Data Visualization of Bird Strike

2000 - 2011

Rishi Jhangili

01 - Project Recap

02 - Problem

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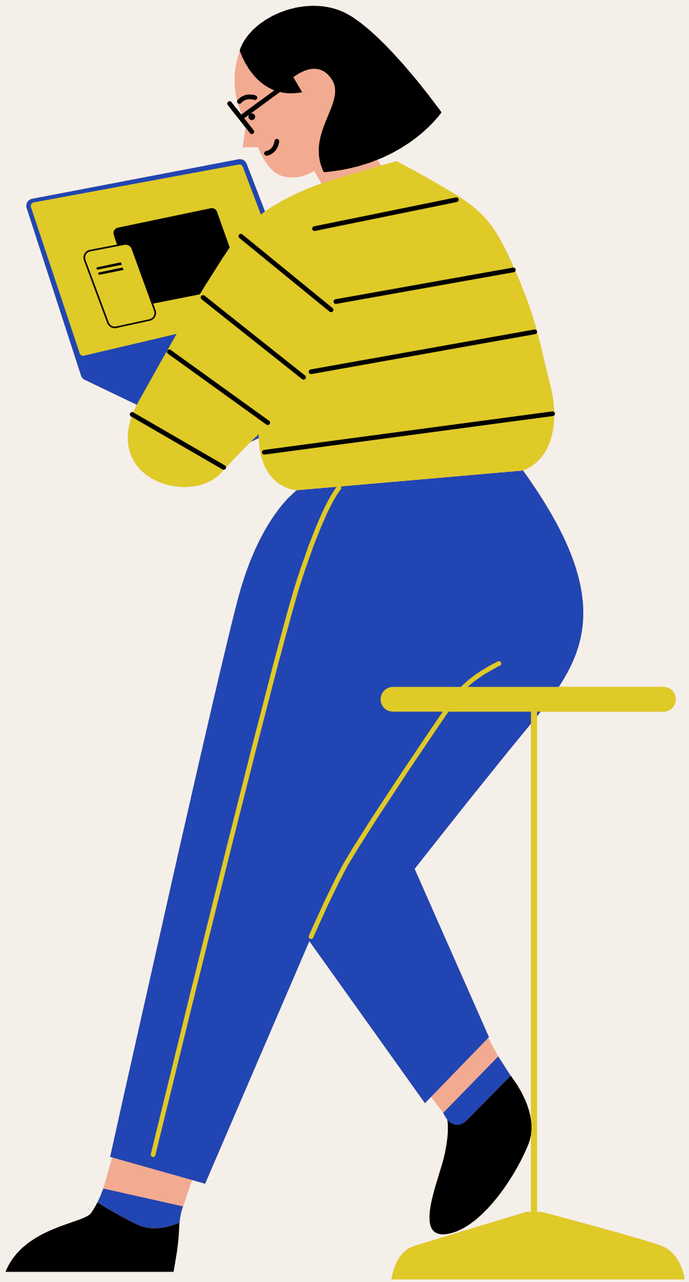
04 - Insights

05 - Summary

Data

Visualization



01 - Project Recap

From 2000 to 2011, data indicates a general upward trend in bird strikes, with the majority of incidents reported in the United States and only 277 flights from Canada. SouthWest Airlines experienced the highest number of bird strikes. The year 2001 was noted for its highest cost-efficiency in handling these incidents.

A significant finding is that 50,584 bird strikes occurred in conditions classified as “no atmospheric,” and 86.4% of bird strikes happened at altitudes below 1,000 feet. The average altitude for approaching flights, where the highest number of bird strikes (20,718) occurred, was approximately 990.05 feet. Additionally, pilot warnings were shown to reduce bird strikes under certain conditions.

02 - Problem

Transport and communication are in the crucial domain in the field of analytics. Environmental impacts and safety are, nowadays, two major concerns of the scientific community with respect to transport scenarios and to the ever-growing urban areas. These issues gain more importance due to the increasing amount of vehicles and people. Seeking new solutions is reaching a point where available technologies and artificial intelligence, especially MAS, are being recognized as ways to cope with and tackle these kinds of problems in a distributed and more appropriate way.

A bird strike is strictly defined as a collision between a bird and an aircraft which is in flight or on a take-off or landing roll. The term is often expanded to cover other wildlife strikes - with bats or ground animals. Bird Strike is common and can be a significant threat to aircraft safety. For smaller aircraft, significant damage may be caused to the aircraft structure and all aircraft, especially jet-engine ones, are vulnerable to the loss of thrust which can follow the ingestion of birds into engine air intakes. This has resulted in several fatal accidents.

Bird strikes may occur during any phase of flight, but are most likely during the take-off, initial climb, approach and landing phases due to the greater numbers of birds in flight at lower levels. To have a closer look the following document visually depicts the data collected on Bird Strikes by FAA between 2000-2011.

Case Study

- Visuals Depicting the Number of Bird Strikes
- Yearly Analysis & Bird Strikes in the US
- Top 10 US Airlines in terms of having encountered bird strikes
- Airports with most incidents of bird strikes – Top 50
- Yearly Cost Incurred due to Bird Strikes:
- When do most bird strikes occur?
- Altitude of aeroplanes at the time of strike
- Phase of flight at the time of the strike.
- Average Altitude of the aeroplanes in different phases at the time of strike
- Effect of Bird Strikes & Impact on Flight
- Effect of Strike at Different Altitude
- Were Pilots Informed? & Prior Warning and Effect of Strike Relation

03 - Process

Data Understanding

Data Cleaning

Data Modelling

Data Analysis

Uncover Insights

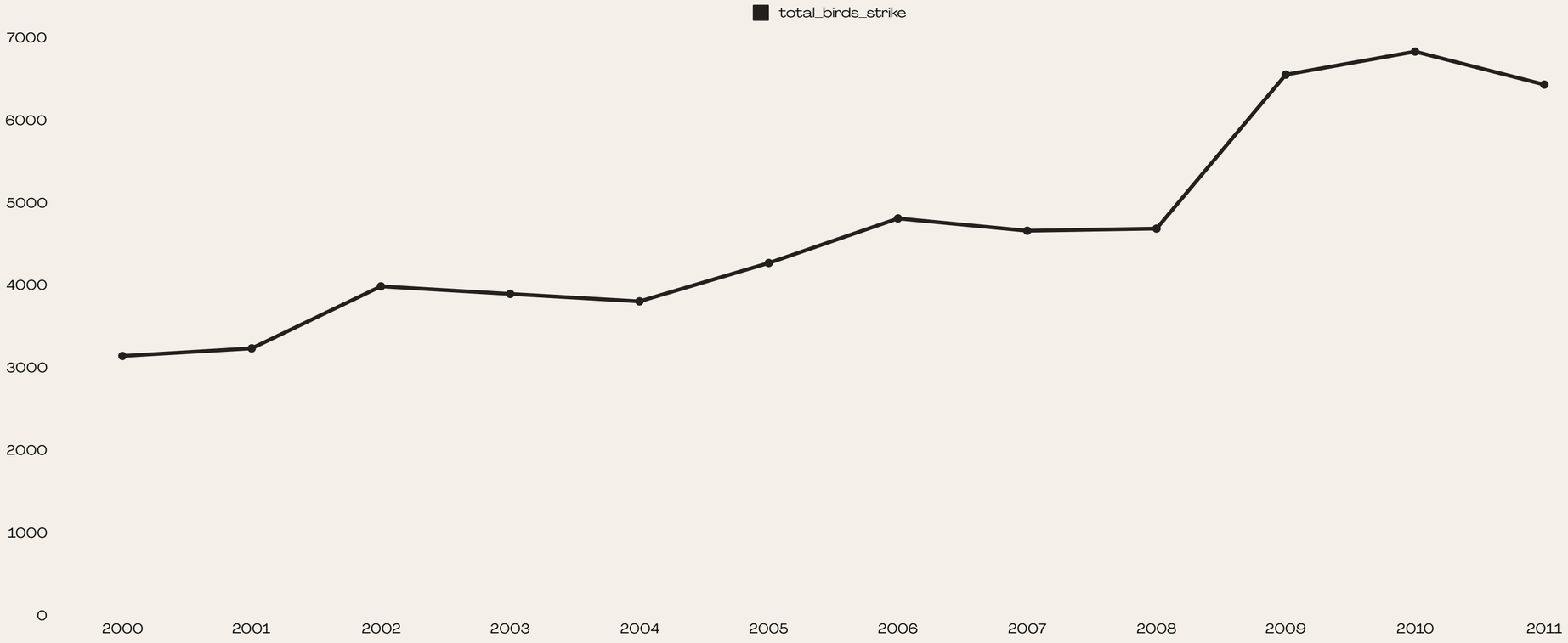
Data Cleaning

I used Python Pandas to clean the data.

Removed Outliers for Bird Strike Actual Count.

Dropped unwanted columns and loaded the data into SQL database

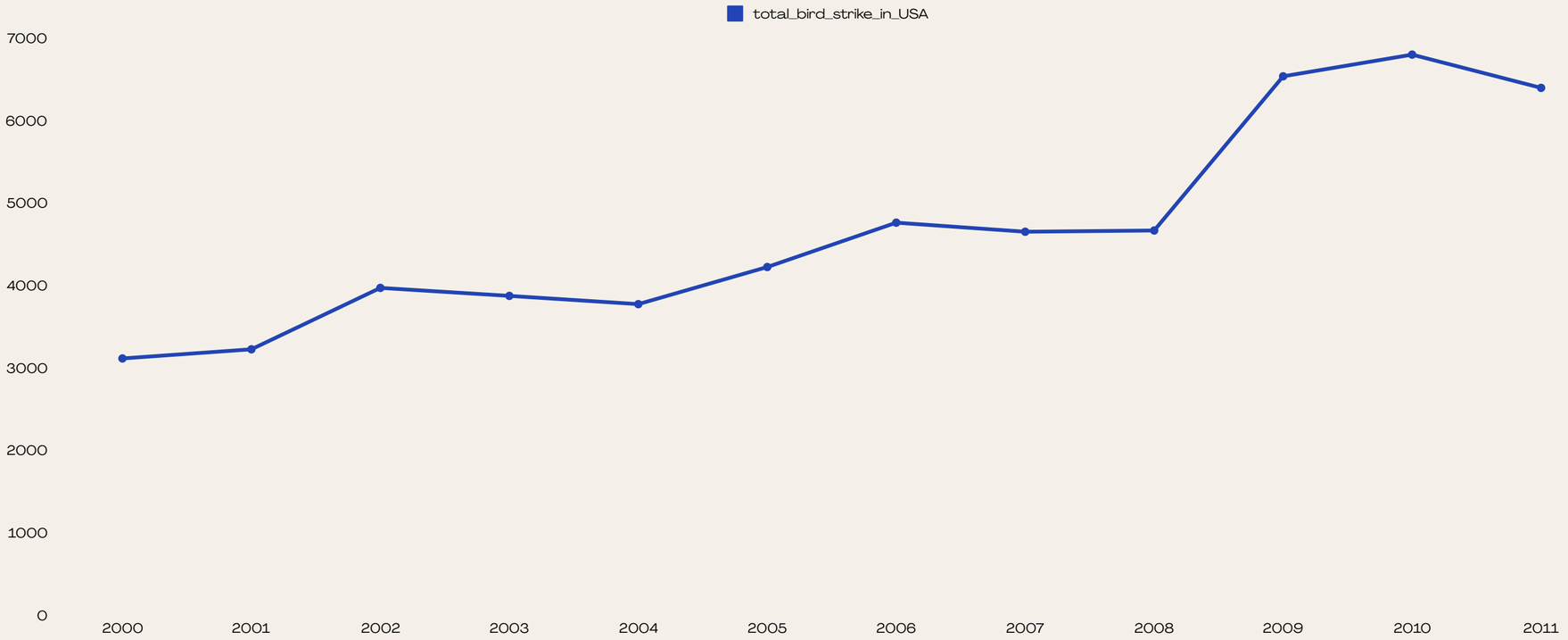
Visuals Depicting the Number of Bird Strikes



	year	total_birds_stri...
	2000	3143
	2001	3235
	2002	3986
	2003	3894
	2004	3804
	2005	4269
	2006	4809
	2007	4660
	2008	4686
	2009	6552
	2010	6831
	2011	6431

The data from 2000 to 2011 reveals a general upward trend in bird strikes, with notable increases in 2002, 2006, 2009, and 2010. The overall bird strike from 2000 to 2011 is 56300

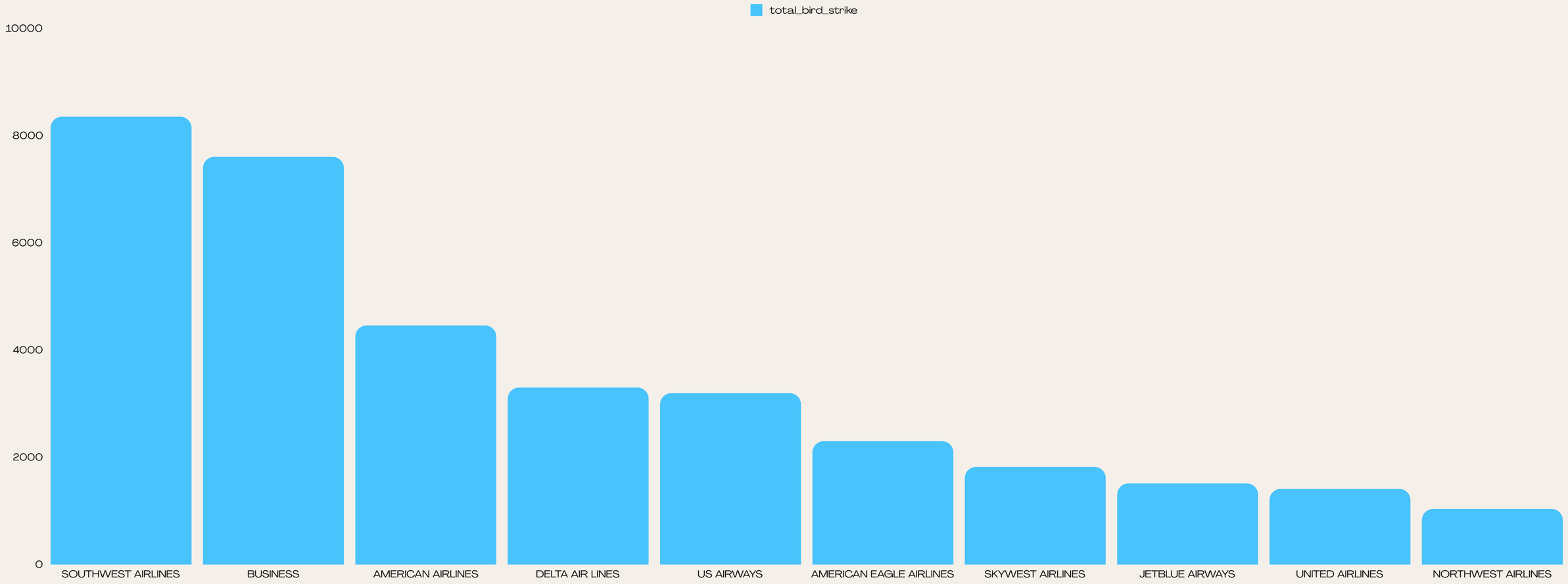
Yearly Analysis & Bird Strikes in the US



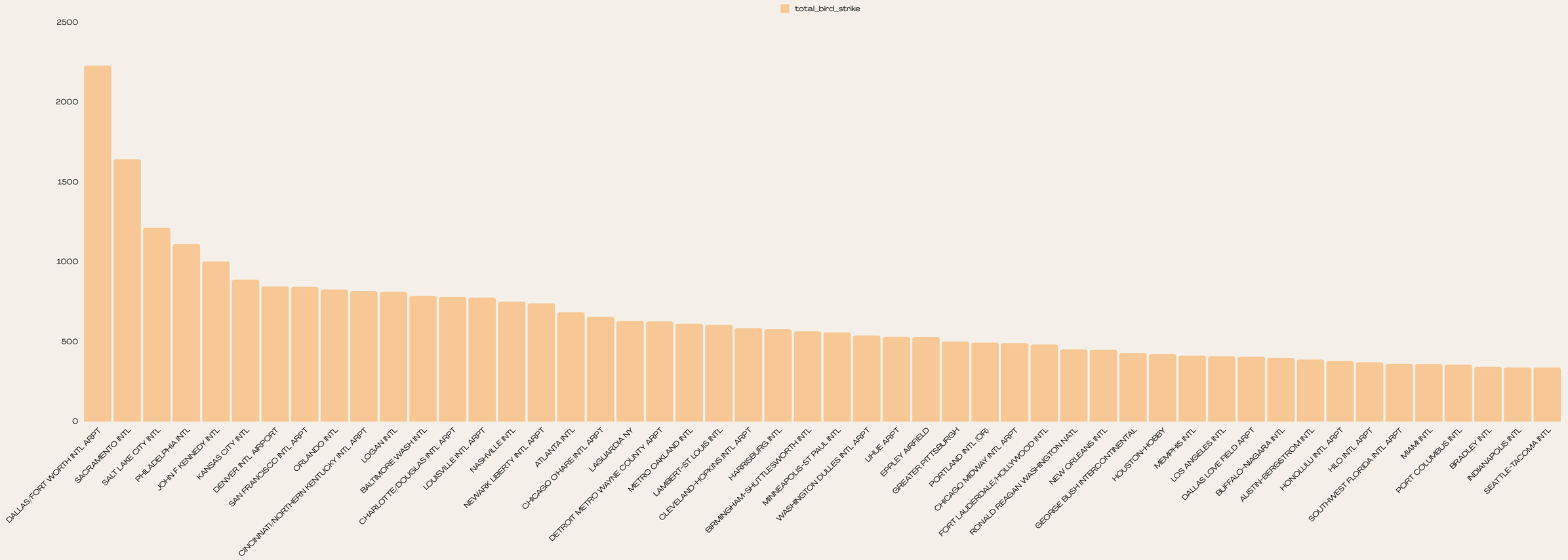
year	total_bird_strike_in_USA
2000	3117
2001	3228
2002	3973
2003	3876
2004	3776
2005	4226
2006	4764
2007	4654
2008	4669
2009	6539
2010	6802
2011	6399

There is a minimal difference compared to the previous list which is 277 less than the overall actual bird strike. (56023 bird strike in US)

Top 10 US Airlines in terms of having encountered bird strikes

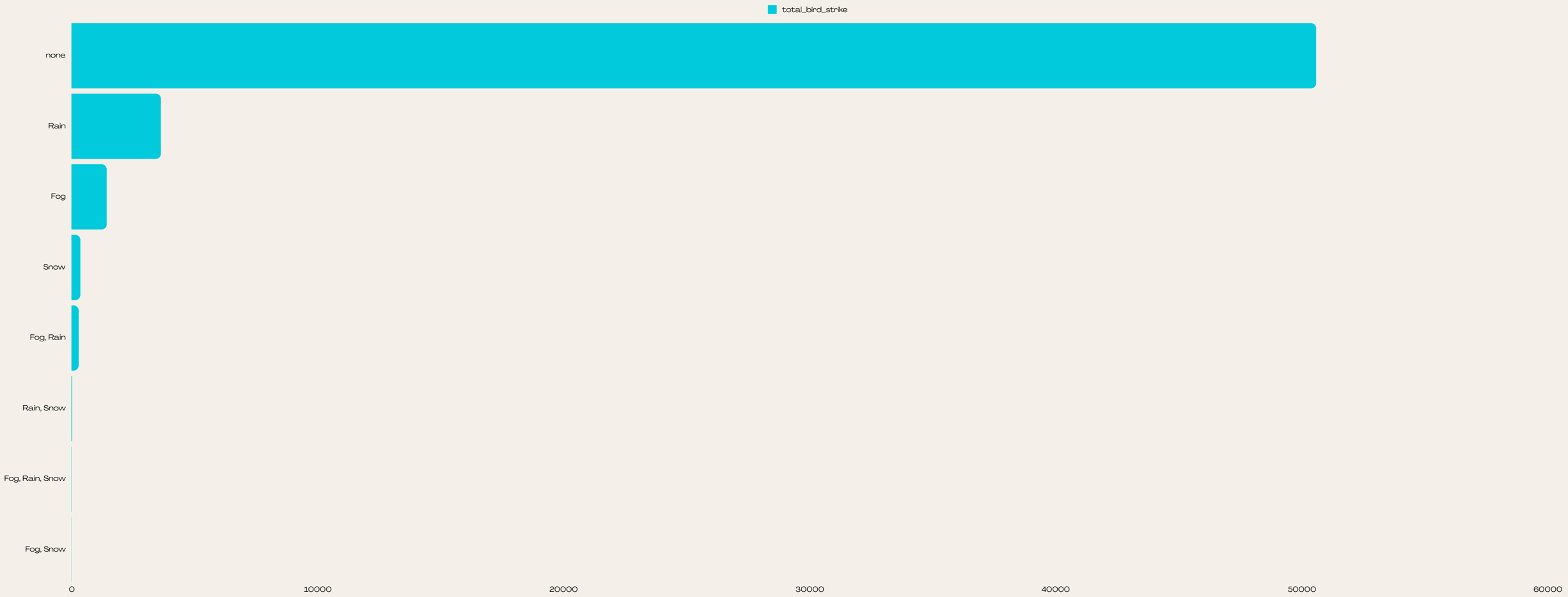


Airports with most incidents of bird strikes – Top 50

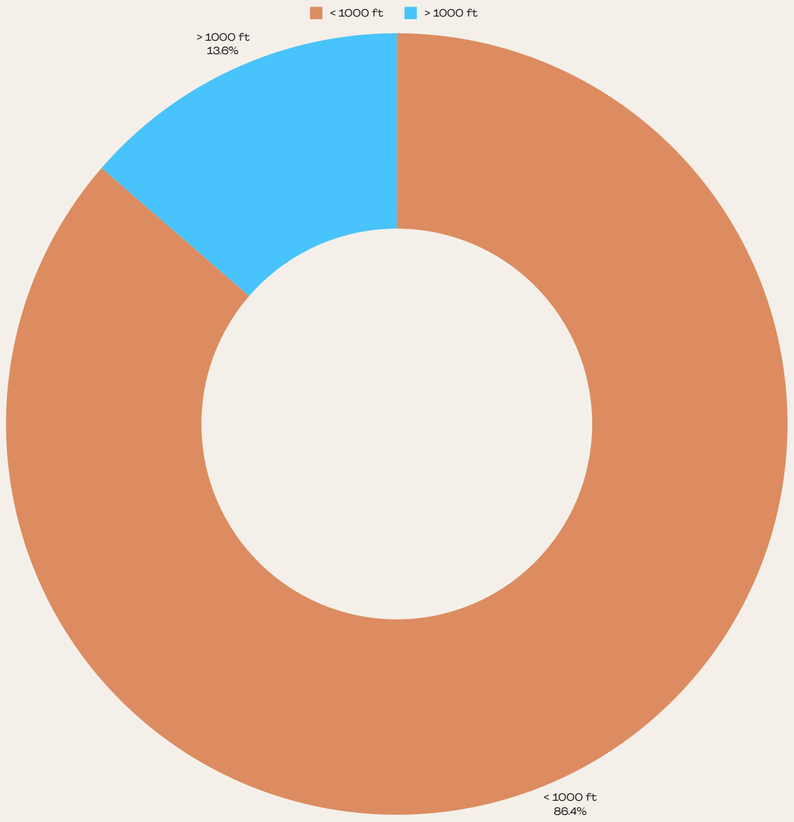


Yearly Cost Incurred due to Bird Strikes

When do most bird strikes occur?

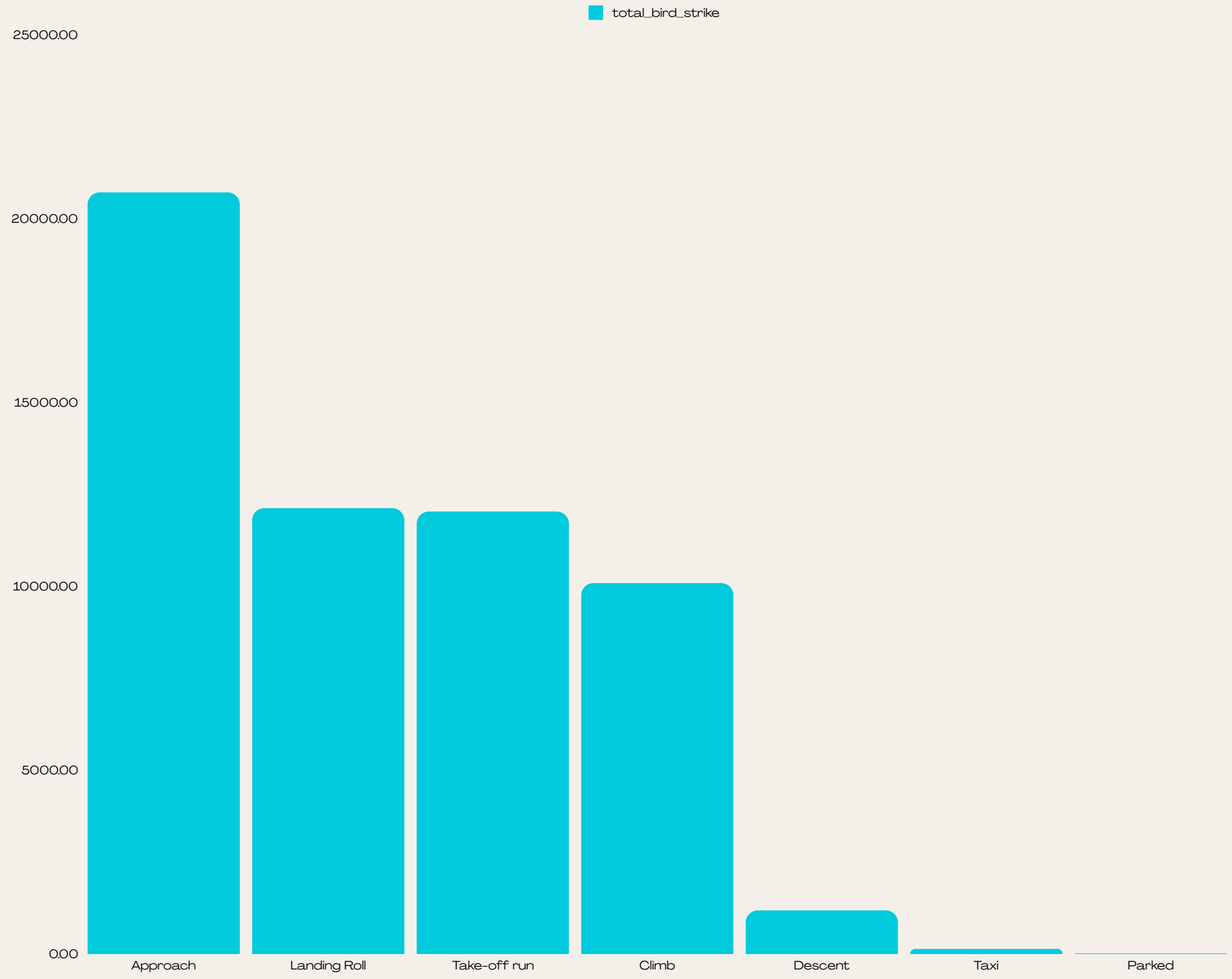


Altitude of aeroplanes at the time of strike



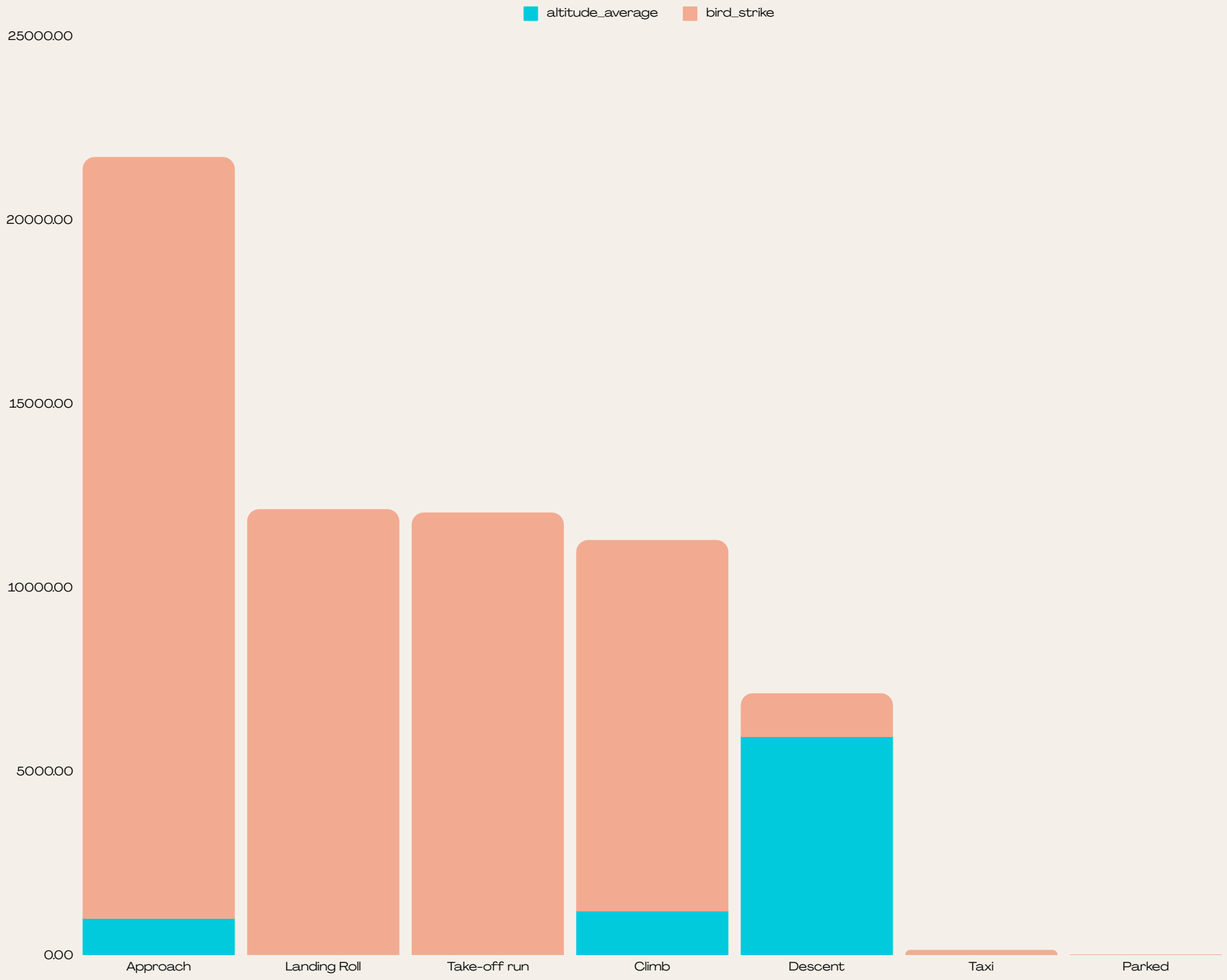
altitude	total_bird_strike
< 1000 ft	48626
> 1000 ft	7674

Phase of flight at the time of the strike.



phase_of_flight	total_bird_strike
Approach	20718
Landing Roll	12127
Take-off run	12035
Climb	10088
Descent	1184
Taxi	135
Parked	13

Average Altitude of the aeroplanes in different phases at the time of strike



phase_of_flight	altitude_average	bird_strike
Approach	990.05	20718
Landing Roll	0	12127
Take-off run	0.1	12035
Climb	1199.65	10088
Descent	5933.96	1184
Taxi	0	135
Parked	0	13

Effect of Bird Strikes & Impact on Flight

impact_on_flight	effect_indicated_damage	total_bird_strike
none	No damage	44553
none	Caused damage	4148
Precautionary Landing	No damage	2159
Precautionary Landing	Caused damage	2052
Aborted Take-off	No damage	1070
Other	No damage	766
Aborted Take-off	Caused damage	646
Other	Caused damage	506
Engine Shut Down	Caused damage	385
Engine Shut Down	No damage	15

Effect of Strike at Different Altitude

altitude	effect_indicated_damage	total_bird_strike
< 1000 ft	No damage	42650
< 1000 ft	Caused damage	5976
> 1000 ft	No damage	5913
> 1000 ft	Caused damage	1761

Were Pilots Informed? & Prior Warning and Effect of Strike Relation

pilot_warned_of_wild...	effect_indicated_damage	total_birds
N	No damage	25640
Y	No damage	22923
N	Caused damage	4446
Y	Caused damage	3291

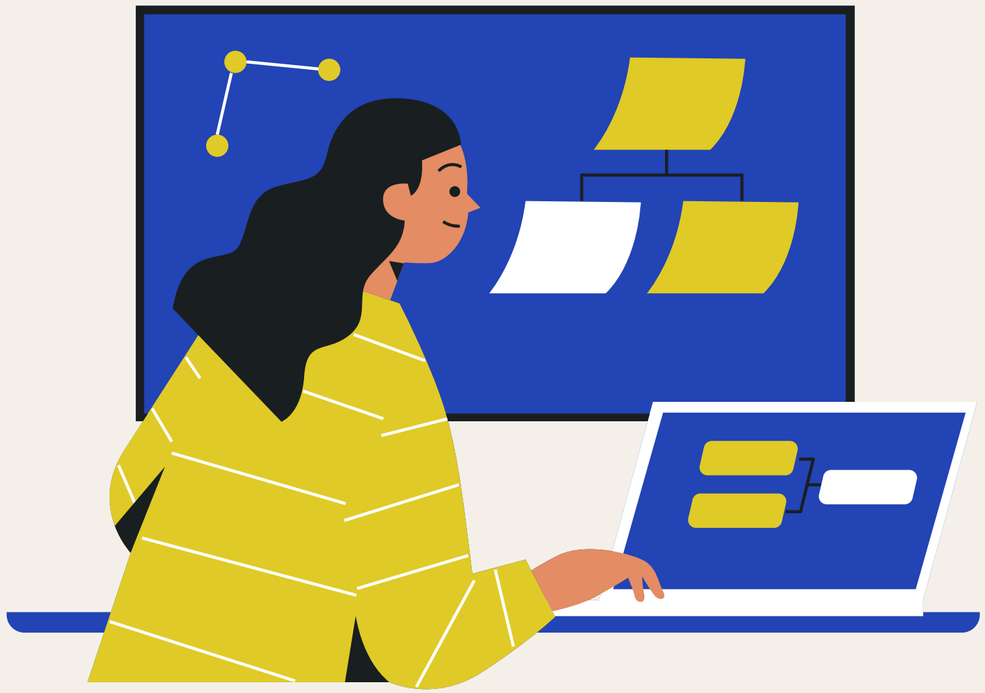
04 - Insights

The data from 2000 to 2011 reveals a general upward trend in bird strikes

Most of the Flight Data is related to the United States.

Only 277 Flights from Canada.

SouthWest Airlines had the most number of bird strikes.



In the year 2001 has experienced the highest cost-efficiency.

The highest bird strike occurs (50584) at no atmospheric.

At an altitude < 1000 ft 86.4% of the bird strikes

The average altitude for approaching a flight is about 990.05. Here the highest bird strike takes place (20718).

When the pilot warns that there is a reduction in bird strikes at certain instincts.

Data visualization simplifies the communication of analysis findings

Data

Visualization

The analysis highlights the critical issue of bird strikes in aviation, particularly at lower altitudes and during flight approaches. The significant concentration of incidents in the United States and the high frequency of strikes with SouthWest Airlines underscore the need for targeted measures to mitigate risks.

Data analysis allows for identifying trends and patterns within datasets.

04 - Conclusions

Data analysis helps in identifying outliers or anomalies in the data

The data also emphasizes the importance of pilot awareness and timely warnings in reducing the frequency of bird strikes. Continuous monitoring and improved preventive strategies are essential to enhance flight safety and minimize the economic impact of bird strikes on the aviation industry.

Thanks

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