iNeuron

Data Visualization of Bird Strikes between 2000 – 2011

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Objective:

Build a dashboard to analyze chicken strikes among 2000 – 2011 inside the US for plane safety and wildlife safety.

Benefits:

- Explain the number of birds strikes.

- Analysis of cost and damage caused by bird strike.

- Learn when there is a bird to shoot.

- Effects of bird strike.

- Analyzing wildlife species that are most often struck.

- Try to find patterns of aircraft types and bird strikes.
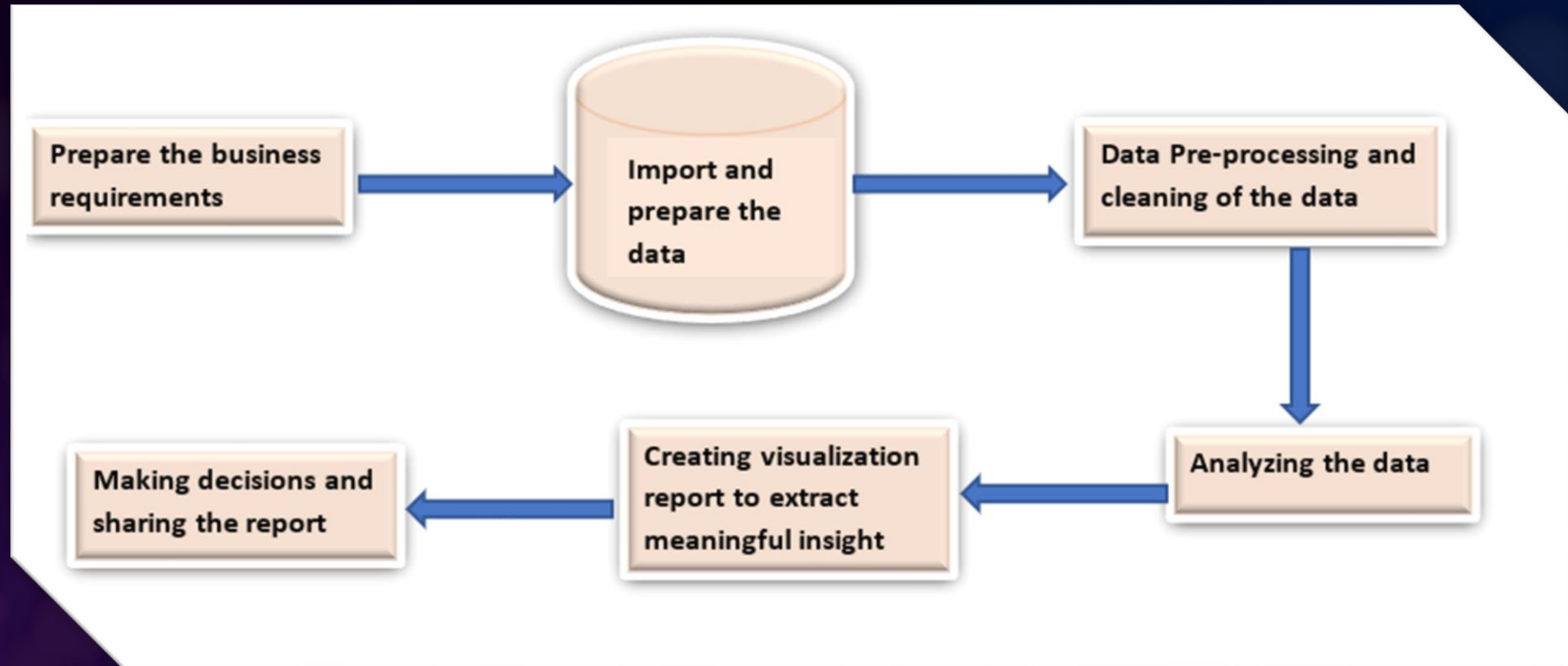

© AIRBUS S.A.S. 2010 - photo by e'm company / H. GOUSSÉ

Data Attributes (Part-1):

1) Record ID – Unique ID of each strike case record

2) Aircraft: Type – Type of the Aircraft

3) Airport: Name – Name of the Airport

4) Altitude bin – Contain Altitude values in respect of 2 bins which are < 1000 ft and > 1000 ft

5) Aircraft: Make/Model – Contain the model of Aircraft

6) Wildlife: Number struck – Contain number of wildlife struck in terms of 4 groups which are 1, 2-10, 11-100, over 100

7) Wildlife: Number Struck Actual – Contain Actual number of wildlife struck

8) Effect: Impact to flight – Contain categorical value about impact in flight due to bird strike

9) FlightDate – Date of the flight

10) Effect: Indicated Damage – Contained categorical value about whether damage happened or not.

11) Aircraft: Number of engines? – Contained the number of engines present in aircraft

12) Aircraft: Airline/Operator – Contain the name of airlines

13) Origin State – Contain the name of origin state

14) When: Phase of flight – Contain categorical value about the phase of flight when strike occurs

15) Conditions: Precipitation – Contain categorical value about the Precipitation conditions during strikes

Data Attributes (Part-2):

16) Remains of wildlife collected? – Contain Boolean value about whether remains of wildlife collected or not

17) Remains of wildlife sent to Smithsonian – Contain Boolean value about whether remains of wildlife sent to Smithsonian or not

18) Wildlife: Size – Contain categorical value about the size of wildlife

19) Conditions: Sky – Contain categorical value about the Sky conditions during strikes

20) Wildlife: Species – Contain wildlife species name

21) Pilot warned of birds or wildlife? – Contain Yes(Y)/No(N) value about whether Pilot warned of birds or wildlife before strike or not

22) Cost: Total $ - Total incurred cost due to bird strikes in dollar

23) Feet above ground – Contain numeric value about Feet above ground of aircraft during strike

24) Number of people injured – Number of people injured due to bird strike

25) Is Aircraft Large? – Contain Yes/No value about whether Is Aircraft Large or not

ARCHITECTURE

Prepare the business requirements → Import and prepare the data → Data Pre-processing and cleaning of the data → Analyzing the data → Creating visualization report to extract meaningful insight → Making decisions and sharing the report

Jupyter Notebook → Data Processing and Analysis → CSV or Excel File → Power BI → Data Visualization and Reports→Deployment and Research Using tools

ARCHITECTURE
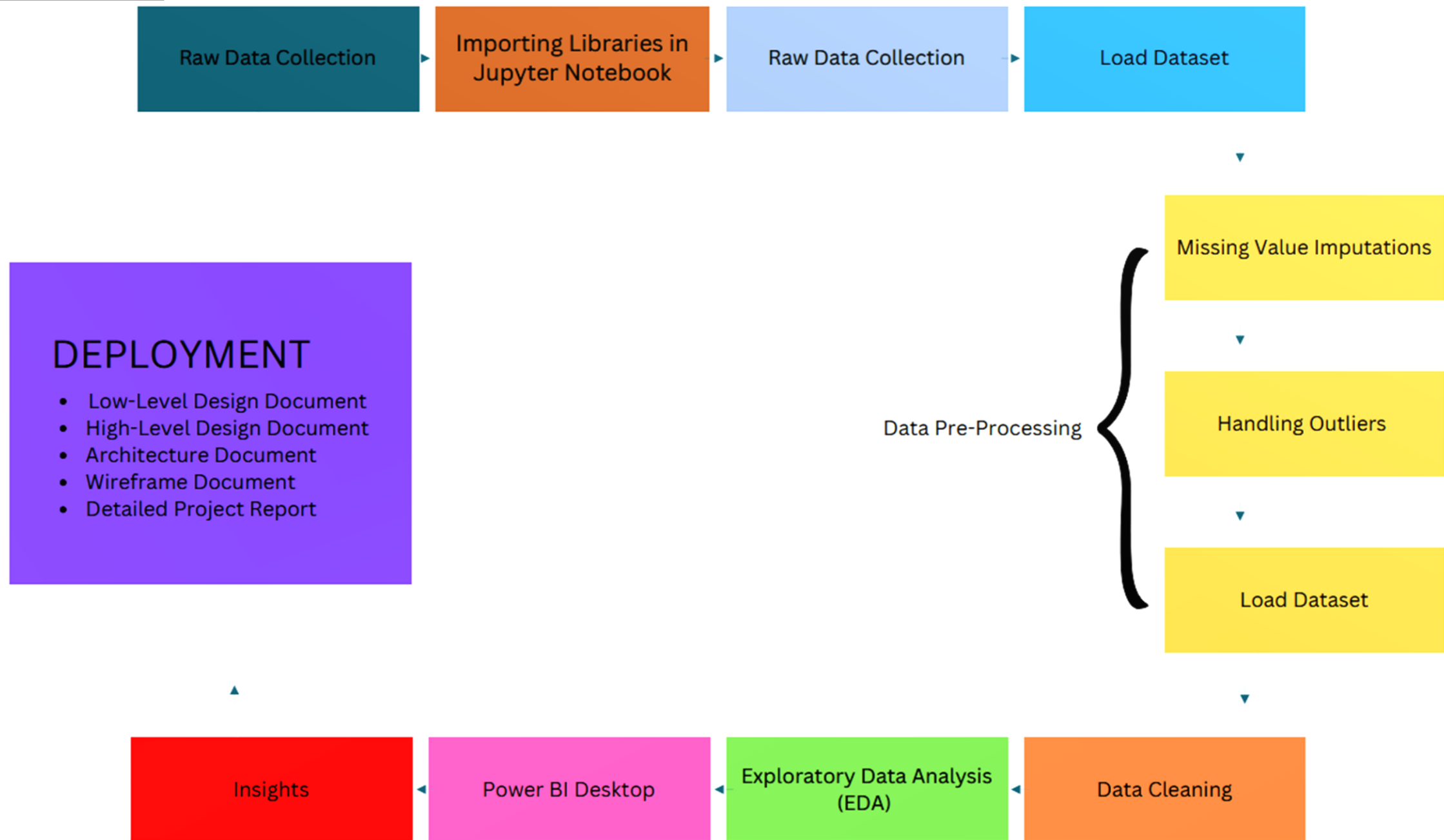
Data CLEANING AND TRANSFORMATION:

NULL values in each column - If all values of a column in the archive are NULL or missing, we will delete this data.

Remove Duplicates - If there are duplicate files, delete them

Remove unused lines - Also, there is no need for the "Comments" column so that we can delete the lines in this article. Lines such as "Write Wild Animals" and "Animals sent to the Smithsonian" do not need to be studied and can be omitted from the example.

Unwanted values in column - If there are some unknown or unwanted values in the categorical value column, delete the column or replace with other values. "Airplane: how many engines?" For the column, there are random letters in the column instead of numbers, so we will extract the data.

Check file type - Check the file type of the line and change the file if necessary.

Tools:

Most maintenance and changes are done in Python, with some changes done in the Power BI Power Query Editor, for extra research we have use https://v3.polymersearch.com/b/656483ee3ad3535d99aeed3a   polymersearch.com AI tool.

INFORMATION

Total number if bird strikes is around 1995 in the span of 11 years which resulted in the repair cost of 101 million dollar.
Out of 1995 flights that have been involved in a bird strike incident, 1109 received no damage while 886 received small to large scale damages.
Number of bird strikes continue to decrease yearly from 2000 to 2011.
Airlines namely, Business ,AIRLINES, SOUTHWEST AIR, DELTA AIRLINES
Business, US Airways, Alaska Airlines are more involved in bird strikes than other airlines.
84 percent of the planes were flying at an altitude <1000 while 16 percent of planes were at altitude >1000 when the strikes occurred.

Bird Strikes by FAA between 2000-2011

Data Visualization of Bird Strikes between 2000 – 2011
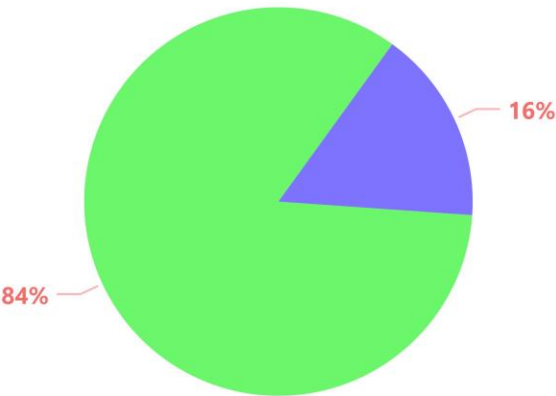
FlightDate
All

Number of Bird Strikes:
1995

TOTAL COST IN REPAIRMENTS
101M

AIRCRAFT DAMAGE
Effect: Indicated D...

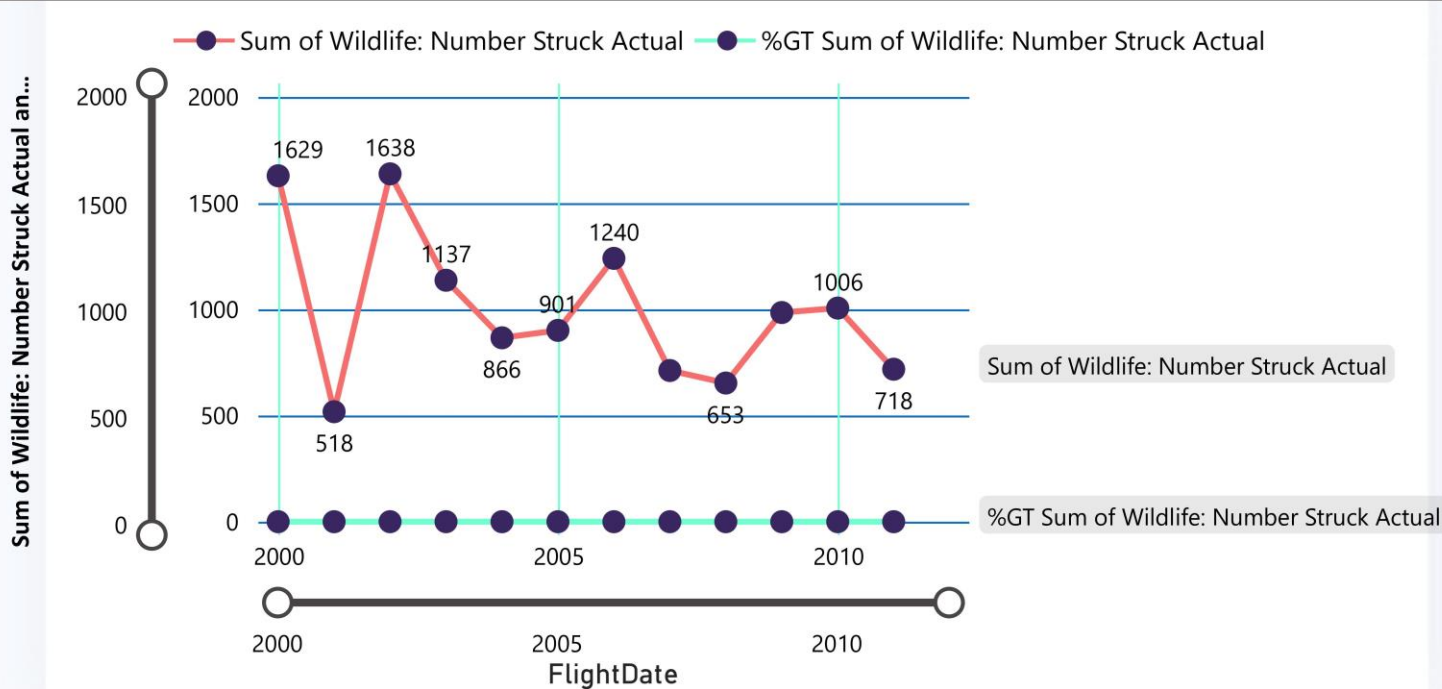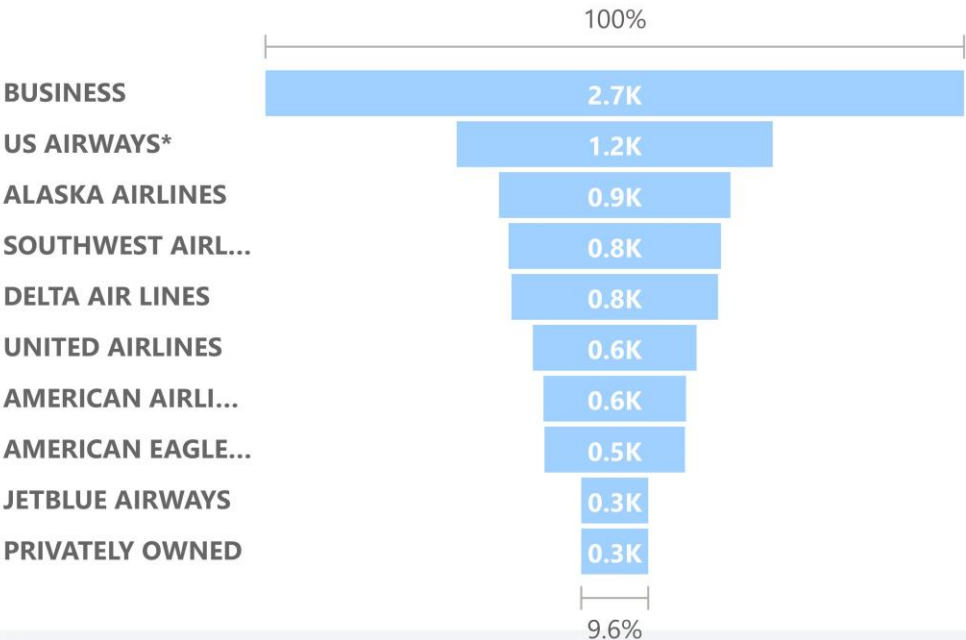|	
No damage	1109
Caused damage	886

0   500   1,000

ALTITUDE
● < 1000 ft   ● > 1000 ft
16%
84%
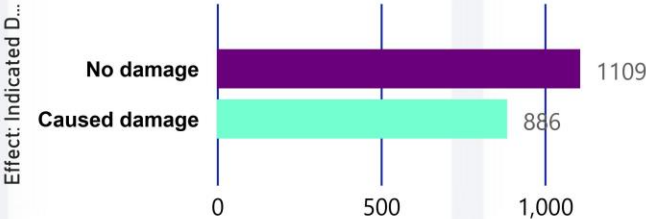
NUMBER OF ACTUAL BIRD STRIKES YEARLY
Sum of Wildlife: Number Struck Actual and %GT Sum of Wildlife: Number Struck Actual by FlightDate

— Sum of Wildlife: Number Struck Actual   — %GT Sum of Wildlife: Number Struck Actual

1629   1638   1137   866   901   1240   518   653   1006   718

Sum of Wildlife: Number Struck Actual an...

2000   2005   2010

FlightDate

Top 10 US Airlines in terms of having encountered bird strikes

100%

BUSINESS	2.7K
US AIRWAYS*	1.2K
ALASKA AIRLINES	0.9K
SOUTHWEST AIRL...	0.8K
DELTA AIR LINES	0.8K
UNITED AIRLINES	0.6K
AMERICAN AIRLI...	0.6K
AMERICAN EAGLE...	0.5K
JETBLUE AIRWAYS	0.3K
PRIVATELY OWNED	0.3K

9.6%

FlightDate
2005

When do most bird strikes occur?

Airport: Name	Count of Wildlife: Number struck
BIRMINGHAM-SHUTTLESWORTH INTL	5
ERNEST A LOVE FIELD	5
CINCINNATI/NORTHERN KENTUCKY INTL ARPT	4
DETROIT METRO WAYNE COUNTY ARPT	4
HENDERSON FIELD	4
JOHN F KENNEDY INTL	4
ORLANDO INTL	4
SACRAMENTO INTL	4
CHICAGO MIDWAY INTL ARPT	3
DES MOINES INTL	3
EPPLEY AIRFIELD	3
KANSAS CITY INTL	3
LAGUARDIA NY	3
MIAMI INTL	3
RICHMOND INTL	3
SOUTHWEST FLORIDA INTL ARPT	3
BALTIMORE WASH INTL	2
DAYTONA BEACH INTL	2
FORT LAUDERDALE/HOLLYWOOD INTL	2
GENERAL MITCHELL INTL	2

When do most bird strikes occur?

(Blank) — 150
Rain — 11
Fog — 2
Fog, Rain — 1
Fog, Rain, Snow — 1
Rain, Snow — 1

When do most bird strikes occur?

Climb — 62
Take-off run — 60
Approach — 30
Landing Roll — 9
Descent — 3
Parked — 1
Taxi — 1
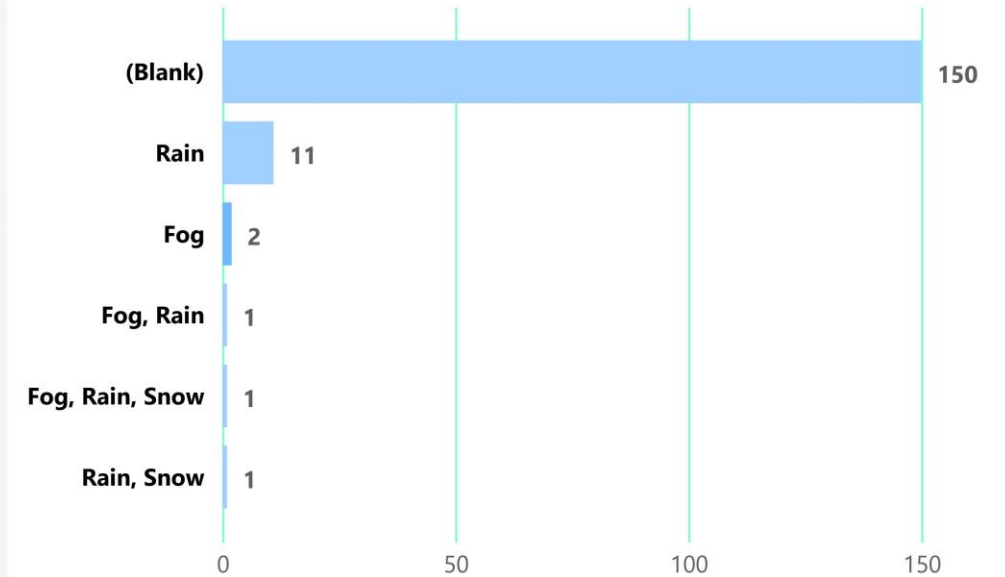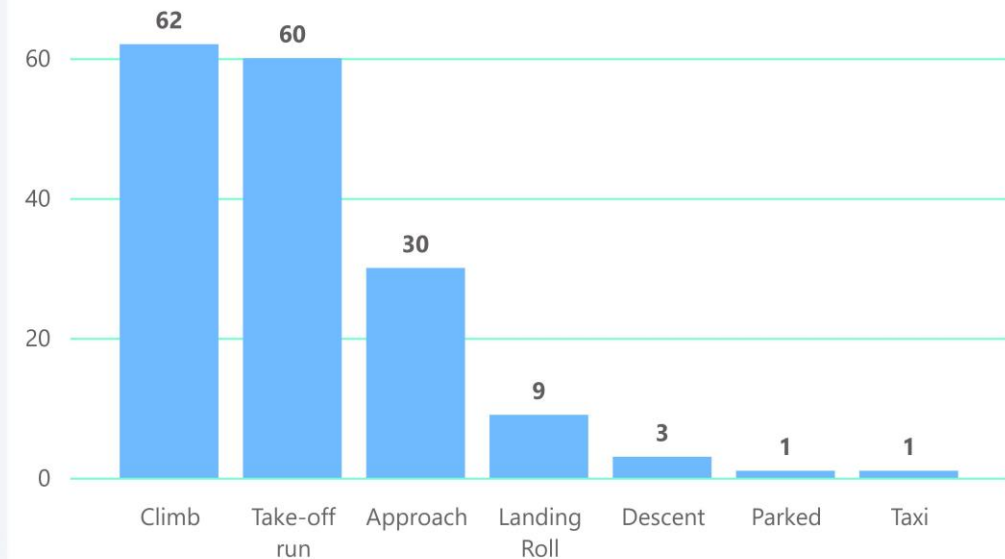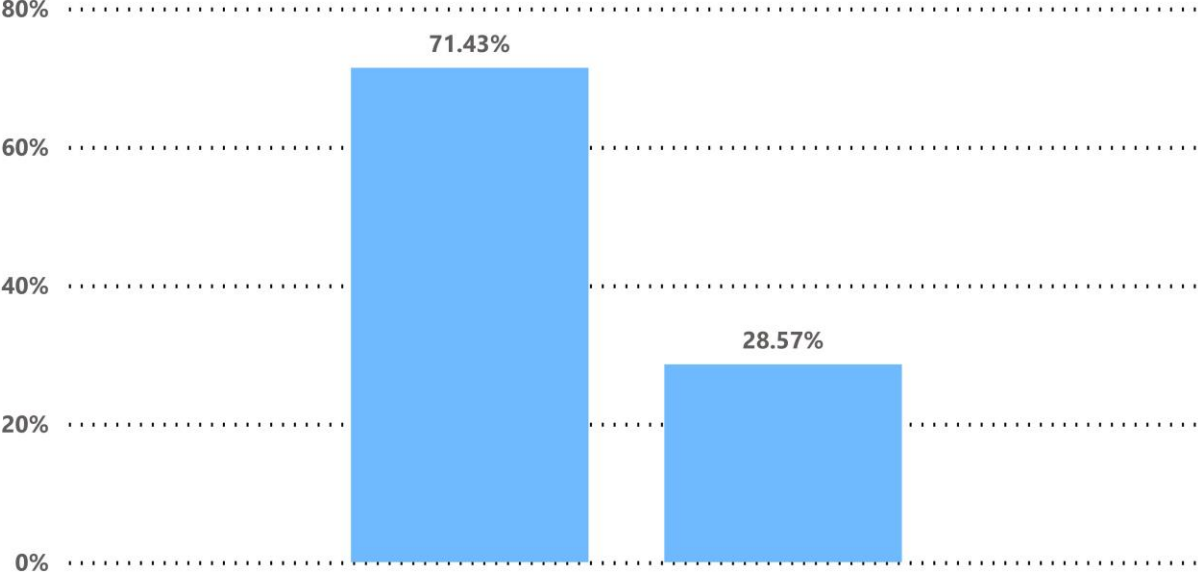
Phase of Flight

Descent ⌄

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Average Altitude of the airplanes in different phases at the time of strike
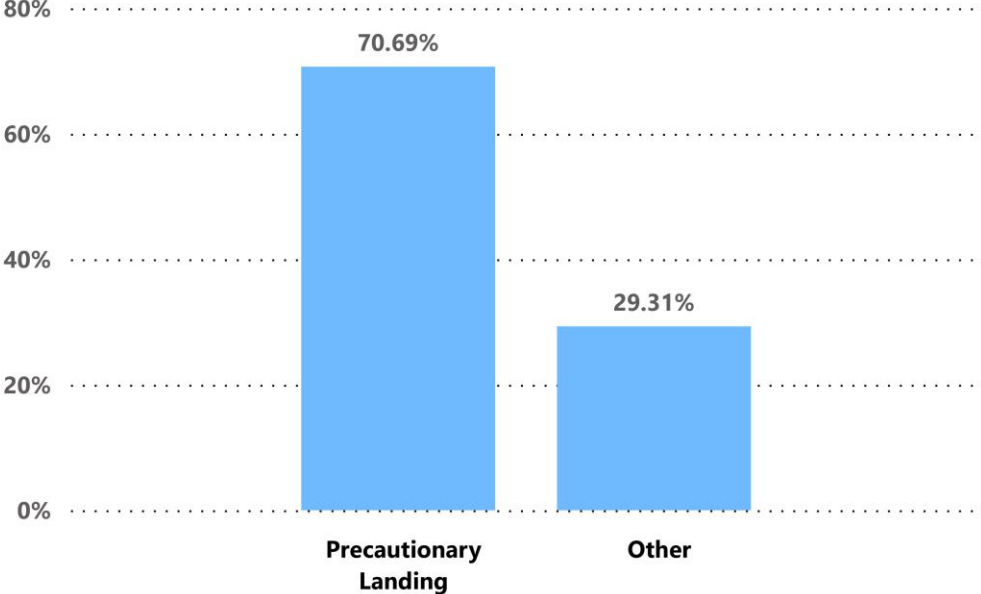
3.58K
Average of Feet above ground

%GT Count of Wildlife: Number Struck Actual by Effect: Indicated Damage

71.43%	28.57%

(Y-axis: 0%, 20%, 40%, 60%, 80%)

Were Pilots Informed?

8 (13.79%)

50 (86.21%)

Pilot warned of birds or wildlife?
- ● N
- ● Y

Impact on Flight

Precautionary Landing	Other
70.69%	29.31%

(Y-axis: 0%, 20%, 40%, 60%, 80%)

FlightDate

2002 ∨

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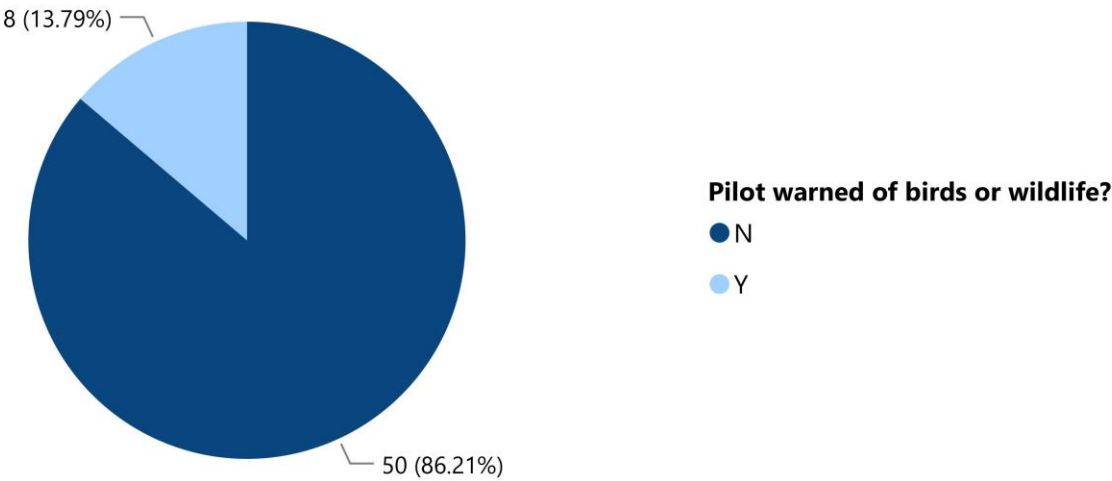
Number of birds strike in each state

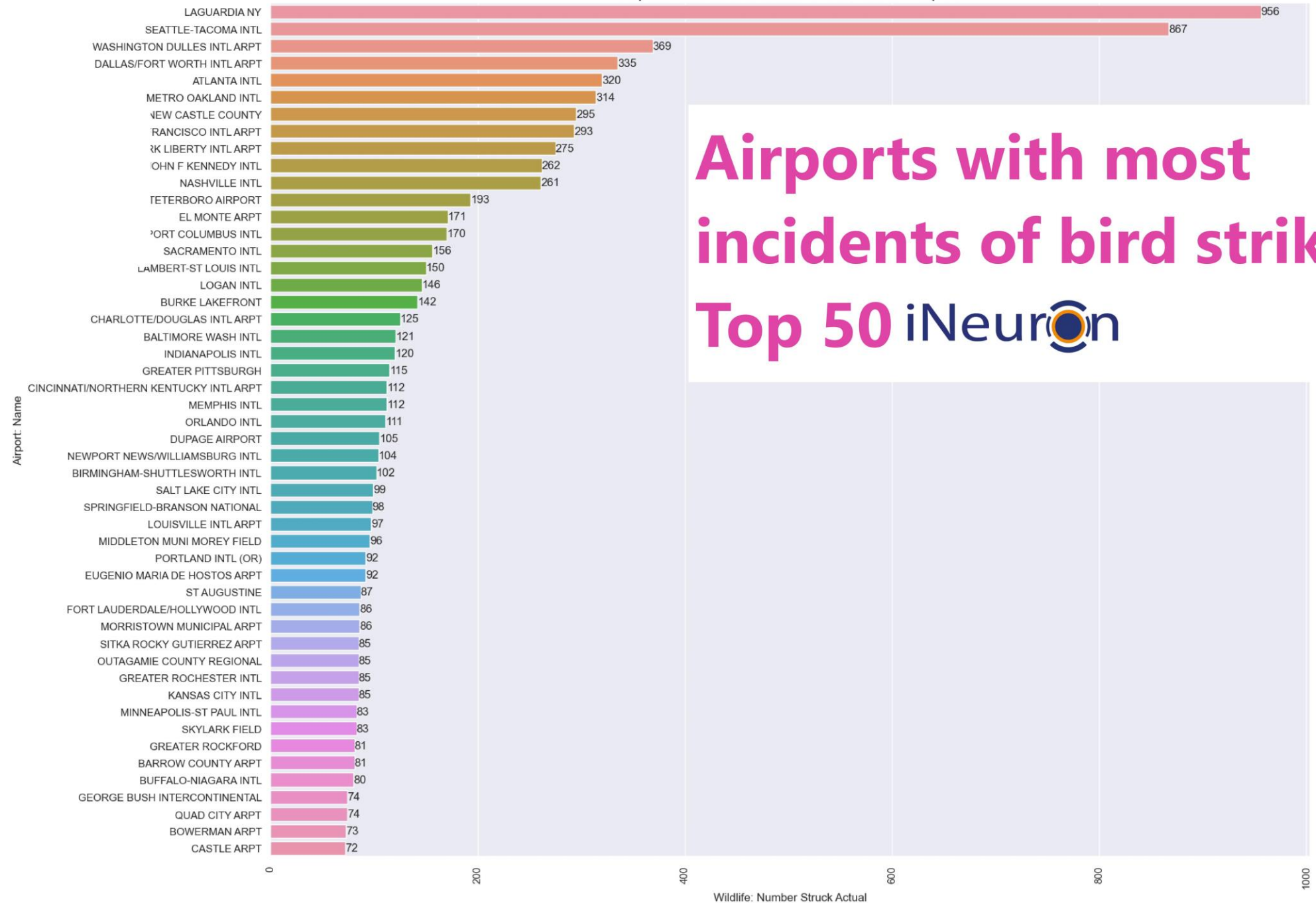## Size of Birds

Large
44.00

Small
88.00

Aircraft Large?

No
149.00
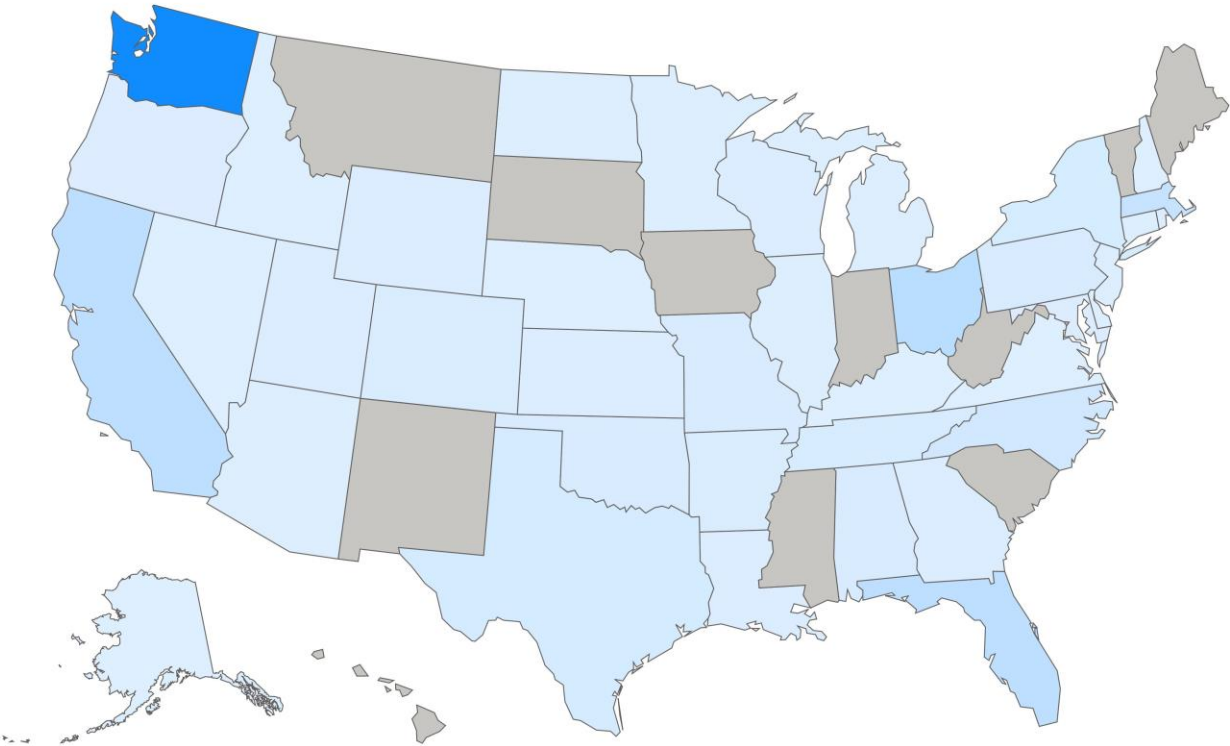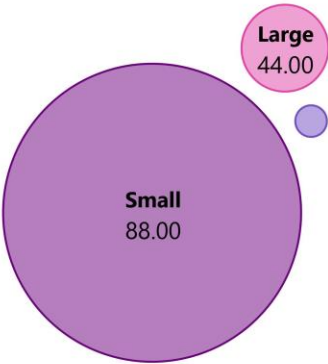
Airports with most incidents of bird strikes – Top 50

Questions and answers

1"What is a bird strike strictly defined as?","a collision between a bird and an aircraft which is in flight or on a take-off or landing roll"

"2","What is the term for bird strikes?","

The term for bird strikes is bird-aircraft strike hazard (BASH). It encompasses collisions between aircraft and any airborne animal, including birds, bats, and even insects.

"3","What type of strike can be a significant threat to aircraft safety?","Bird Strike"

"4","What type of aircraft may be damaged by a bird strike?","aircraft structure"

"5","What has resulted in?","fatal accidents"

"6","What type of strikes are most likely during the take-off, initial climb, approach and landing phases?","Bird strikes"

"7","What airlines are more involved in bird strikes than other airlines?","US Airways, Alaska Airlines"

"8","How many of the planes were flying at an altitude 1000?","84 percent"

Bird strikes are a significant threat to aircraft safety, particularly for smaller aircraft and jet-engine aircraft. When birds are ingested into jet engines, they can cause loss of thrust and even engine failure. Bird strikes are most likely to occur during takeoff, initial climb, approach, and landing, as these are the phases of flight when aircraft are flying at lower altitudes and are more likely to encounter birds.

Several factors contribute to the risk of bird strikes, including:

•Bird density: The number of birds in an area is a major factor in the risk of bird strikes. Areas with high bird populations, such as near airports, landfills, and wetlands, are at increased risk.

•Aircraft type: Smaller aircraft are more vulnerable to bird strikes than larger aircraft because they have less structure to protect them from damage. Jet-engine aircraft are also more vulnerable because they are more likely to ingest birds into their engines.

•Flight time: Bird strikes are more likely to occur during the day than at night, as birds are more active during daylight hours.

•Season: Bird strikes are more likely to occur during migration periods, when large numbers of birds are moving from one area to another.

Several strategies can be used to reduce the risk of bird strikes, including:

•Habitat management: Removing or modifying bird habitat near airports can help to reduce the number of birds in the area.

•Radar systems: Radar systems can be used to detect birds and alert pilots, giving them time to take evasive action.

•Training: Pilots can be trained to recognize and avoid birds.

Despite these efforts, bird strikes remain a significant threat to aircraft safety. More research is needed to develop new and improved methods of bird strike prevention.

Thank you

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Scientific findings