Wildlife Strikes

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Here's What's Coming

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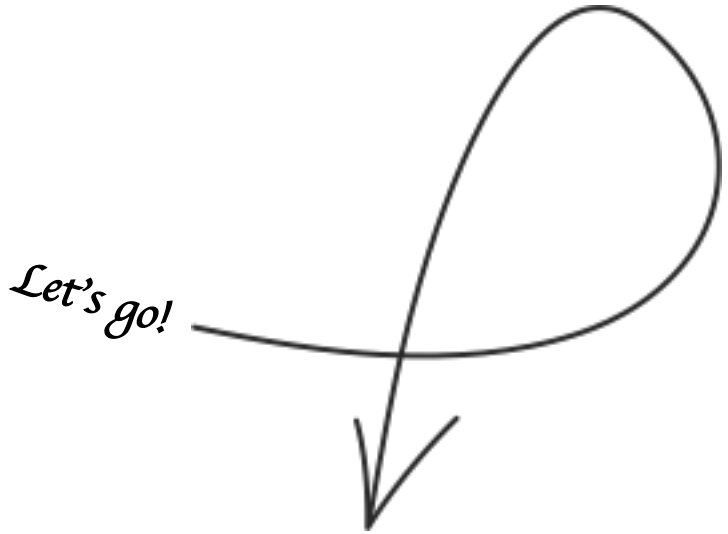
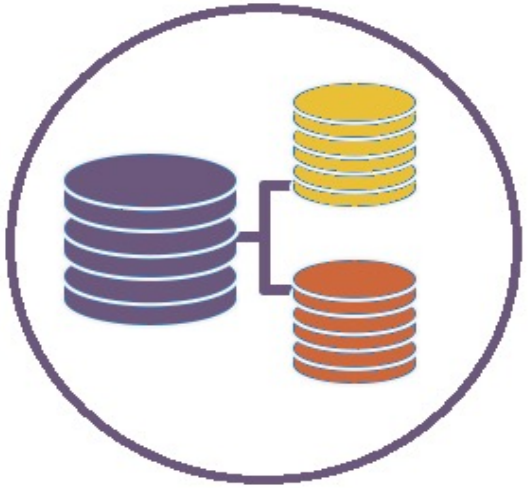


What is a bird strike?

- A wildlife strike incident is defined as a collision between an aircraft and an animal during any / all phases of the flight, including those animals killed by the downwash of aircraft.

- Wildlife strikes are serious hazards for both civil and military aircraft; military aircraft are under significantly increased risk due to their low flight paths, high velocities and single engines.

Datasets



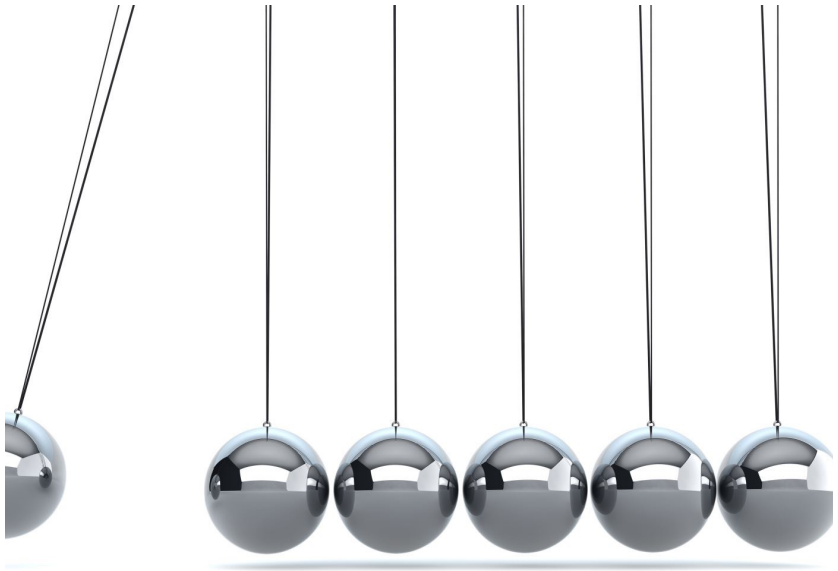
- Wildlife Strikes dataset
  - ➢ Contains data from 1990 to 2021
  - ➢ 260,000 records, and 100 fields
  - ➢ Location: U.S covering all states

- Aviation Dataset
  - ➢ Contains data from 1990 to 2021
  - ➢ 88000 records, and 31 fields
  - ➢ Location: U.S covering all states

- US State code mapping
  - ➢ Contains state abbreviations

Since the data contained is voluntarily reported, there is some noisy data is present in both datasets.

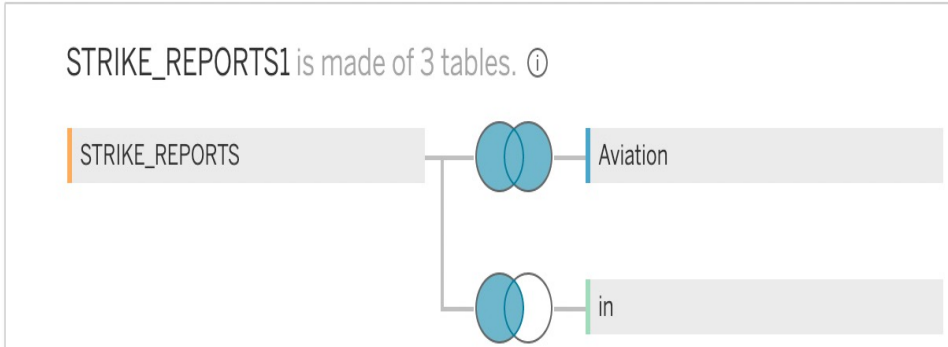
Methods

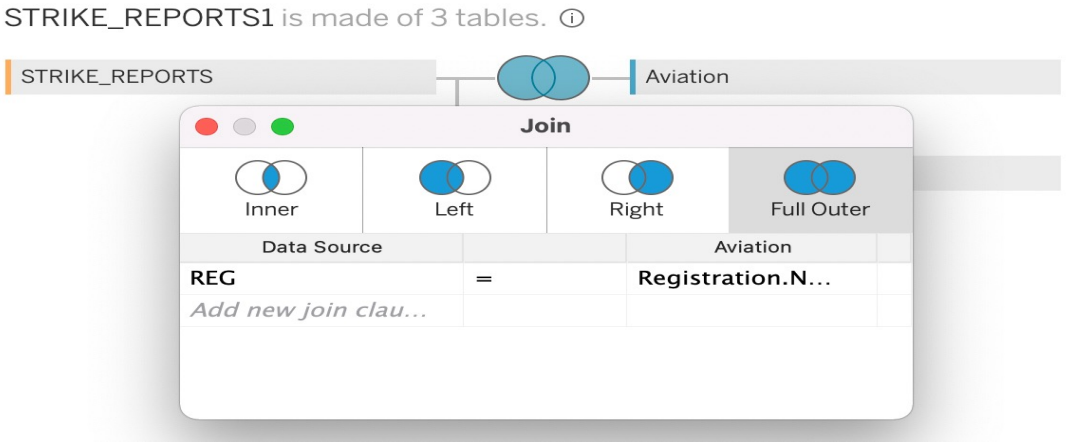


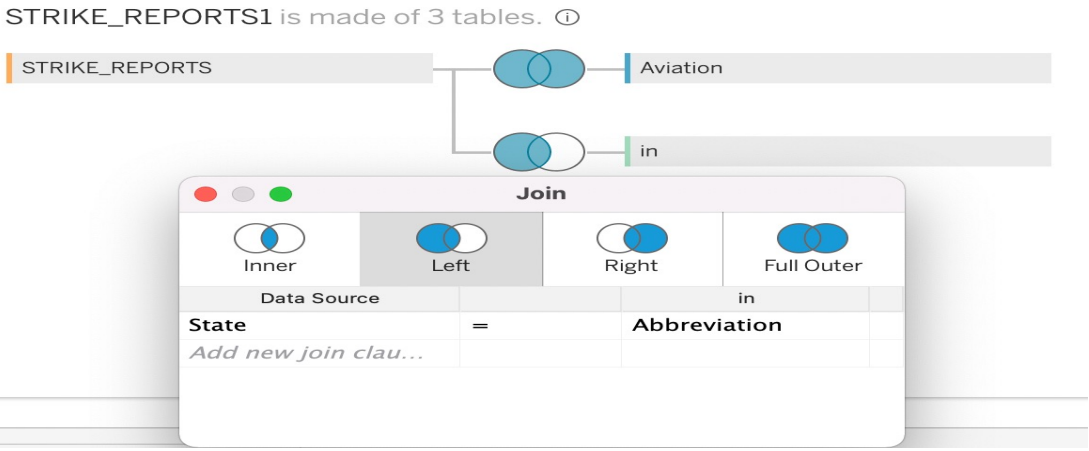
The large number of null and unknown values that skewed the query results. For example, we started cleaning the dataset by excluding null values and unknowns as necessary.

We joined the two datasets Aviation and Wildlife Strikes data using Outer join on column-registration number of the accident.

We also did some data transformations for the effective visualizations.



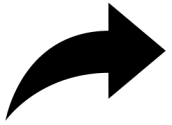




we joined the two datasets Aviation and Wildlife Strikes data using Outer join on column-registration number of the accident. Along with the two datasets, we also joined the US state code mapping table using the left join on state column which helps in mapping state codes with the state names.

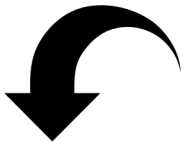
Some examples of Data transformations

```
IF [Damage Level] = 'D' THEN 'Damaged'
ELSEIF [Damage Level] = 'M' THEN 'Minor Damage'
ELSEIF [Damage Level] = 'M?' THEN 'Uncertain level'
ELSEIF  [Damage Level] = 'N' THEN 'No Damage'
ELSEIF [Damage Level] = 'S' THEN 'Substantial'
ELSE NULL
END
```



'Damage Level'

```
if [Height]= 0 THEN 'Ground Level'
ELSEIF  [Height]>=1 AND  [Height]<=1000 then 'Low FL(1-1000 ft)'
ELSE 'High FL(>1000 ft)' END
```



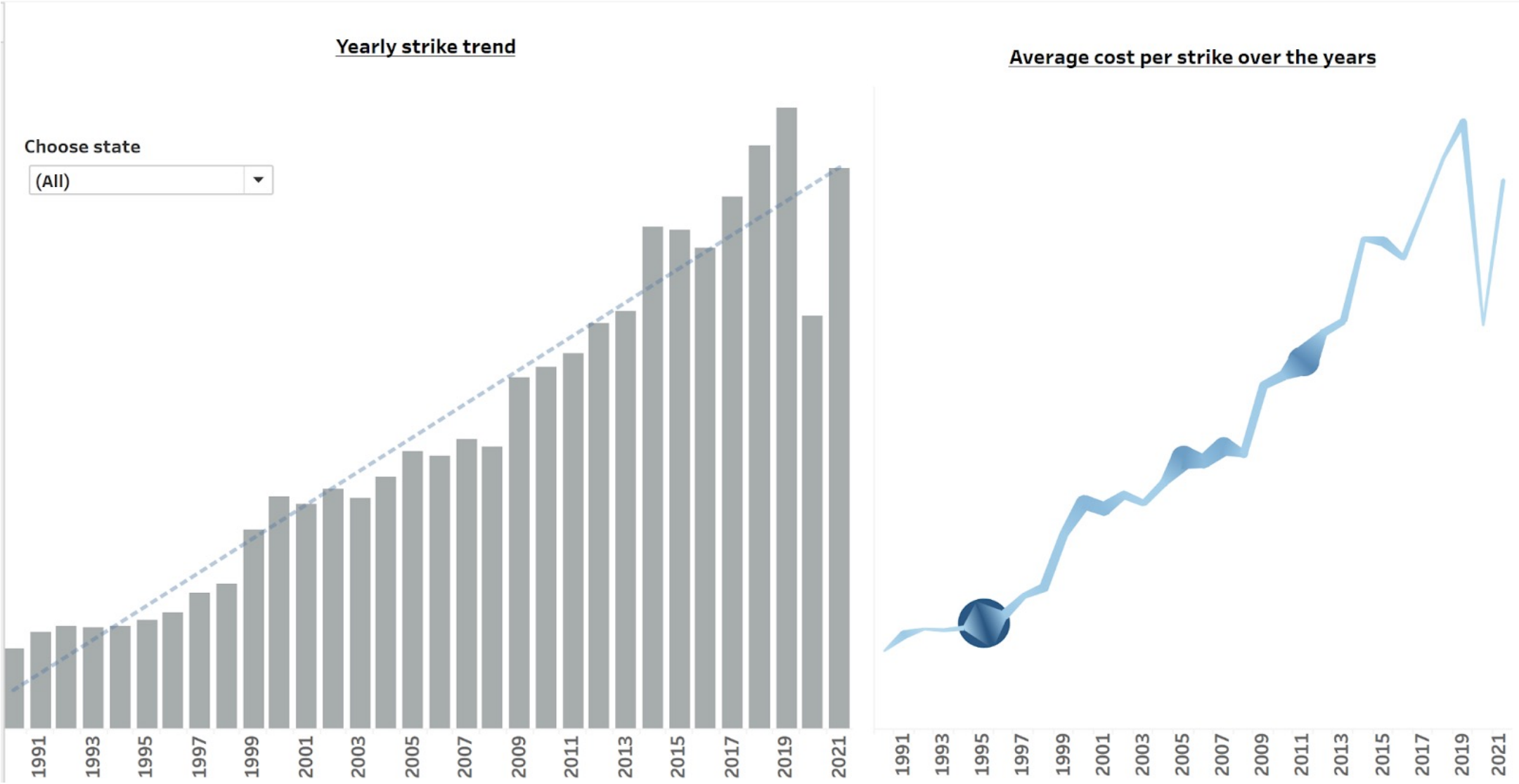
'Feet from Ground level'

'Total Cost'

```
[Cost Other]+[Cost Other Infl Adj]+[Cost Repairs]+[Cost Repairs Infl Adj]
```

Visualizations

US Bird Strikes yearly trend



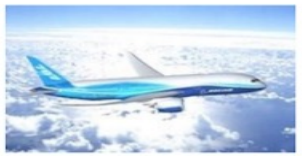
Choose year
(All)

Choose metric
Number of strikes

AK									VT	ME
	WA	ID	MT	ND	MN	IL	WI	MI	NY	RI	NH
	OR	NV	WY	SD	IA	IN	OH	PA	NJ	CT	MA
	CA	UT	CO	NE	MO	KY	WV	VA	MD	DE	
		AZ	NM	KS	AR	TN	NC	SC	DC		
				OK	LA	MS	AL	GA			
HI				TX					FL		

Landing
62.27%

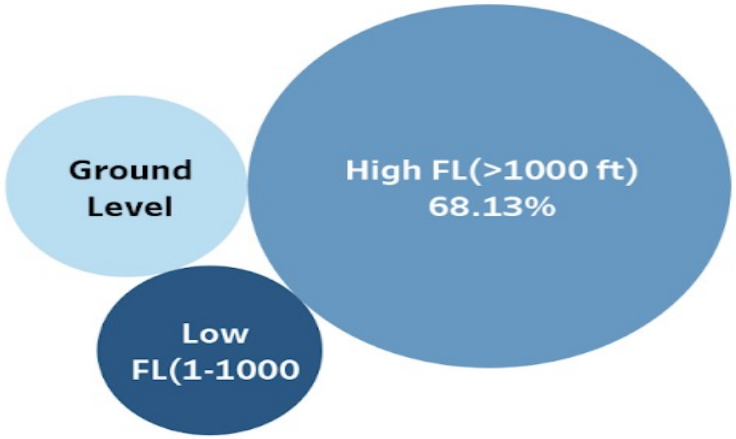
Take off
34.62%

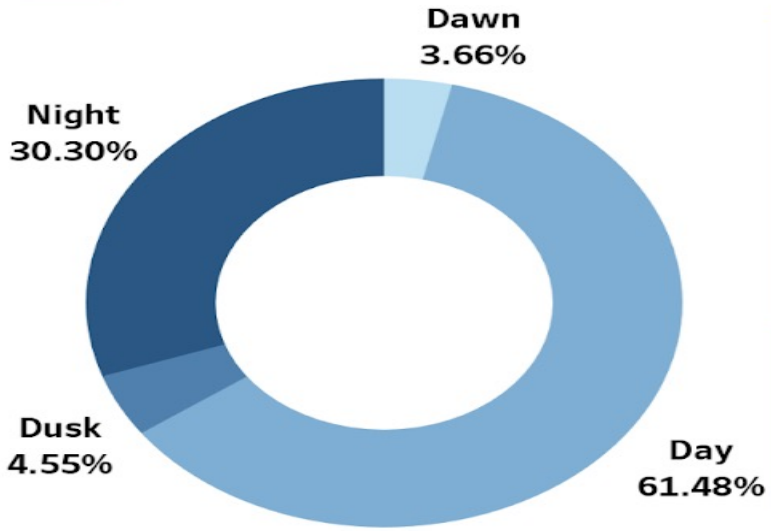


En Route
3.11%

340 Injuries

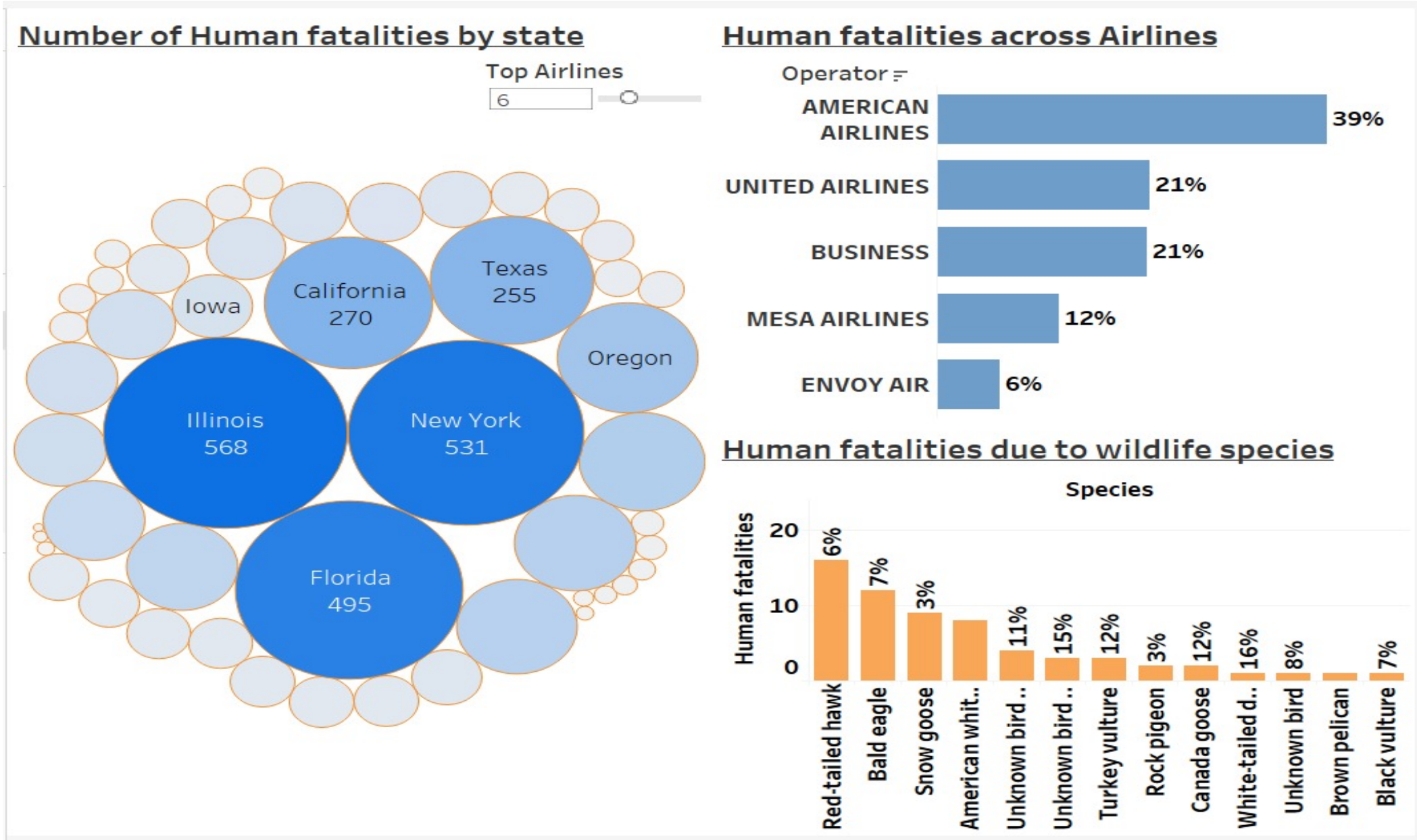
5,346 Fatalities





Overview of causes

How worse are these strikes?

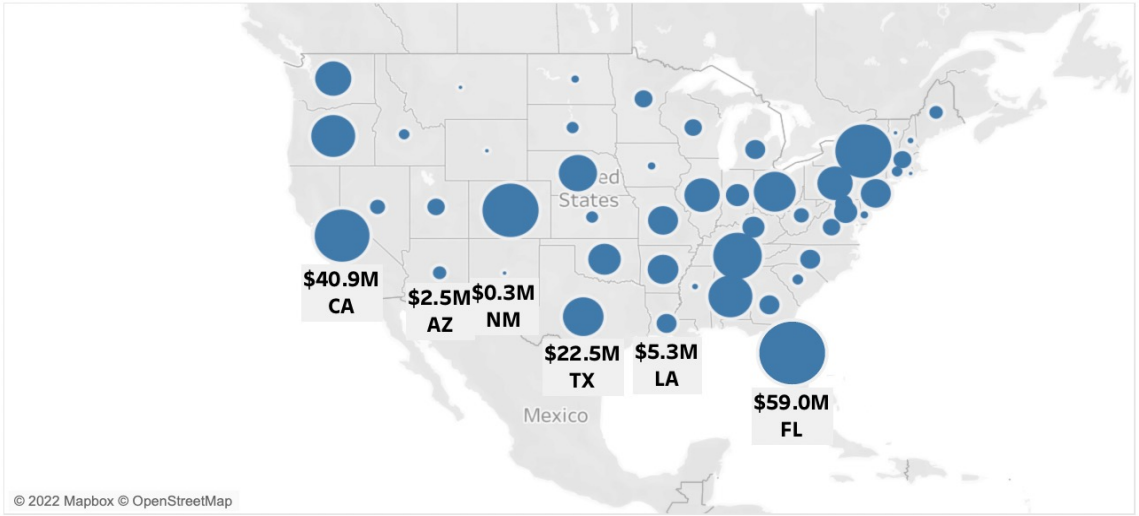


How much damage is caused by birds?

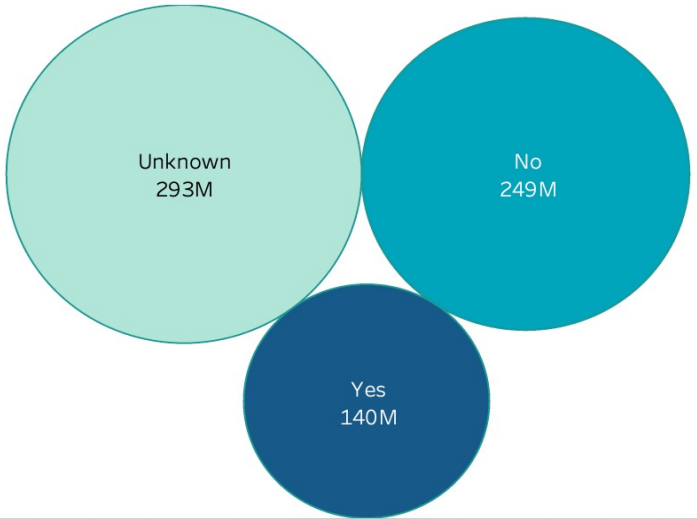
Year of Incident Date

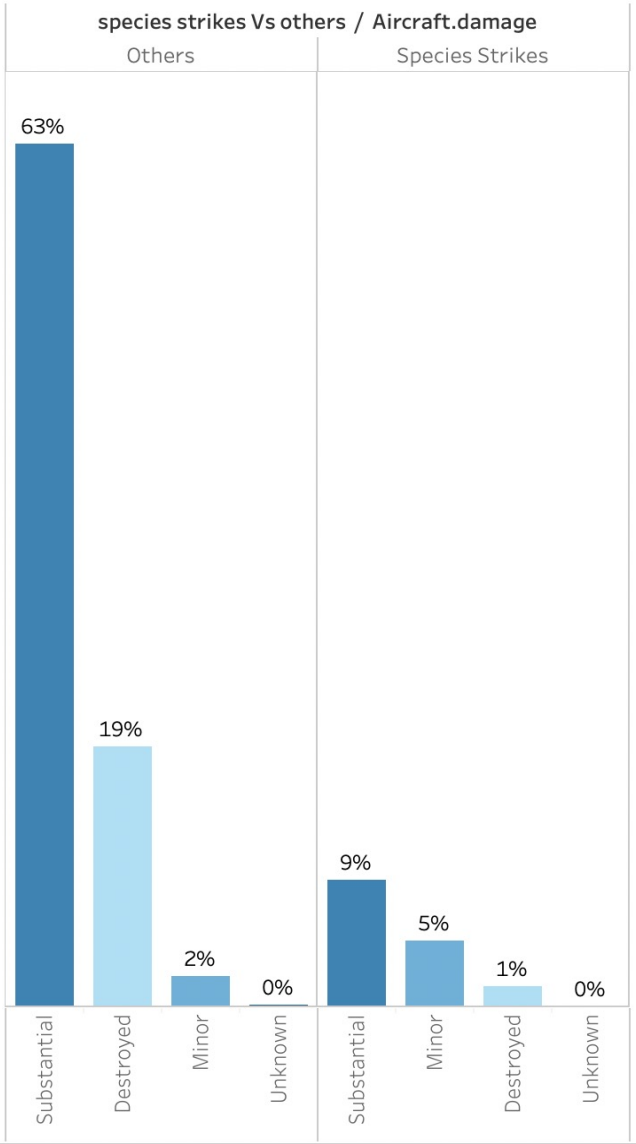
Pick one year to look at: (All)

Total damages across states



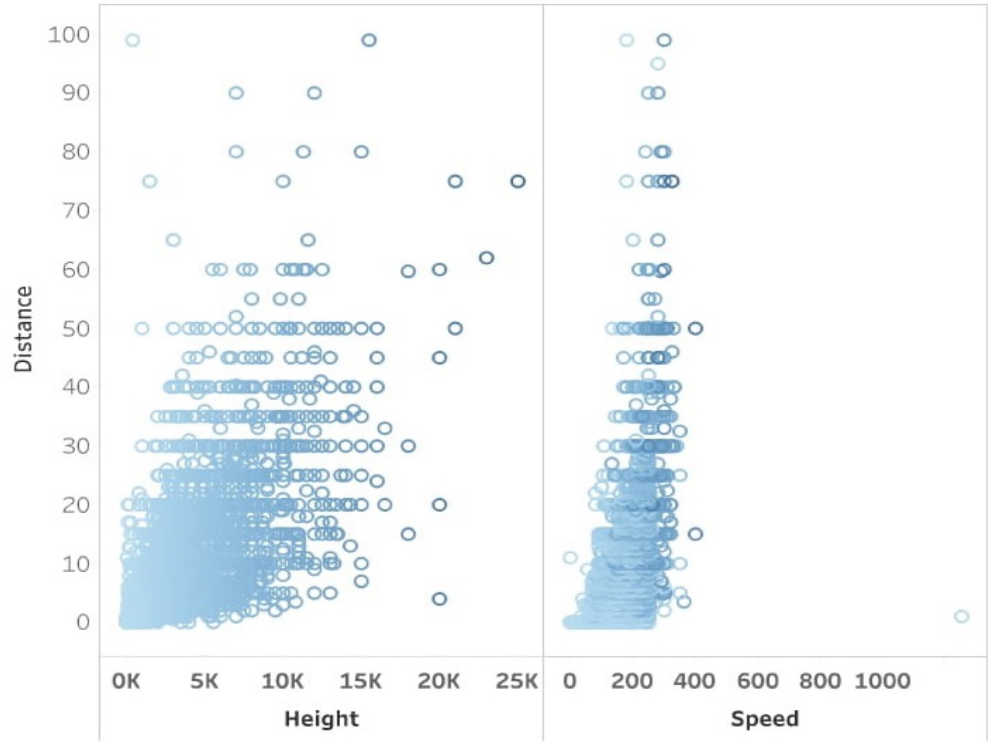
Pilot Warned of wildlife strikes



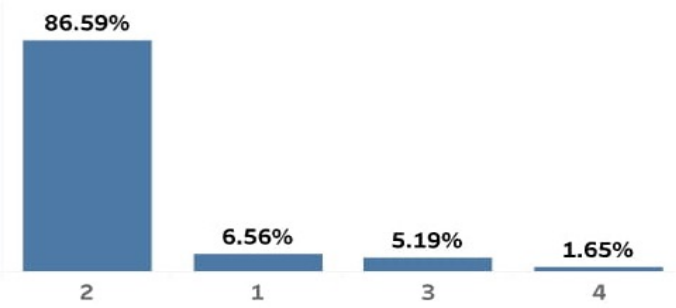


What are the trends in birds?

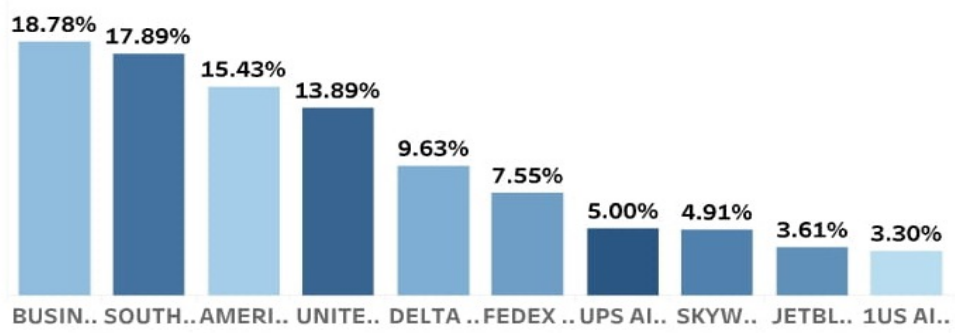
strikes occured more at low speeds and few miles distance from airport



2 engine aircrafts are more prone to strikes

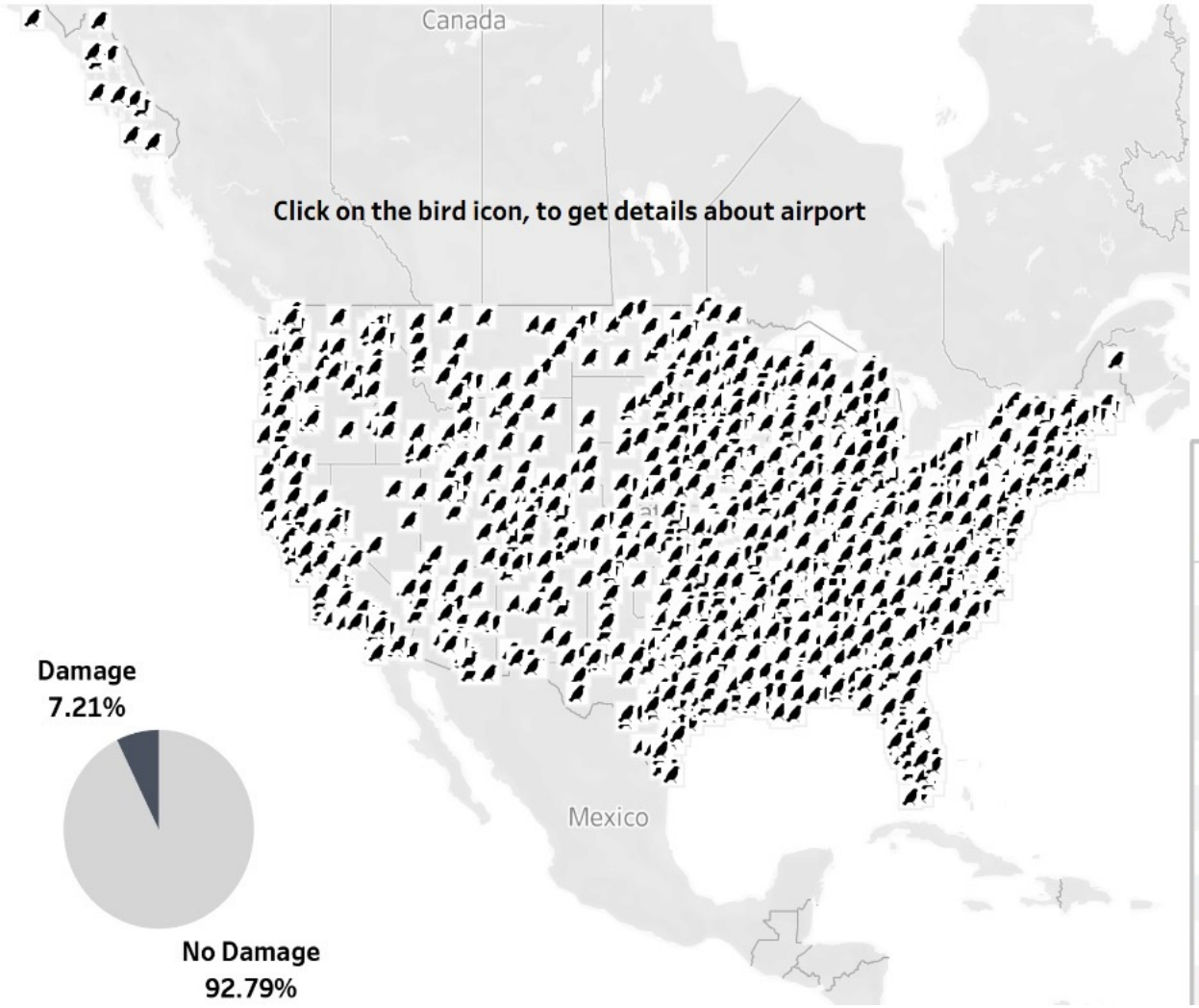


top 10 airlines resulted in strikes

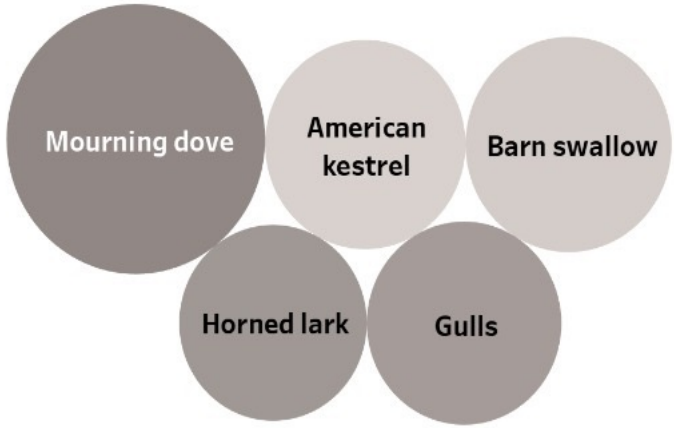


Where are the birds going?

Airports across country



Top Bird species strike count



Strikes cost analysis across Airports

Airport	Strikes	Total Cost
DENVER INTL AIRP..	8,550	$36,435K
DALLAS/FORT WO..	7,219	$2,921K
CHICAGO O'HARE I..	5,760	$5,873K
JOHN F KENNEDY I..	5,537	$28,752K
MEMPHIS INTL	4,453	$30,905K
SALT LAKE CITY IN..	3,422	$1,683K
SACRAMENTO INTL	3,416	$5,635K
ORLANDO INTL	3,262	$2,976K
DETROIT METRO ..	3,252	$121K
HARTSFIELD - JAC..	3,066	$430K

Conclusions and Recommendations

- Since most of the incidents occur at approach or departure when the airplanes are at low altitude and closer to the airport, we can minimize the attractiveness of the airport environment to birds by following

  1)Modifying the habitat – Removing food sources, such as seed-bearing plants.

  2)Controlling bird behavior – Flying trained falcons (or drones) over nesting sites to prevent birds from nesting.

  3)Adapting flight times and paths – Adjusting flight times to avoid the busiest hours for bird activity, such as early morning and late evening, or to make alterations during seasonal migration periods.

Conclusions and Recommendations

- Using trained birds to ward off the migratory birds from the airport locations can be a useful tool to reduce bird strikes.
- Since the modern commercial jets are faster and less noisier they often go undetected by the birds which results in bird strikes. The Aviation industry can add pulsating lights in the aircraft wings that have found to reduce the air strikes in other parts of the world.
- The airlines industry can study the migratory birds pattern and routes in the summer seasons. Avoiding such routes if possible could result in reduced bird strikes.

Conclusions and Recommendations

- Training dogs to track through the airport and surrounding area as a visible threat

- Closer monitoring, greater understanding and more targeted action is needed to counteract the fact that airports are getting busier, more flights are being scheduled and alternative habitats for birds are shrinking.

Challenges

✈️ One of the challenges was the normalization of the data to make suitable comparisons for the bird strikes in different months

✈️ There were some columns with missing data values and there were a few columns that lacked information and the data was taken from FAA website.