Aviation Wildlife Strikes

Question 1

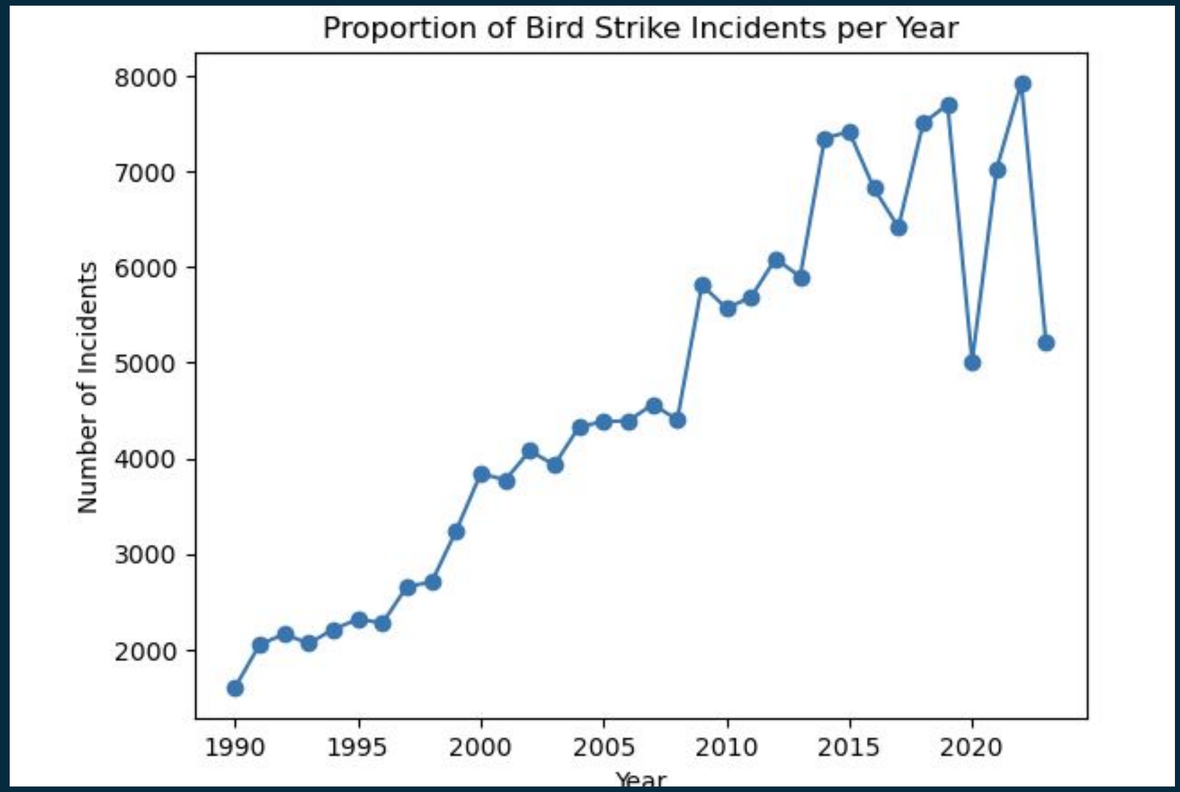
- Analyze data from the FAA Wildlife Strike Database.
  - Timeframe: Incidents recorded from 1990 to 2023.
  - Focus: Wildlife strikes, primarily involving birds, on civil aircraft in the U.S.

- Analysis Goals:
  - Uncover patterns and trends in wildlife strike incidents.
  - Examine frequency and geographic distribution.
- Assess impact on aviation safety.

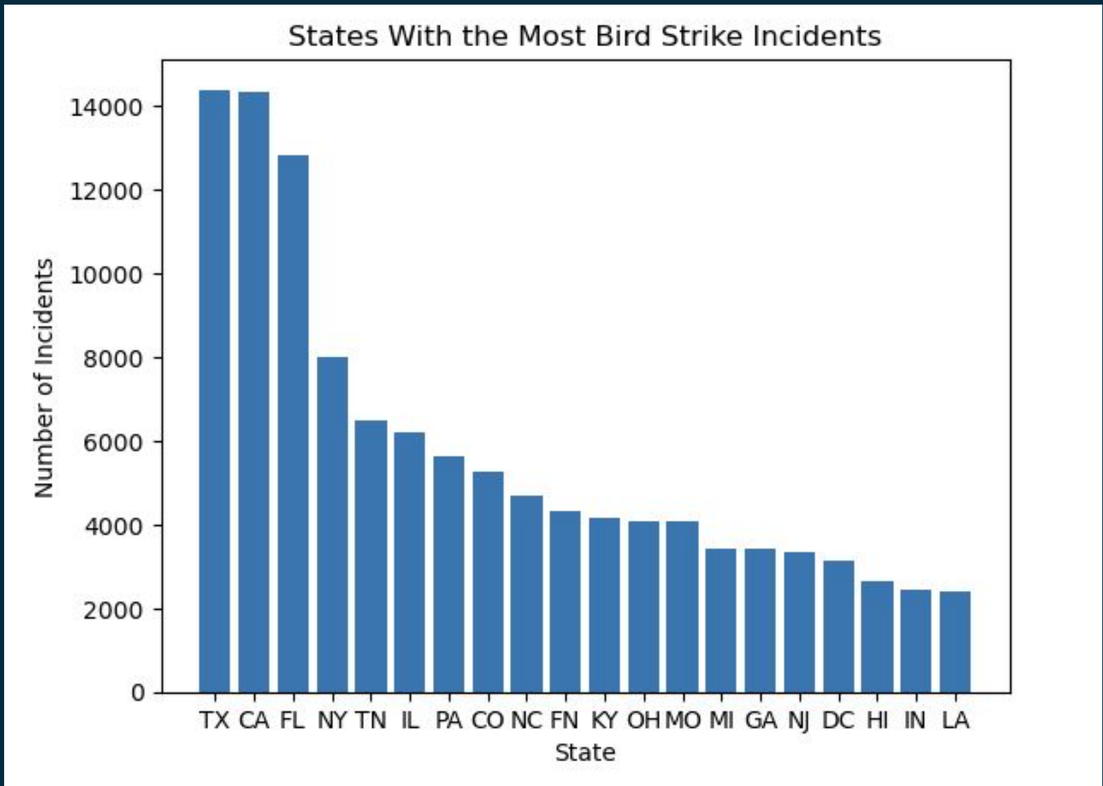
- Key Elements to Investigate
  - Annual changes in incident frequency.
  - Common wildlife species involved in strikes.
  - Damage assessment during different phases of flight.
  - Environmental or operational factors contributing to increased strikes over time.

Question 2

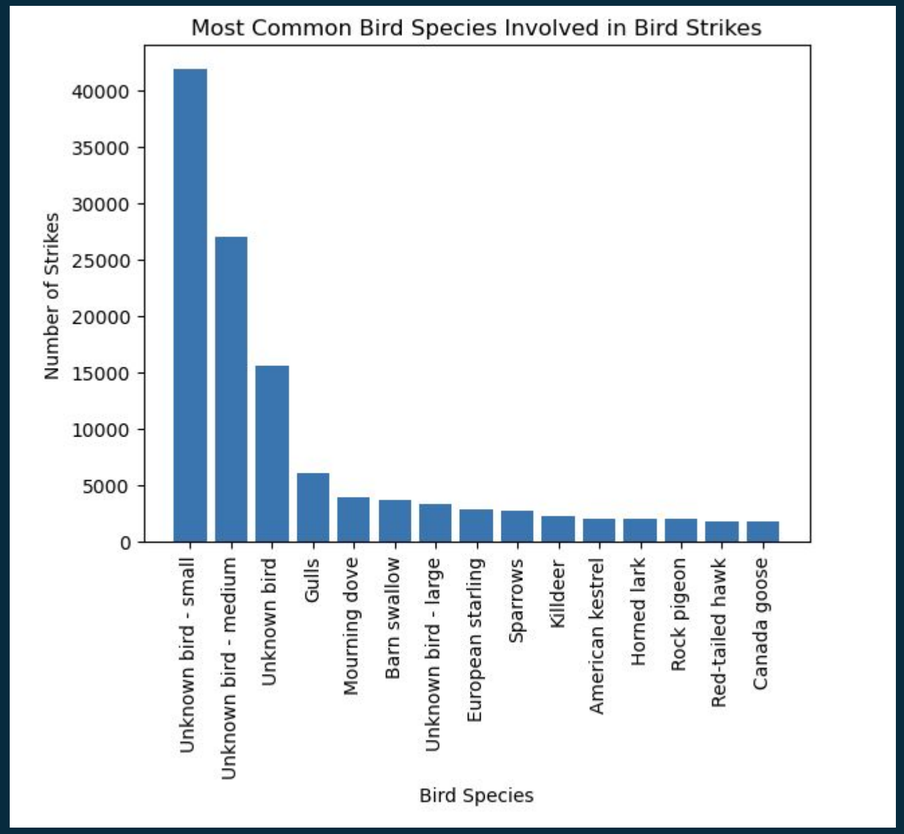
Question 3


Proportion of Bird Strike Incidents per Year
Number of Incidents
8000
7000
6000
5000
4000
3000
2000
1990
1995
2000
2005
2010
2015
2020
Year

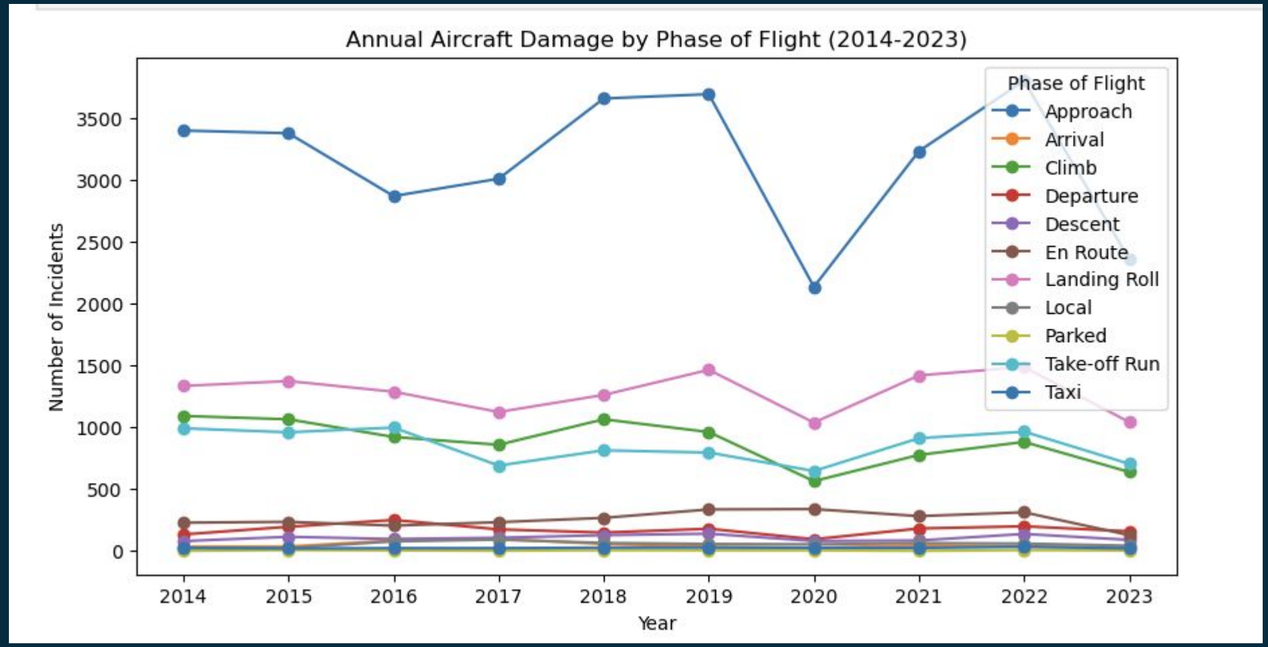
Question 3


States With the Most Bird Strike Incidents
Number of Incidents
14000
12000
10000
8000
6000
4000
2000
0
TX CA FL NY TN IL PA CO NC FN KY OH MO MI GA NJ DC HI IN LA
State

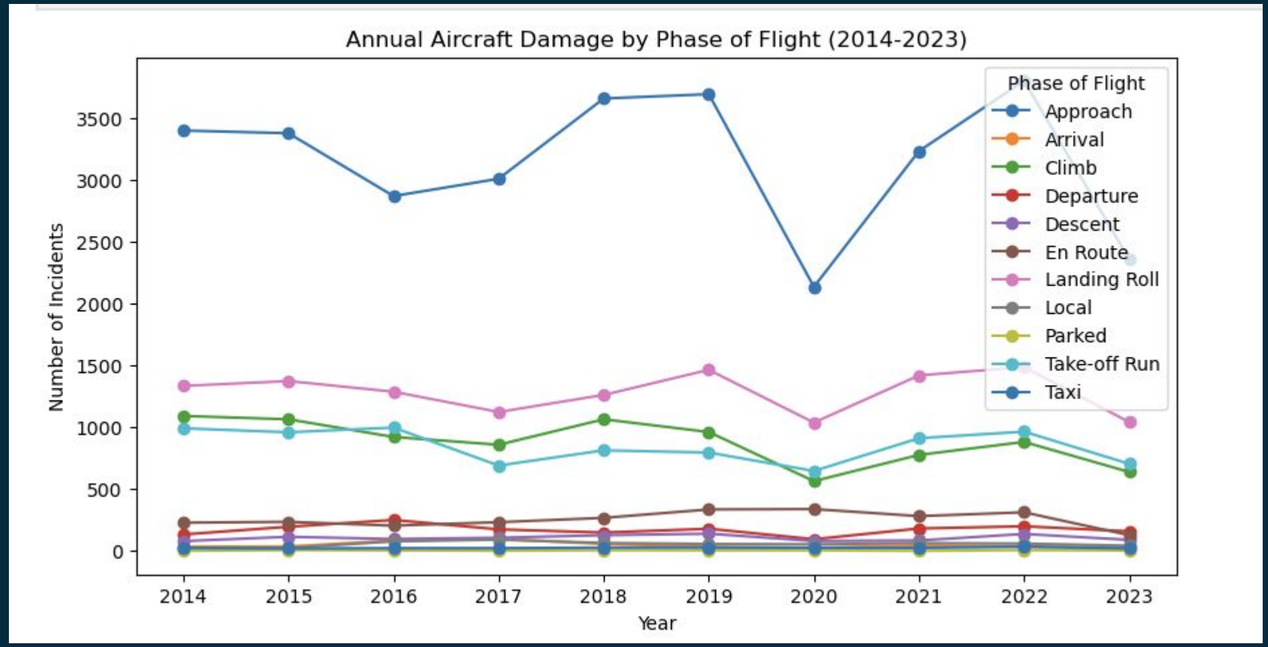
Question 3


Most Common Bird Species Involved in Bird Strikes
Number of Strikes
0
5000
10000
15000
20000
25000
30000
35000
40000
Unknown bird - small
Unknown bird - medium
Unknown bird
Gulls
Mourning dove
Barn swallow
Unknown bird - large
European starling
Sparrows
Killdeer
American kestrel
Horned lark
Rock pigeon
Red-tailed hawk
Canada goose
Bird Species

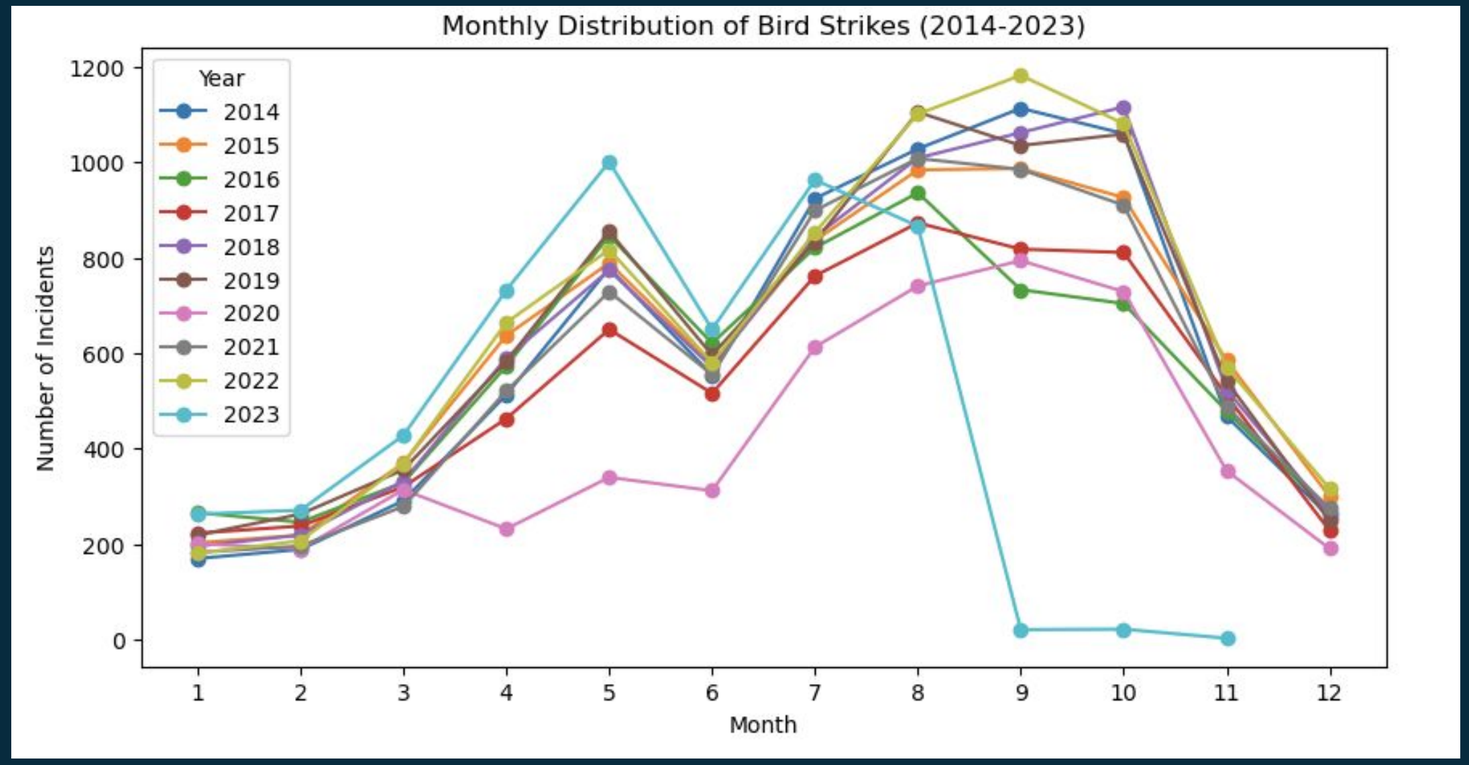
Question 3


Annual Aircraft Damage by Phase of Flight (2014-2023)
Number of Incidents
Year
0
500
1000
1500
2000
2500
3000
3500
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
Phase of Flight
Approach
Arrival
Climb
Departure
Descent
En Route
Landing Roll
Local
Parked
Take-off Run
Taxi

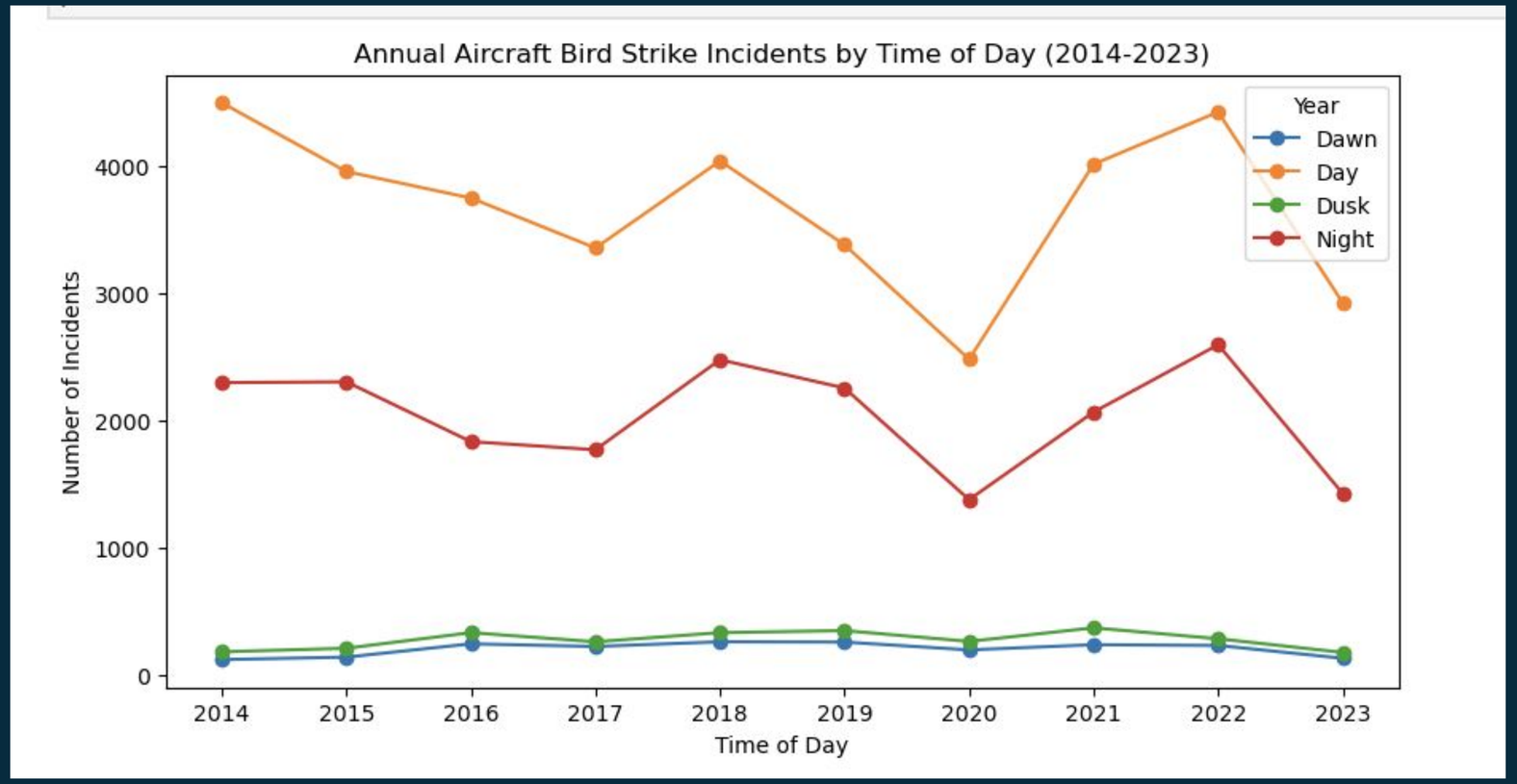
Question 3


Annual Aircraft Damage by Phase of Flight (2014-2023)
Number of Incidents
Year
0
500
1000
1500
2000
2500
3000
3500
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
Phase of Flight
Approach
Arrival
Climb
Departure
Descent
En Route
Landing Roll
Local
Parked
Take-off Run
Taxi

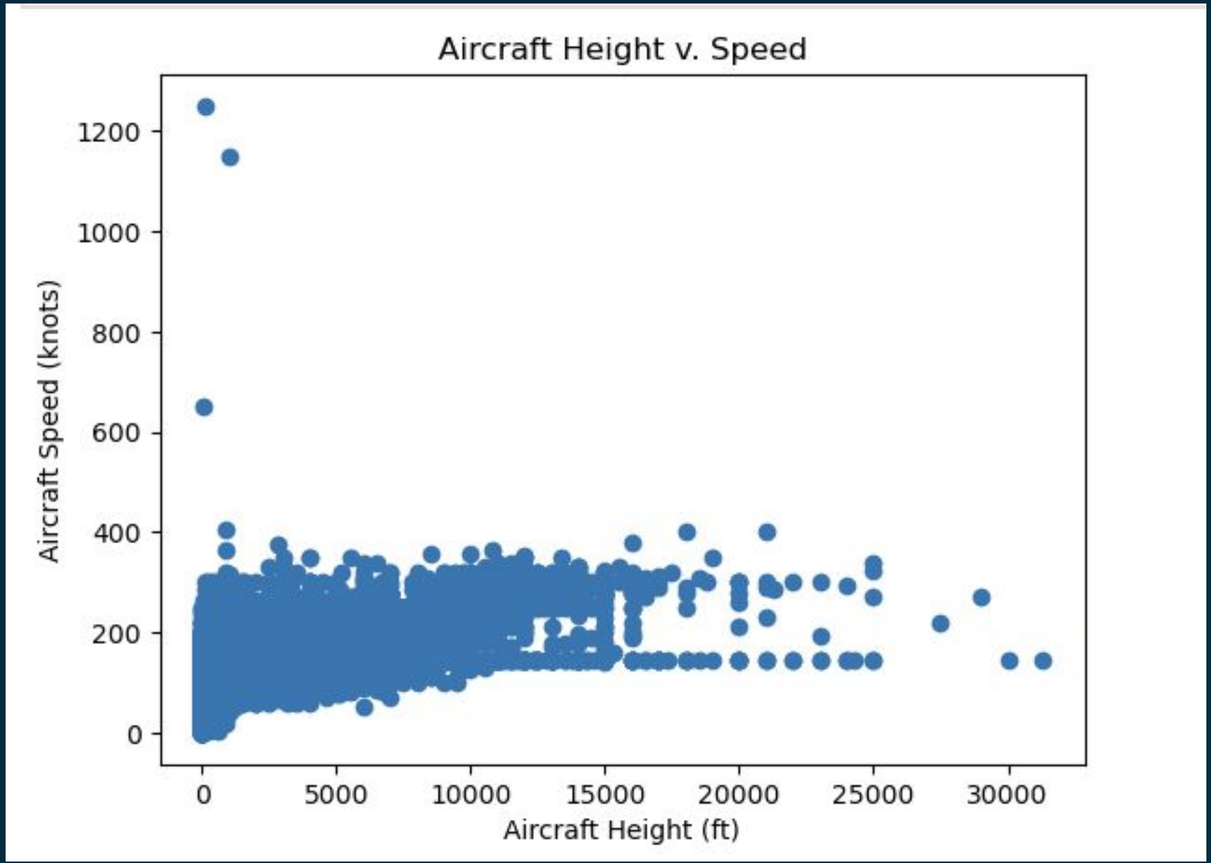
Question 3


Monthly Distribution of Bird Strikes (2014-2023)
Year
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
Number of Incidents
0
200
400
600
800
1000
1200
1
2
3
4
5
6
7
8
9
10
11
12
Month

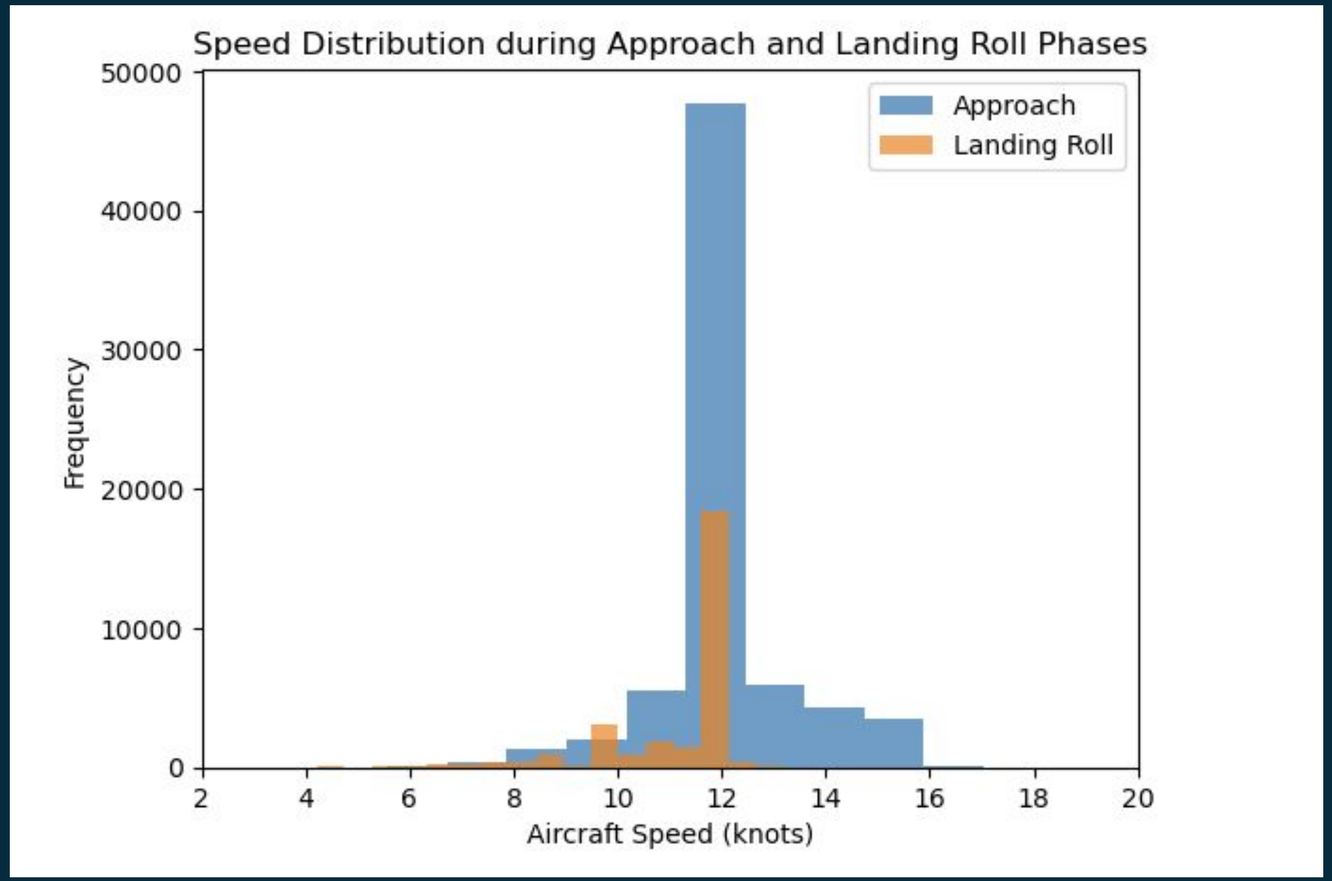
Question 3


Annual Aircraft Bird Strike Incidents by Time of Day (2014-2023)
Year
Dawn
Day
Dusk
Night
Number of Incidents
0
1000
2000
3000
4000
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
Time of Day

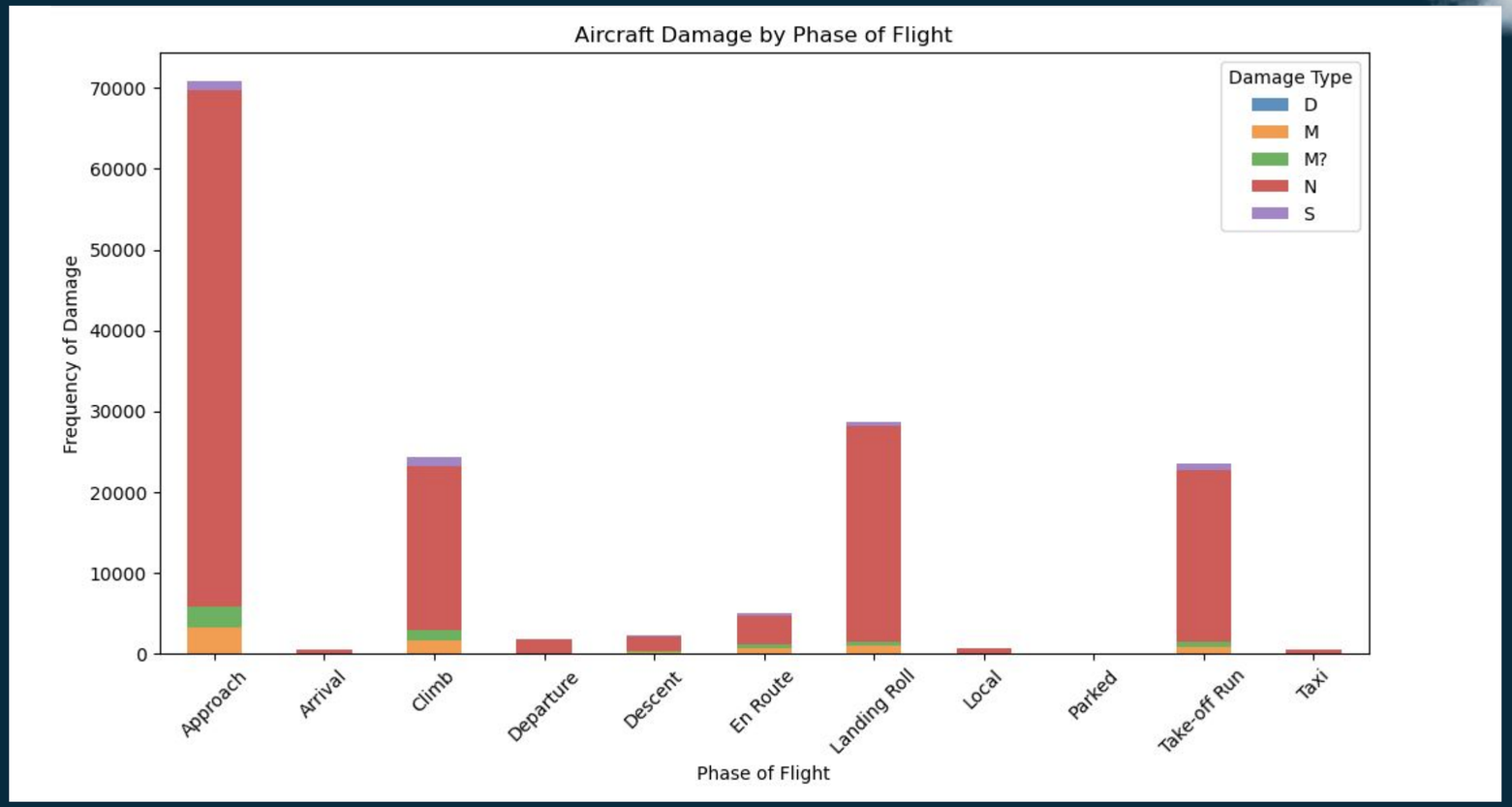
Question 4


Aircraft Height v. Speed
Aircraft Speed (knots)
0
200
400
600
800
1000
1200
0
5000
10000
15000
20000
25000
30000
Aircraft Height (ft)

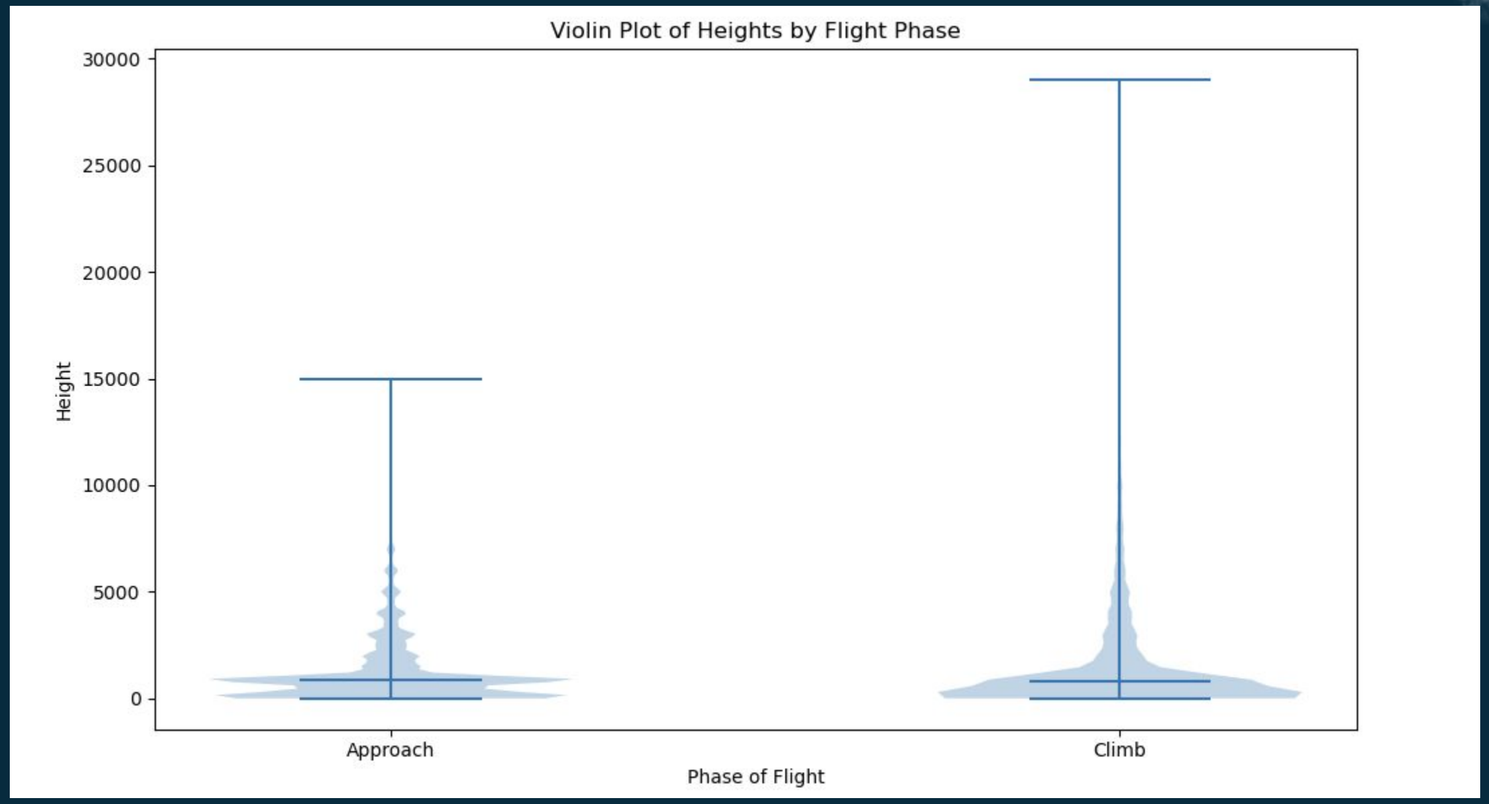
Question 4


Speed Distribution during Approach and Landing Roll Phases
Approach
Landing Roll
Frequency
50000
40000
30000
20000
10000
0
2
4
6
8
10
12
14
16
18
20
Aircraft Speed (knots)

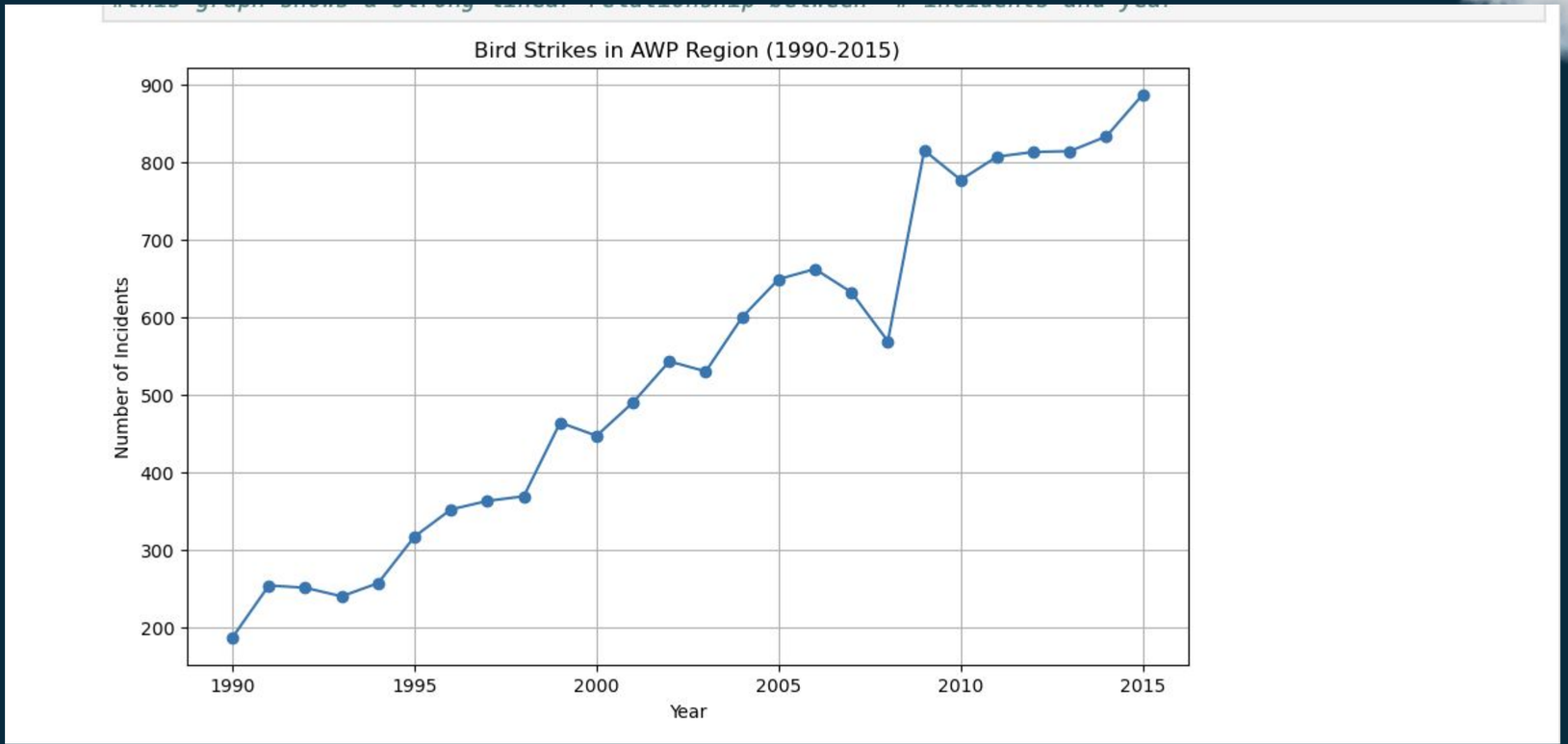
Question 4


Aircraft Damage by Phase of Flight
Damage Type
D
M
M?
N
S
Frequency of Damage
70000
60000
50000
40000
30000
20000
10000
0
Approach
Arrival
Climb
Departure
Descent
En Route
Landing Roll
Local
Parked
Take-off Run
Taxi
Phase of Flight

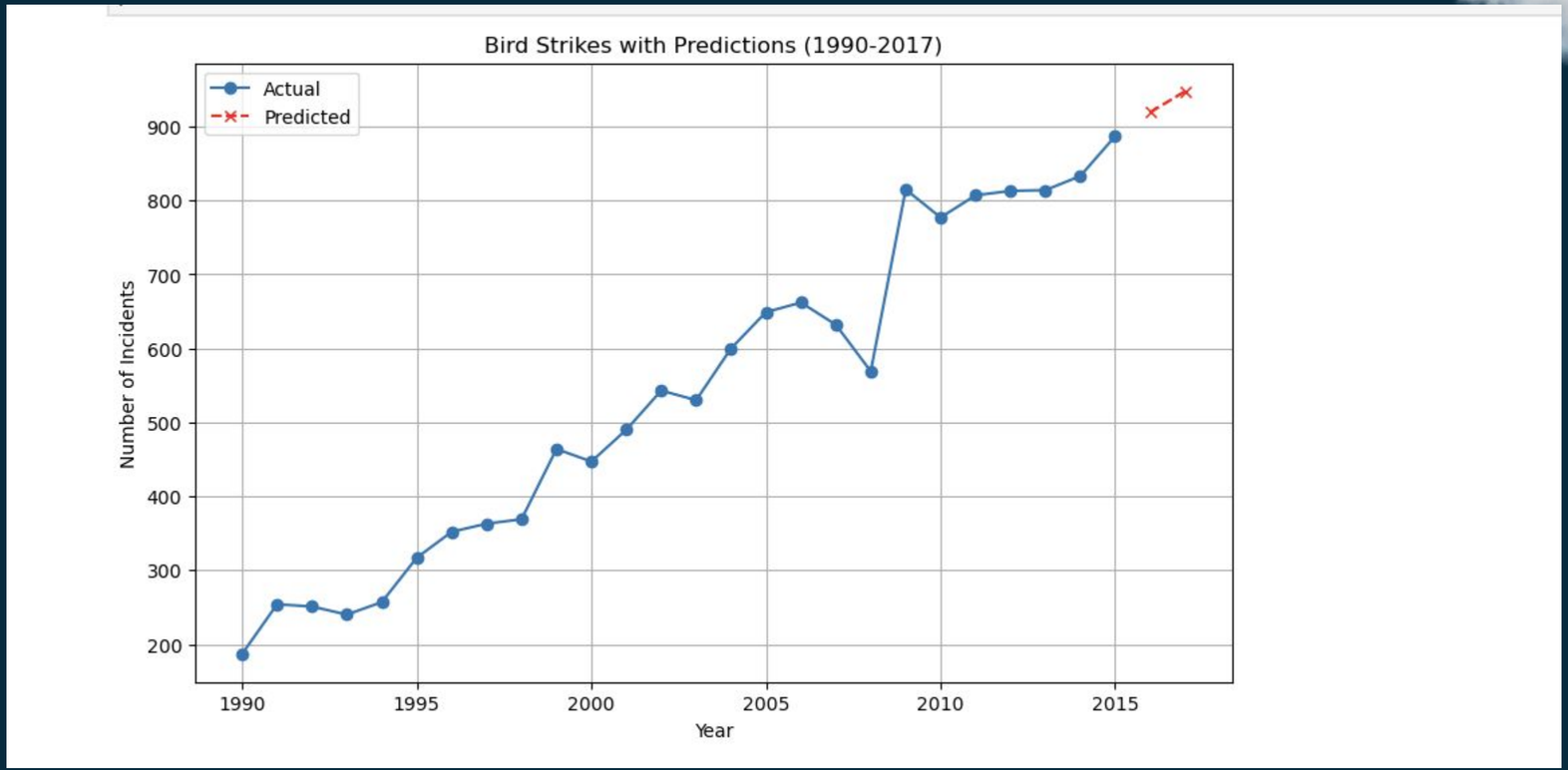
Question 4


Violin Plot of Heights by Flight Phase
30000
25000
20000
15000
10000
5000
0
Height
Approach
Climb
Phase of Flight

Question 5


Bird Strikes in AWP Region (1990-2015)
Number of Incidents
Year
900
800
700
600
500
400
300
200
1990
1995
2000
2005
2010
2015

Question 5


Bird Strikes with Predictions (1990-2017)
Actual
Predicted
Number of Incidents
Year
200
300
400
500
600
700
800
900
1990
1995
2000
2005
2010
2015

Question 6 - Key Findings

- Comprehensive analysis of bird strike incidents (1990–2023)
- Identified key trends, patterns, and statistical relationships
- **Upward Trend:** Increasing bird strikes over the years
  - Dips in 2020 and 2021 due to reduced flights (COVID)
  - Incomplete data for 2023
- **Frequent Incidents:** Most occur during approach and landing roll
- **Seasonal Pattern:** Higher strikes in late summer and fall
  - Linked to increased bird activity and flight frequency
- **Statistical Testing:** Flight phase significantly related to aircraft damage
- **Predictive Model:** Linear regression model with high accuracy (R^2 = 0.97)
  - Accurate forecasts up to 2020; caution advised for later predictions

Thank you!