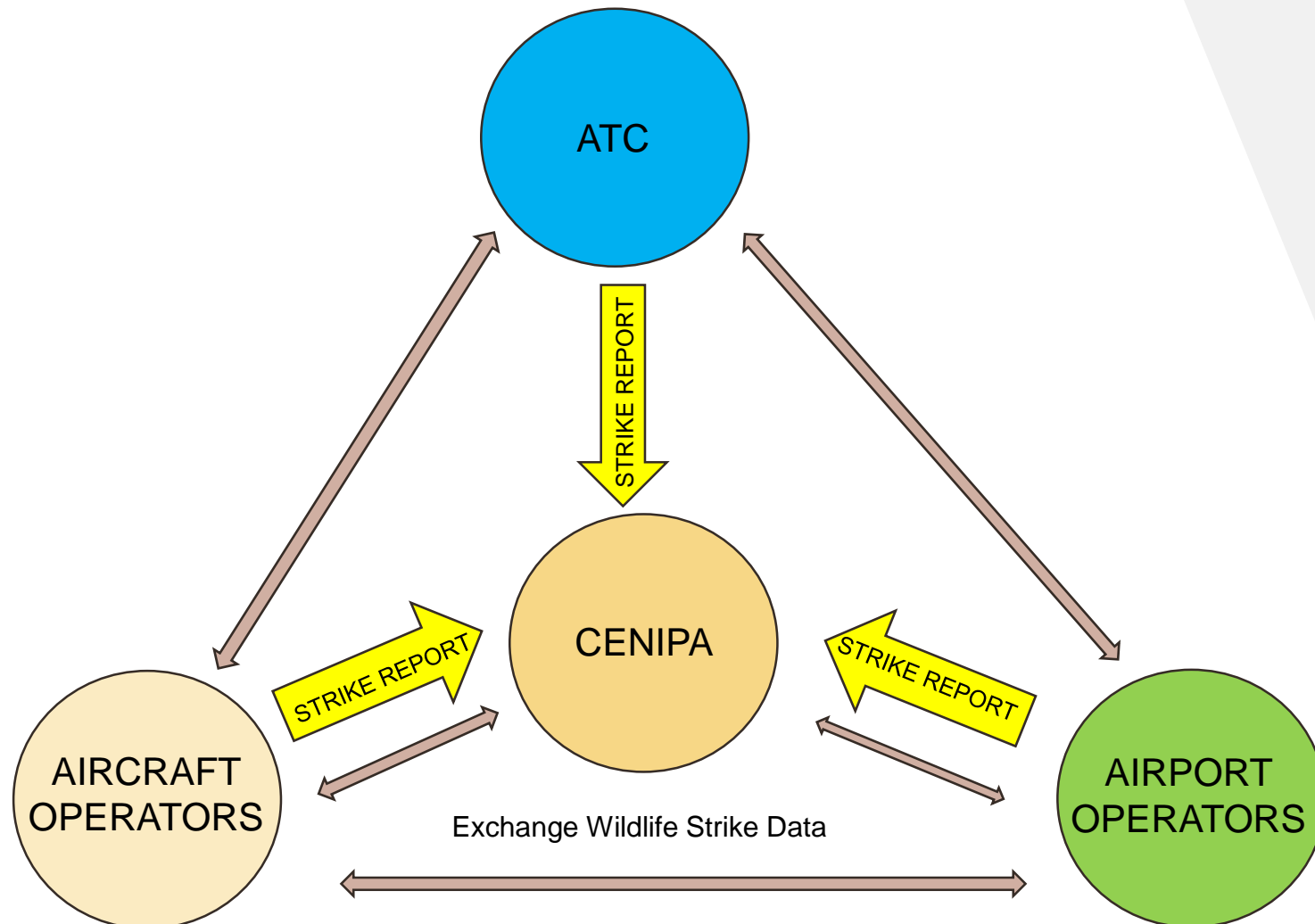
- ✈ CENIPA Wildlife Strike Database;
 - ✈ There 491 strikes involving a major air carrier in Brazil in 2018 (personal information);
 - ✈ CENIPA Database – 626 strikes in the same period!
- ✈ Several strike reports were incomplete (e.g., missing information about phase of flight; altitude of strikes; costs) and/or with conflicting information (e.g., strike during landing X altitude 3,000 feet AGL);
 - ✈ There is a need for data / information about the number of aircraft movements per time of the day;
 - ✈ There is a need for information regarding the costs of wildlife strikes.
- ✈ **It is important to note that comparison of reported wildlife strike data from an airport in relation to other airports is not a valid metric!**

MANAGEMENT IMPLICATIONS

- ✈ Findings of concern:
 - ✈ The rate of wildlife strikes per 100,000 aircraft movements has increased in Guarulhos, Brasilia, Santos Dumont, and Galeao Airports (2011-2018);
 - ✈ Approximately 69% of the strikes occurred during the day;
 - ✈ On average 35.88% of the strikes caused damage to the aircraft;
 - ✈ On average, 88% of the **damaging** strikes occurred below 1,500 feet AGL;
- ✈ There is a need to improve the quality of wildlife strike reporting in Brazil;
 - ✈ Only **3.5%** of the strikes were reported by **flight crews**;
 - ✈ *Safety efforts to mitigate the risk of accidents due to wildlife strikes should be supported by robust data and information.*

Wildlife Hazard Management: An Analysis Of Wildlife Strikes Data From the Five Busiest Airports in Brasil – (2011-2018)

ENHANCE DATA COLLECTION PROCESS



Questions





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Thank you!

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