
Data Visualization of Bird Strikes between 2000-2011

Project Detail

Project Title	Data Visualization of Bird Strikes between 2000-2011
Technology	Business Intelligence
Domain	Transportation and Communication
Project Difficulty Level	Advanced
Programming Language Used	Python
Tools used	Jupyter Notebook, MS-Excel, MS-PowerBI

Objective

Transport and communication is one of the crucial domain in 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 for new solutions is reaching a point where available technologies and artificial intelligence, especially MAS, are being recognized as ways to cope 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

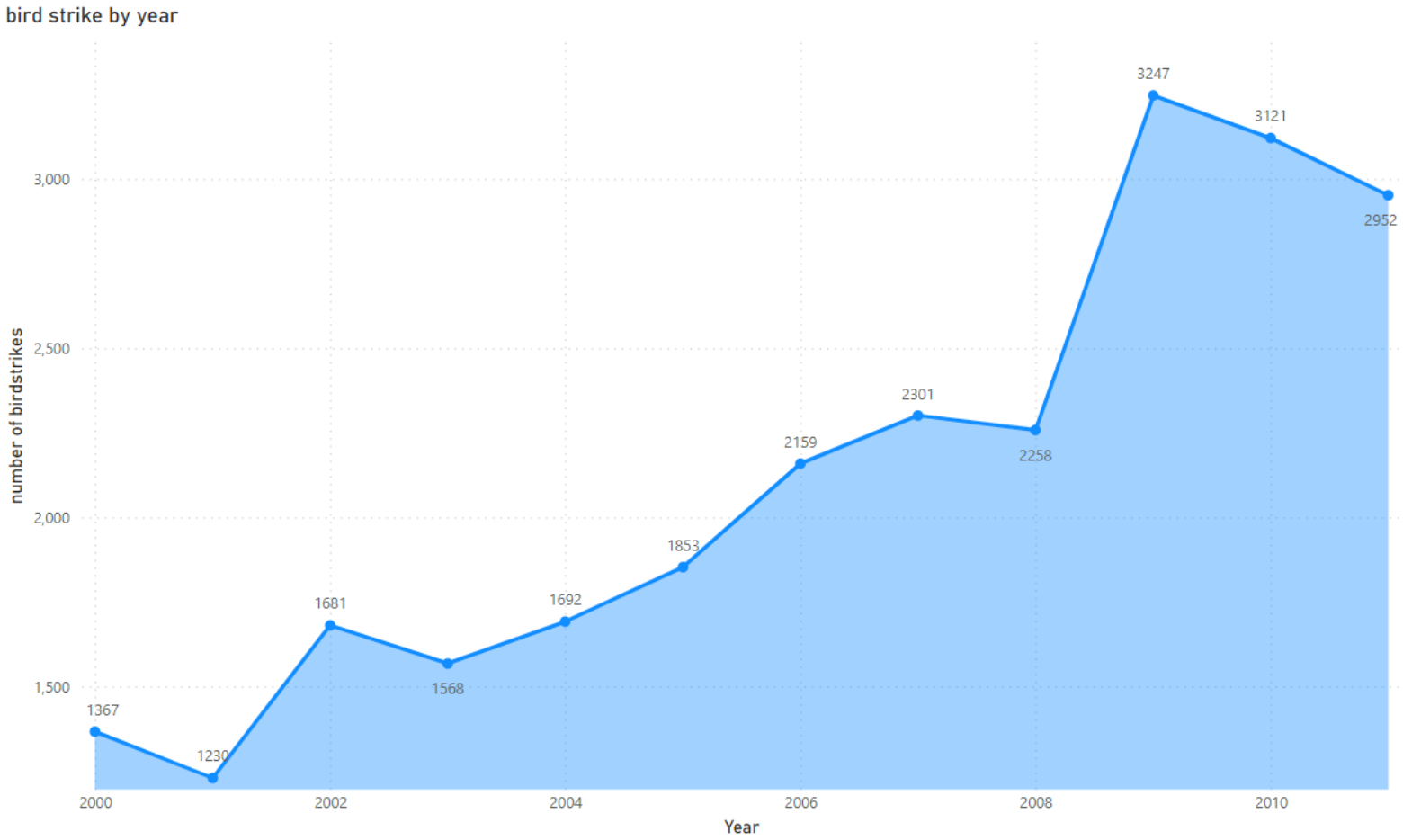
Problem Statement

The goal of this project is to analyse the bird strike incidents happened between 2000-2011. To achieve the goal, we used a data set that is collected by FAA during 2000-2011. The objective of the project is to perform data visualization techniques to understand insights of the data. This project aims apply various Business Intelligence tools such as Tableau or Power BI to get a visual understanding of the data.

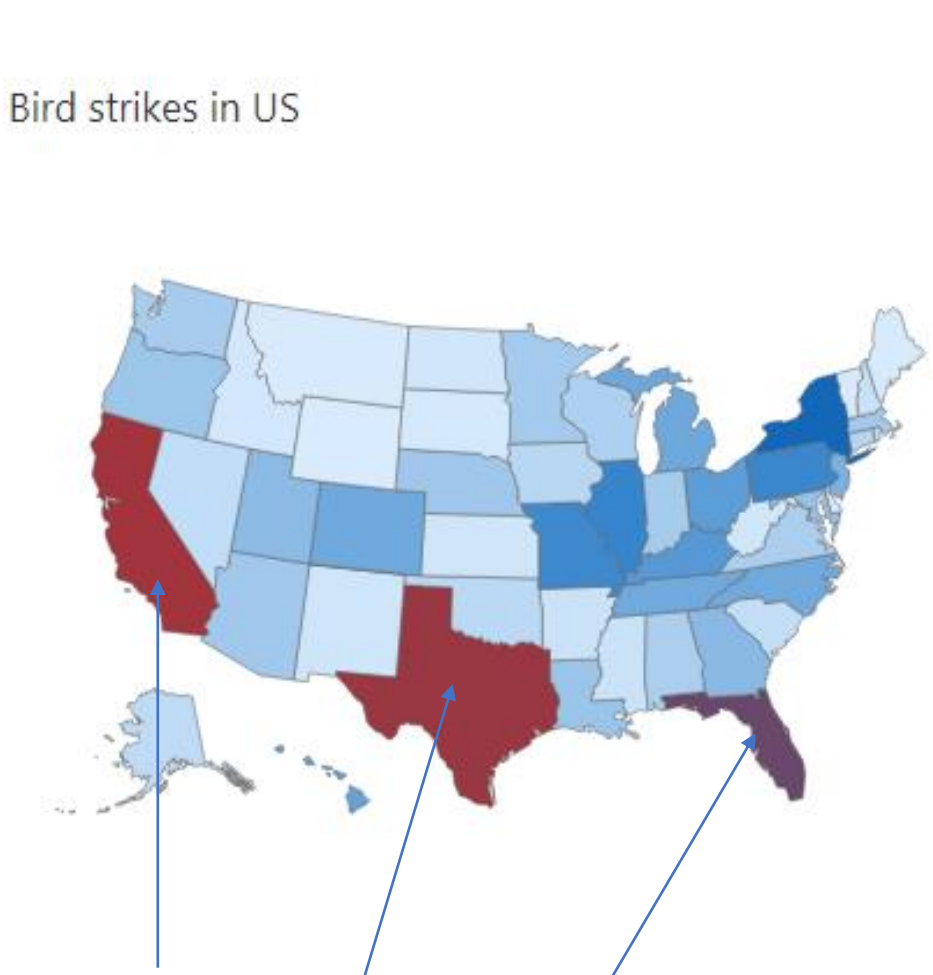
Insights

Total Number of Bird Strikes Incidents per Year

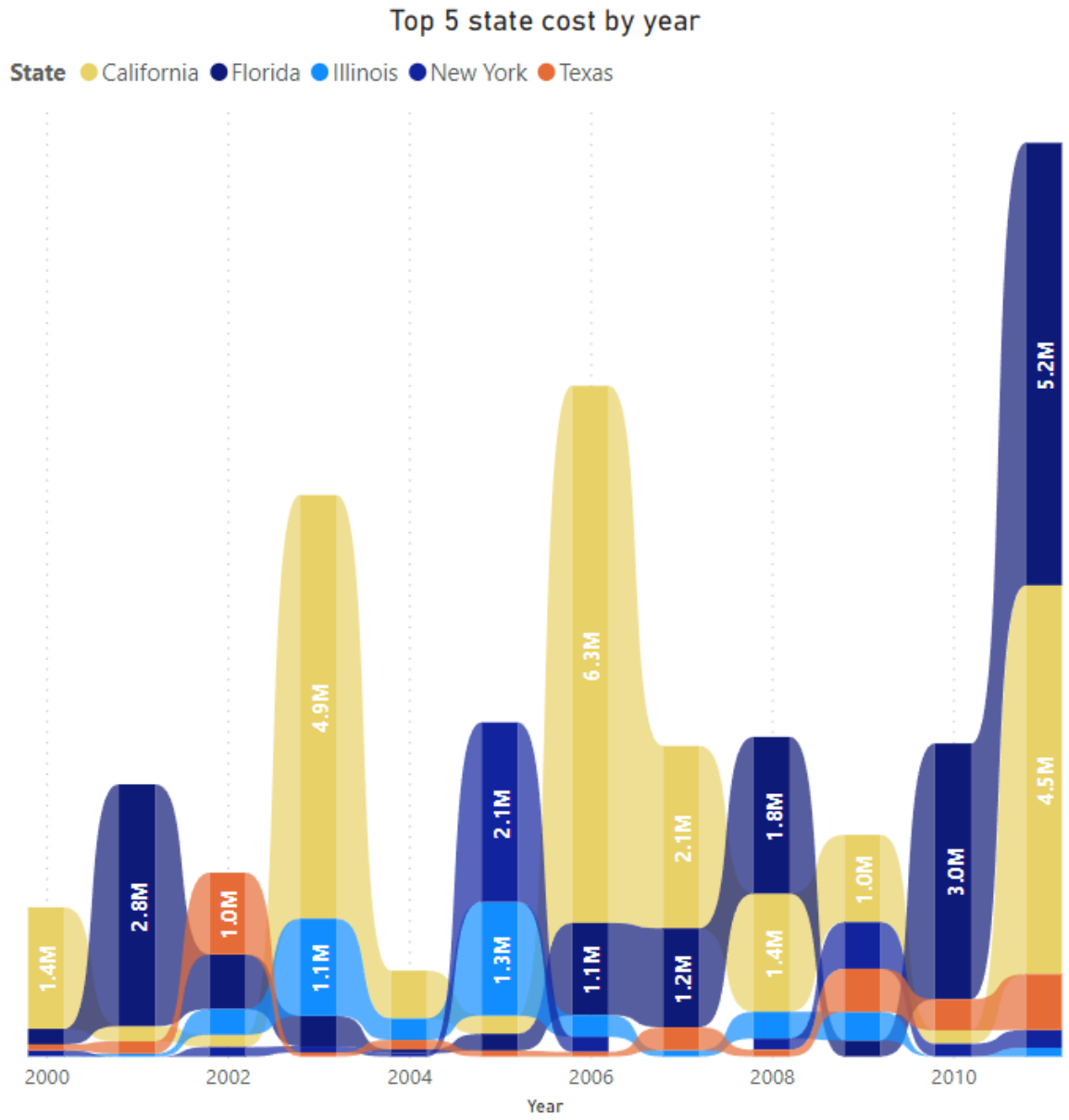
- We can see that Bird Strikes Incidents have an upward trend 2009 has the highest number of incidents.
- Number of Bird Strikes trended up between 2005 and 2011 with a rise of 1,099.
- Small birds are affecting more on the strikes. 2009, 2010 & 2011 are the year where most strikes occurred



Bird Strikes Incidents in US

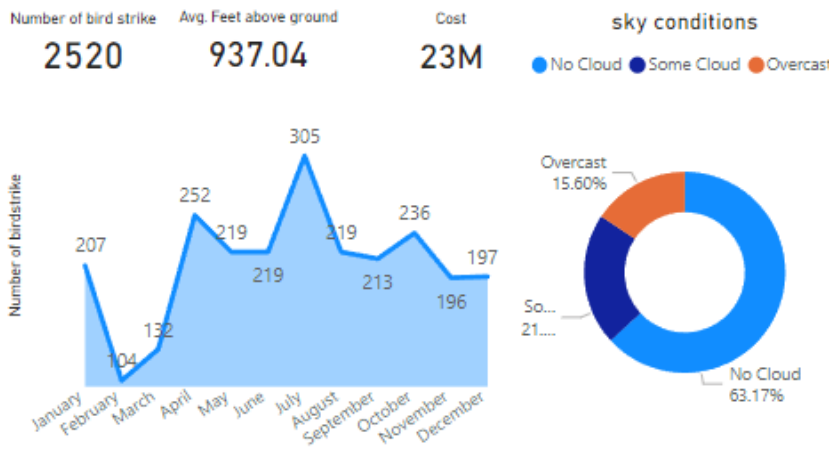


California, Texas and Florida has the highest number of bird strike incidents.



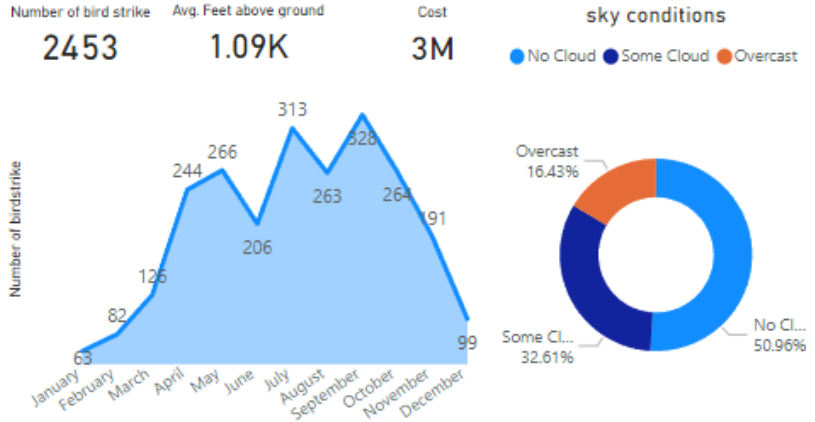
Bird Strikes Incidents in US

California



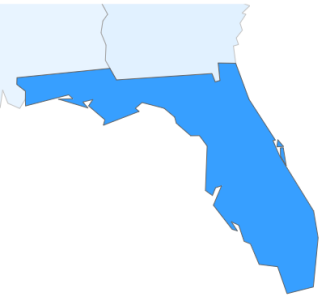
- California has the highest bird strike cases
- Cost of damage due to bird strike is also highest
- In Max bird strikes incident the sky was clear
- Worst month for bird strike is July

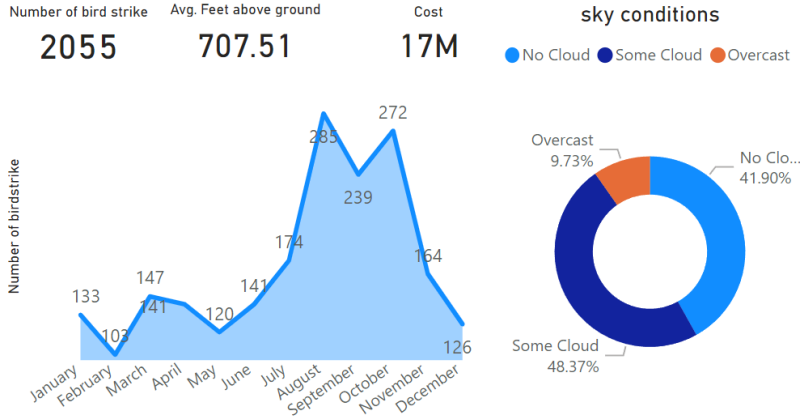
Texas



- Texas is the 2nd highest bird strike cases
- Cost of damage far less compared to California and Florida
- In Max bird strikes incident the sky was clear
- Worst month for bird strike is September

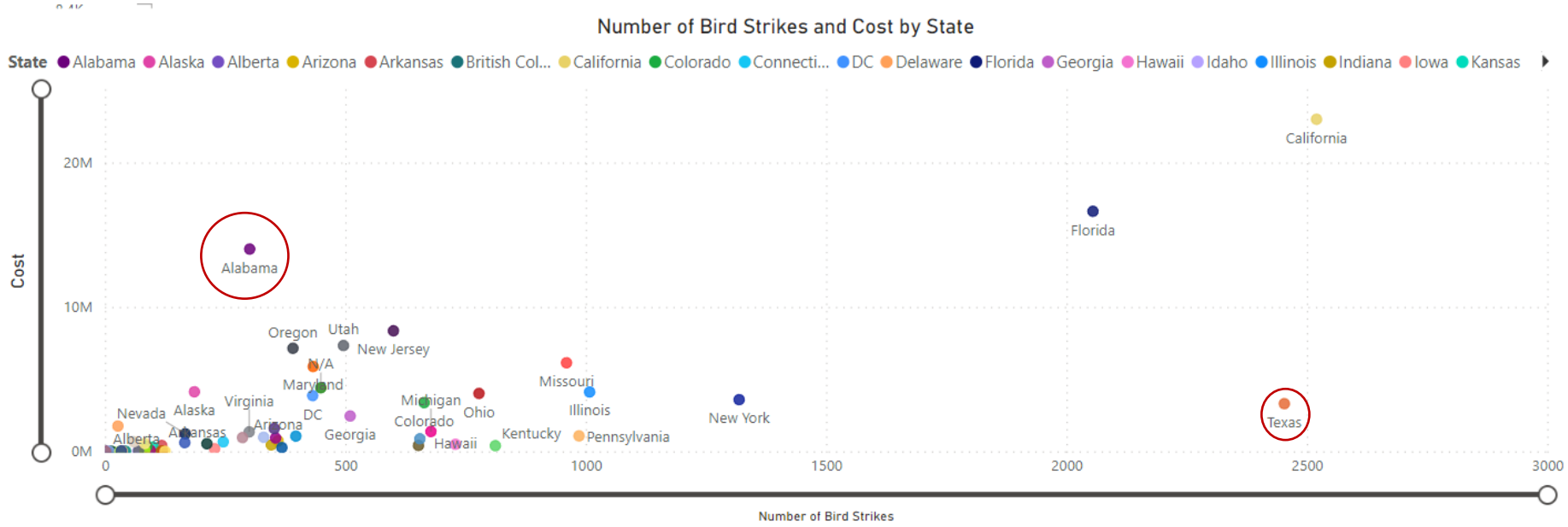
Florida

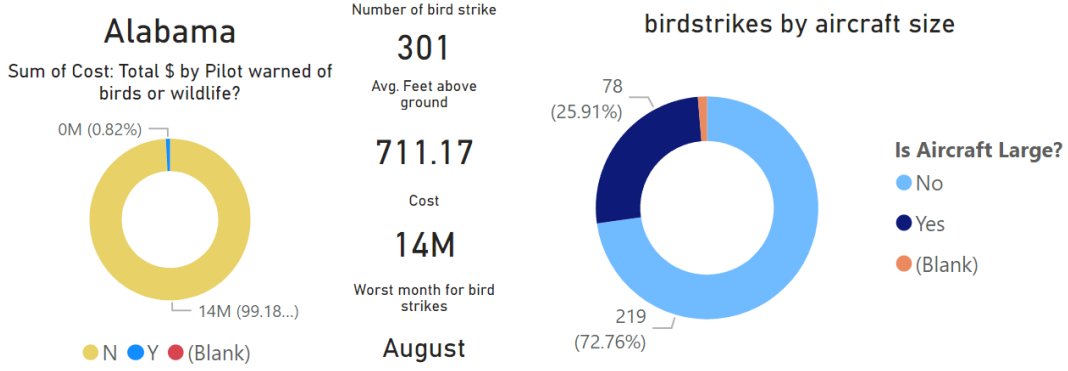


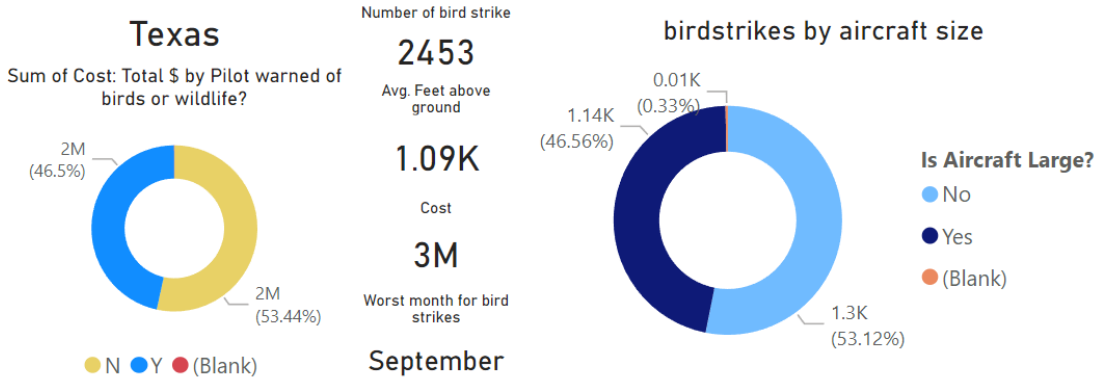


- Florida is the 3rd highest in bird strike cases
- Cost of damage due to bird strike is 2nd highest
- In Max bird strikes incident the sky had some clouds
- Worst month for bird strike is August

Bird Strikes Incidents in US



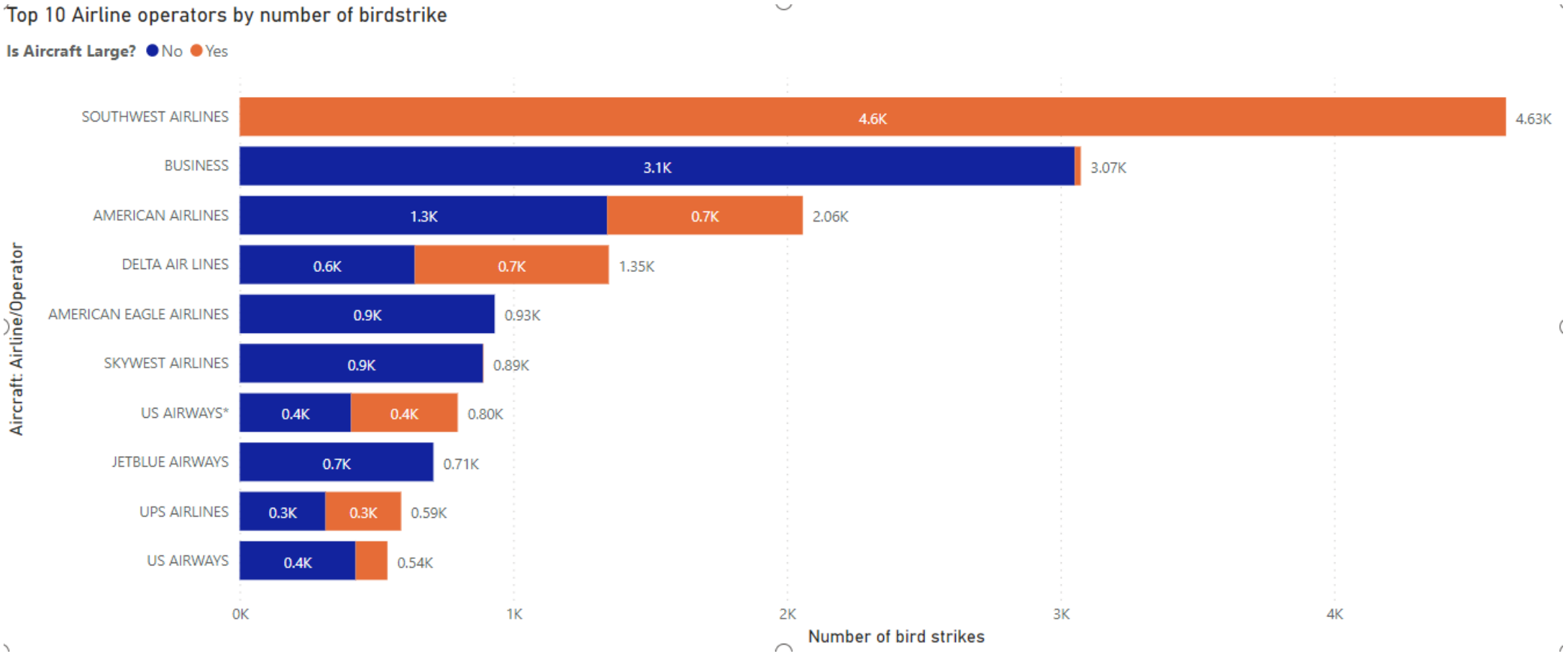




- Alabama has less than 301 bird strike incident but cost of damage is 14M
- Alabama has the 3rd highest cost of damages
- Almost all of the cases where aircraft was damaged the pilots were not warned
- Worst month for bird damage cases is August
- Small aircraft are far more affected by birdstrikes

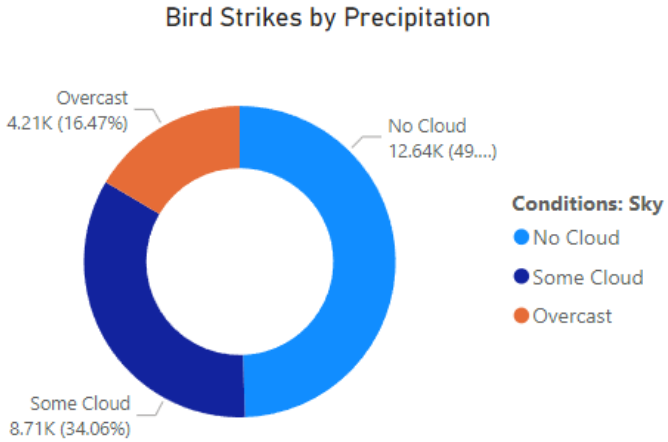
- Texas has much more bird strike incident (2453) but cost of damage is 3M
- Texas has the 3rd highest records of bird strikes
- Texas does much better job in warning the pilots compared to Alabama
- Worst month for bird damage cases is September
- Small and large aircrafts are equally affected by bird strikes in texas

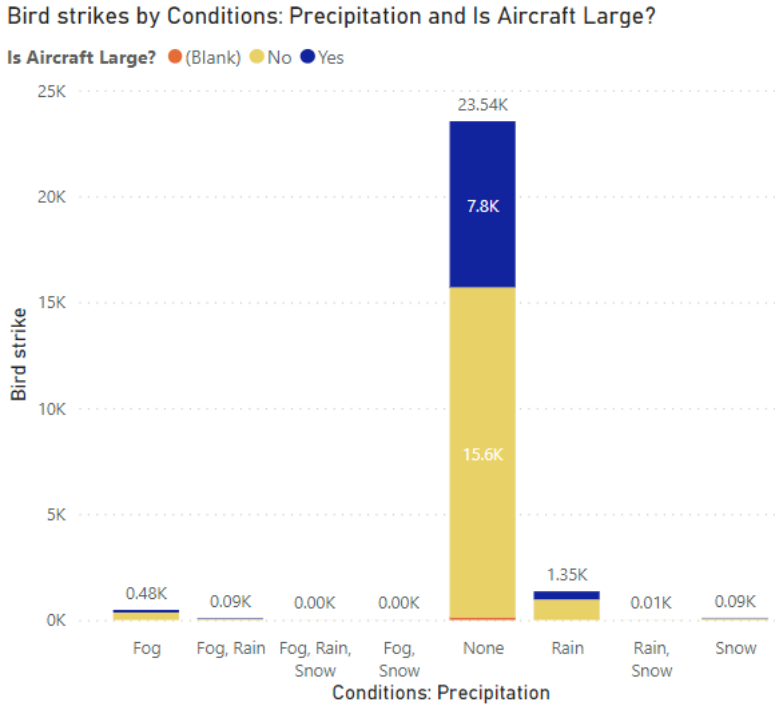
Top 10 Airlines having encountered most number of bird strikes



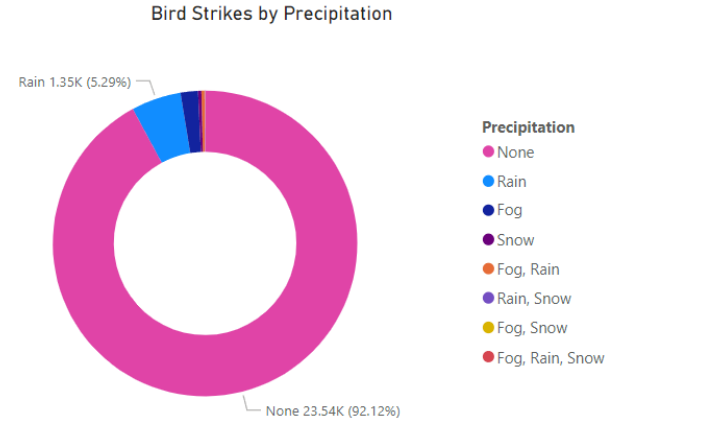
- Southwest airlines has encountered most number of bird strike followed by business and American airlines
- Except for southwest airlines all other birdstrike incidents are dominated my small sized aircraft

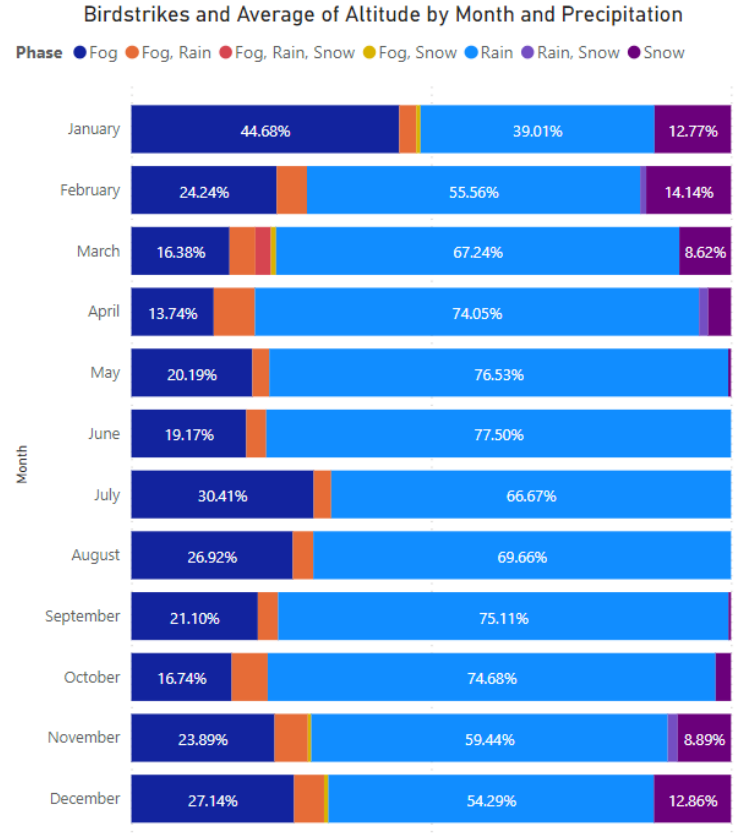
When do most bird strike incidents occur?



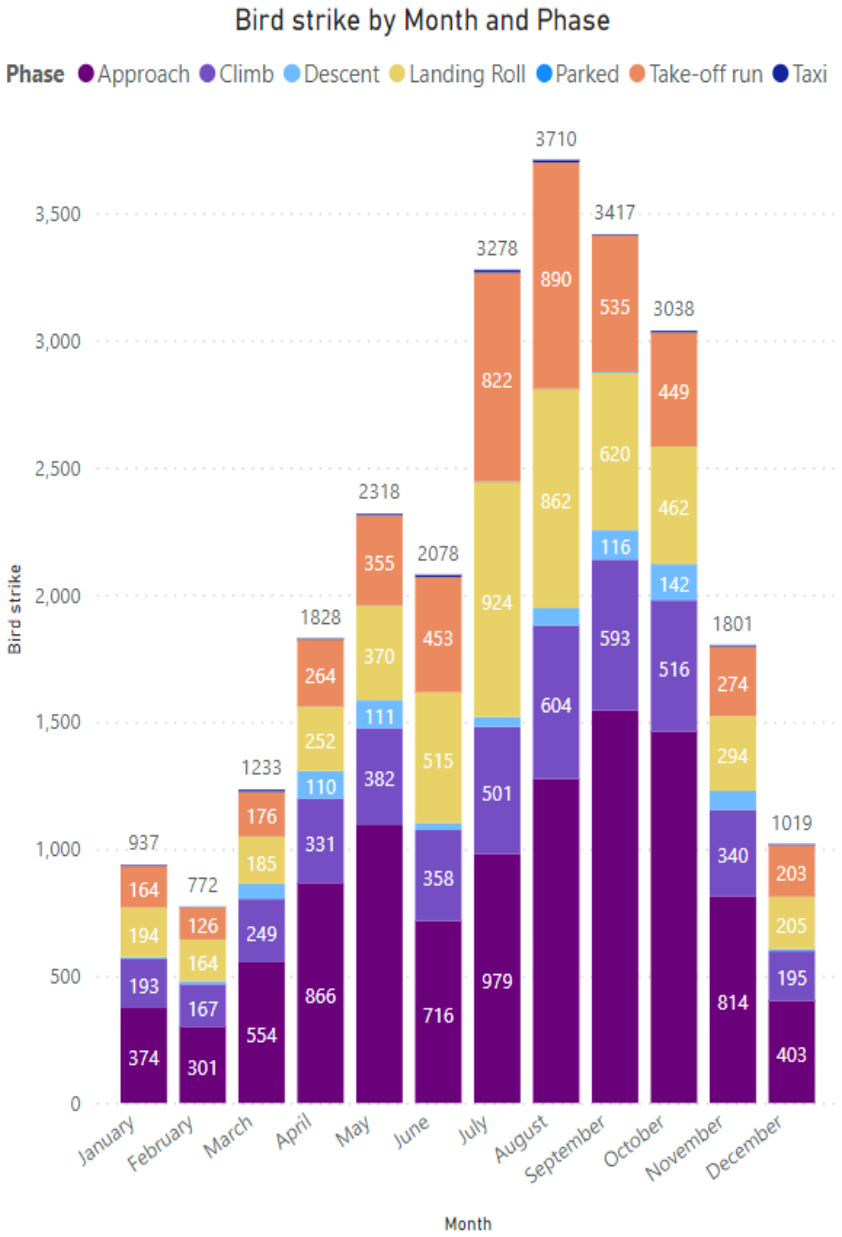


- Most of the incidents have happened when there was no cloud in each year
- Majority of the bird strikes cases have no precipitation conditions
- The most common Precipitation conditions for the strike are rain followed by fog
- Precipitation conditions effect aircraft size
- Between May to September Rain dominates the precipitations condition that happen during the bird strike



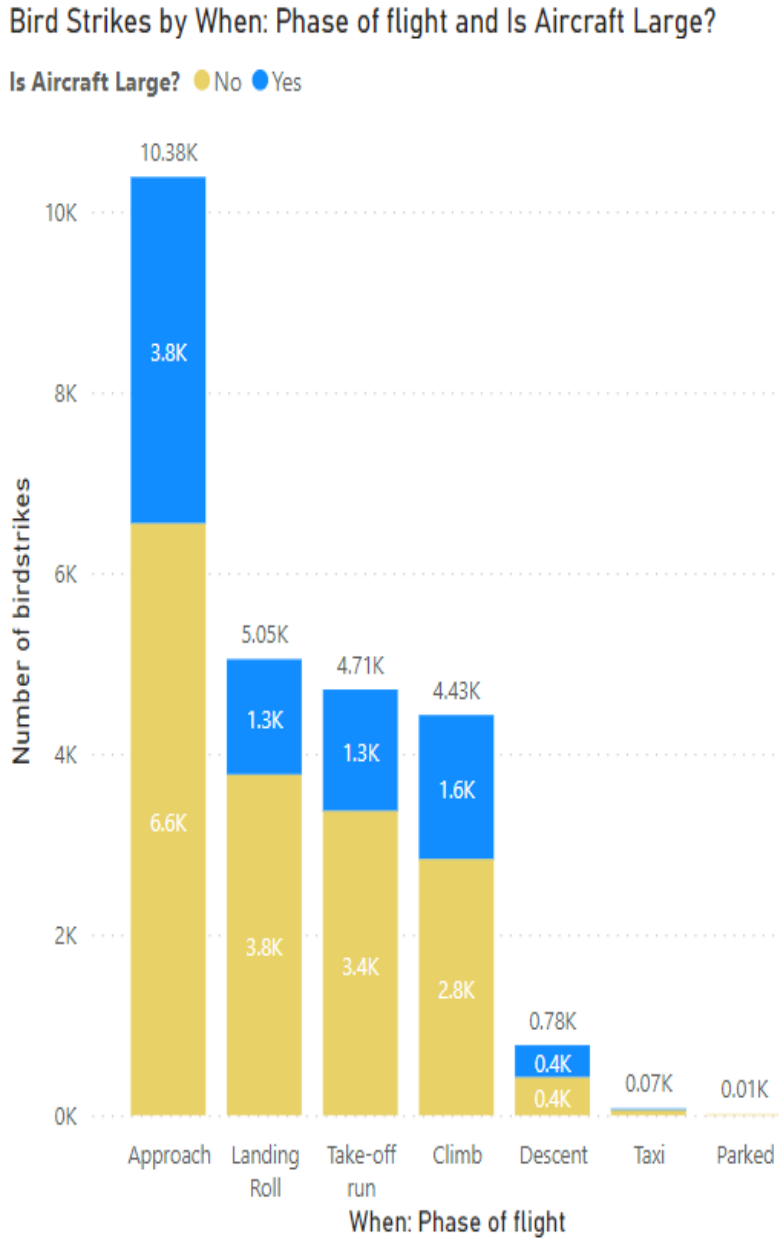


Phase of Flight at the time of strike

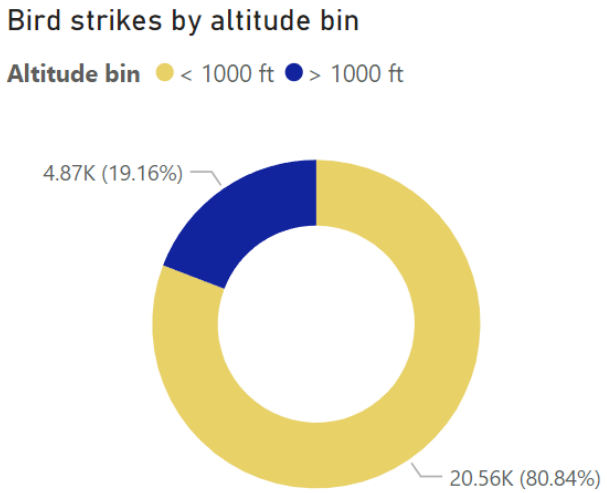


- Total Count of bird strike was higher for small aircraft (17,027) than the large ones (8402).
- Approach in Aircraft size made up 25.77% of the bird strikes cases.
- Average number of bird strikes was higher for small aircrafts (2,432.43) than large ones (1,400.33).
- Number of bird strikes for No and Yes diverged the most when the When: Phase of flight was Approach, when No were 2,722 higher than Yes.

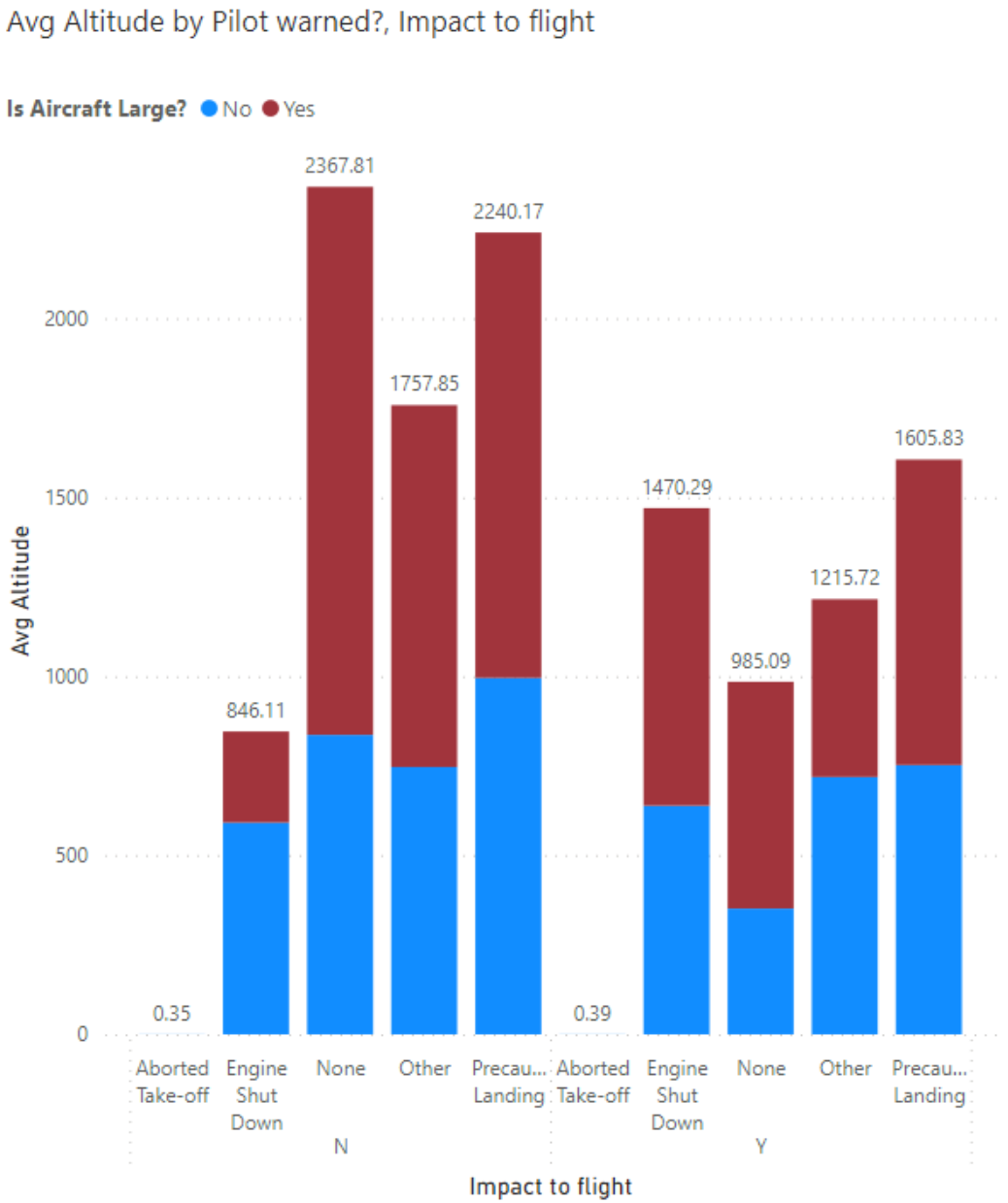
- Bird strike for Parked started trending up on July 2000, rising by 100.00% (2) in 2 months.



Altitude of Airplane at the time of bird strike

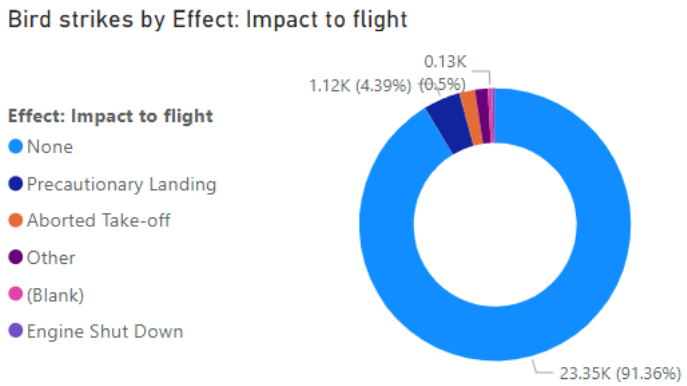


80.84% of bird strike incidents have happened when the altitude of airplane was <1000 ft and 19.16% have happened when altitude was >1000 ft.



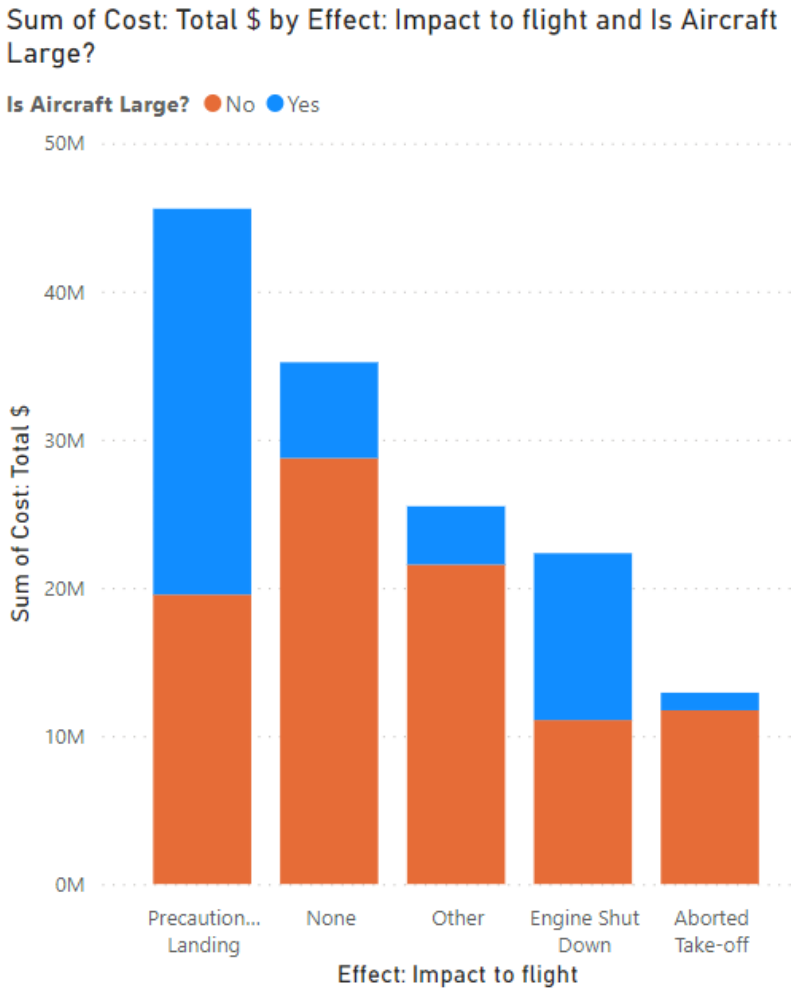
- Between January 2000 and December 2000, Descent trended up with a 108.92% increase, followed by Climb and Approach.
- The most recent Average of Altitude anomaly was in April 2000, when Take-off run had a high of 1.14.
- Across Phase, Approach had the most interesting recent trend and started trending up on June 2000, rising by 95.90% (580.47) in 5 months.

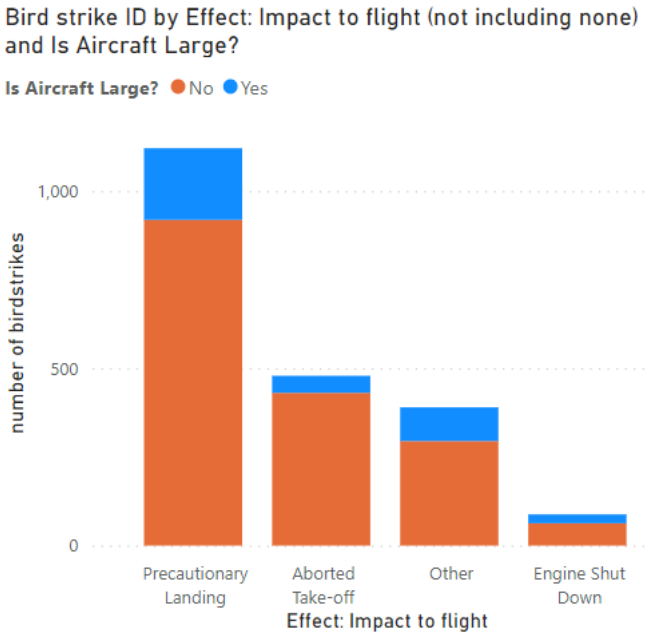
Impact on Flights



91.83% incidents where there was no impact on flights

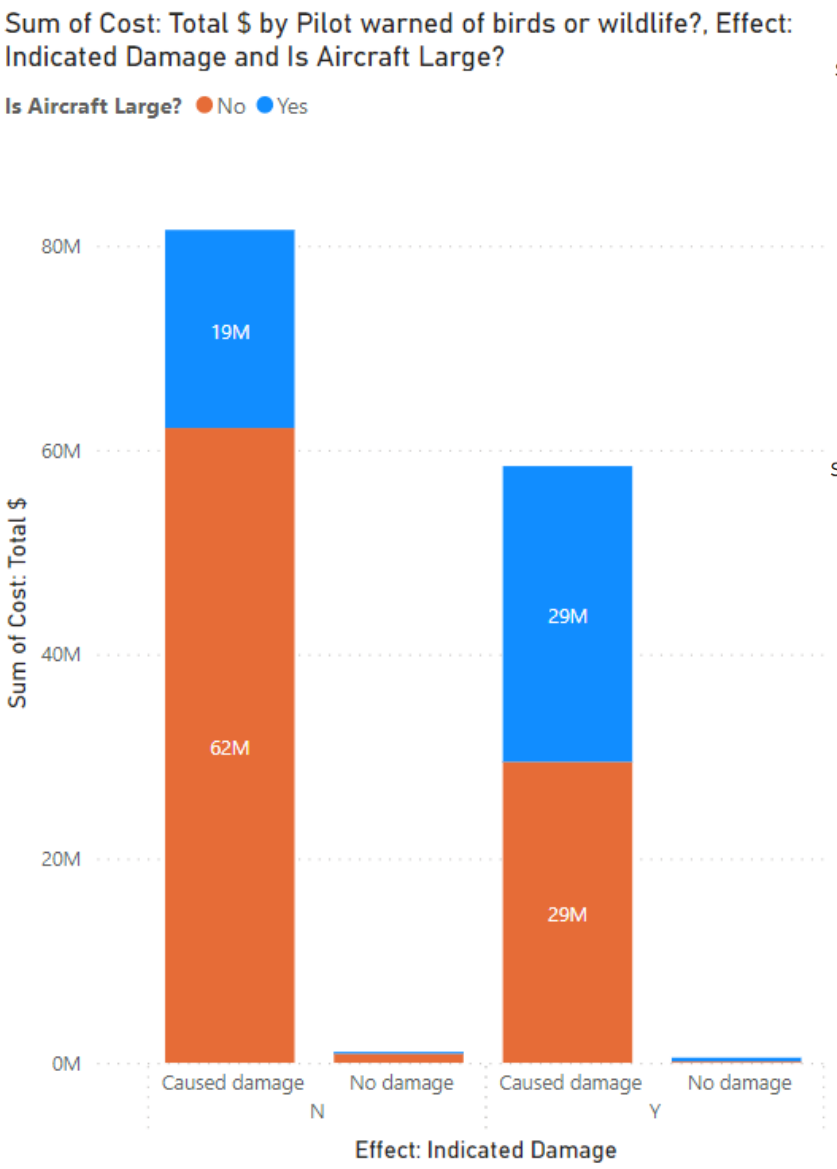
- Total Sum of Cost: Total $ was higher for No (92665917) than Yes (48881261).
- None in Is Aircraft Large? made up 20.31% of Sum of Cost: Total $.
- Average Sum of Cost: Total $ was higher for No (1,85,33,183.40) than Yes (97,76,252.20).
- Sum of Cost: Total $ for No and Yes diverged the most when the Effect: Impact to flight was None, when No were 22290594 higher than Yes.

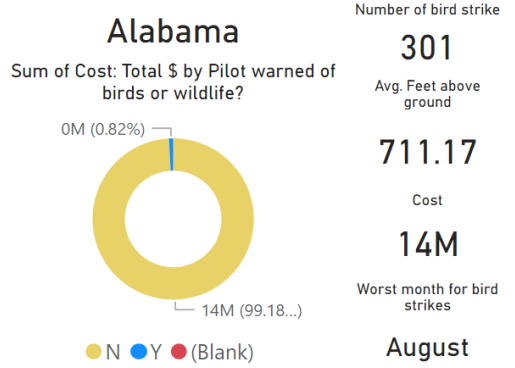




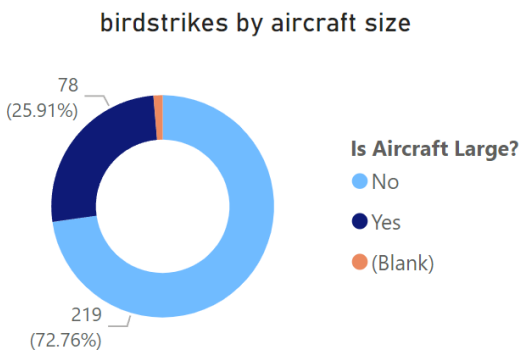
- Total number of bird strikes was higher for No (1,708) than Yes (370).
- Precautionary Landing in Is Aircraft Large? made up 44.23% of number of birdstrikes.
- Average number of bird strikes was higher for No (427) than Yes (92.50).
- Number of bird strikes for No and Yes diverged the most when the Effect: Impact to flight was Precautionary Landing, when No were 717 higher than Yes.

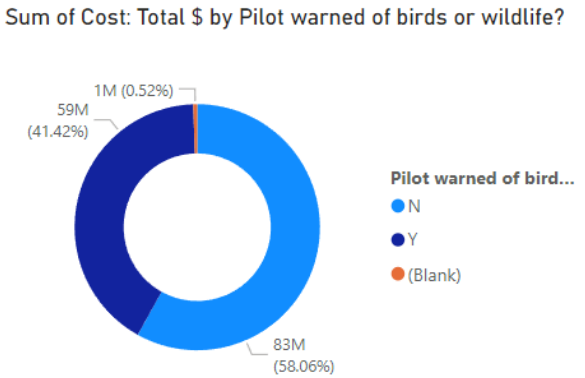
Does prior warning reduces the effect of damage?

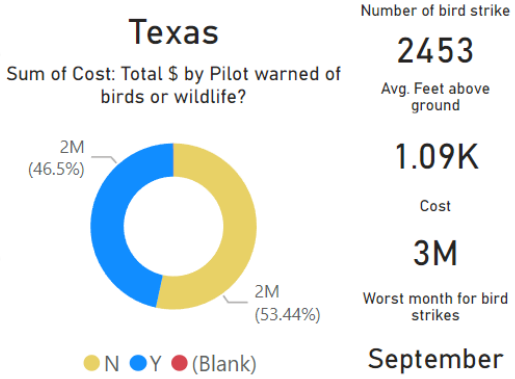




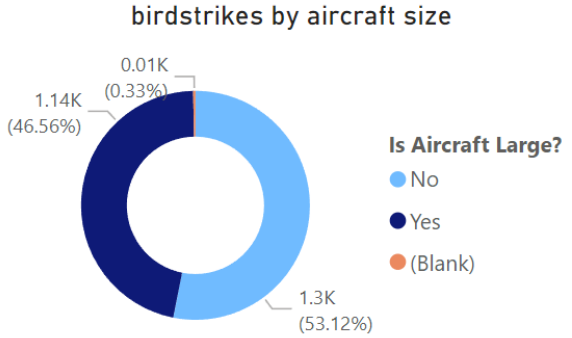
Number of bird strike
301
Avg. Feet above ground
711.17
Cost
14M
Worst month for bird strikes
August







Number of bird strike
2453
Avg. Feet above ground
1.09K
Cost
3M
Worst month for bird strikes
September



- Prior warning seems to help avoid damage more in case of small aircraft
- Even with higher bird strikes cases Texas avoid high damage by prior warning compared to Alabama
- Cost of damages is reduced in case of prior warning

Conclusion

- Strikes occurred during Summer(August) & Autumn(September) seasons, when sky has no cloud.
- South Airlines faced the more strikes.
- DALLAS airport faced the most strikes
- Most number of strikes occurred in the month of August.
- Prior warning to the pilot reduces the risk of damage to the aircraft, especially in case of small aircrafts
- During the Approach phase of the flight, most bird strikes occurred.
- California & Texas are the states where most strikes occurred.
- Bird Strikes Incidents have an upward trend 2009 has the highest number of incidents.
- 52.78% of incidents have happened due to some small unknown bird.
- 72.9% incidents have happened when there is 1 bird/wildlife is struck in the airplane and caused damage.
- 90.31% incidents caused no damage while 9.69% incidents caused damage
- 80.84% of bird strike incidents have happened when the altitude of airplane was <1000 ft and 19.16% have happened when altitude was >1000 ft.
- Most of the incidents have happened when there is no cloud in each year
- Southwest airlines has encountered most number of bird strike followed by business and American airlines
- Except for southwest airlines all other bird strike incidents are dominated my small sized aircraft