

IMPACT

Investigating Plane-Bird Collisions at LaGuardia Airport

INTRODUCTION

Since the beginning of aviation history, birds and planes have competed for airspace. A collision between a plane and a wayward bird can easily result in a dented fuselage, a shattered windshield or an engine damaged beyond repair. In one such collision, US Airways Flight 1549, January 15th 2009, a domestic commercial flight from LaGuardia Airport was struck by a flock of Canadian geese. The impact crippled the plane's engines, however the pilot, in an act of heroism, managed to land the plane safely in the Hudson River. The event was reported by the media as the "Miracle on the Hudson." A quick analysis of Federal Aviation Administration data reveals that such impacts are on the rise; media outlets consistently report rising impact rates as well. Articles entitled: "Bloody Skies: The Fight to Reduce Deadly Bird-Plane Collisions" by the Huffington Post and "Bird-Plane Collision Reports Soaring" by National Geographic paint a picture of ever-worsening flight conditions.

However, is this the case? Are flight conditions worsening at LaGuardia due to increased prevalence of bird collisions? In this study, we explore a number of possible reasons behind this increase. One cause might be increasing airline traffic at LaGuardia. Another possibility might be the shifting patterns of medium-sized bird migration and population growth. As migration trajectories shift closer to the airspace surrounding LaGuardia, impacts with larger quantities of birds are might be more likely. Lastly, the collision increase might simply be a result of better data collection.

METHODS & RESULTS

First, to find whether increased airline traffic was the cause of the increased bird collisions, Bird Strike Data from the Federal Aviation Administration was analyzed against LaGuardia's annual air traffic. The FAA Bird strike data is a national database that lists the bird collisions by airport, flight operator, the cost of damages to the aircraft among other variables. Fig.1 is a chart of the annual number of bird collisions at LaGuardia airport per year. Fig.2 shows the number of plane movements (departures and arrivals) at LaGuardia each year.

Next, we investigated the effect of bird migration on the FAA impact data. Below is a chart of the annual FAA impact data from 1990-2013 plotted monthly. It should be noted that there was a sharp spike from September to November, precisely when migratory birds begin to migrate. Although this was not conclusive evidence in the affirmative of migratory bird's effect on the impact rates, it was reason for further instigation.

The relationship in Fig.4 describes the population of birds in terms of conservation of mass. Simply put, the total number of birds over LaGuardia must equal the number of birds entering, less the number of birds leaving, less the number of birds dead (from impact). After rearrangement, Fig.5 shows that the number of migratory birds struck at LaGuardia depends both, on the overall population birds and the flux of birds around the airport. In short, if migratory birds are part of the increase in rates, then their overall population and migration patterns must be contributing factors.

A list of species native to the areas surrounding LaGuardia was taken from the New York Department of Conservation website. This data was then used to refine the FAA impact data into two categories: "Migratory" and "Non-Migratory". The idea is that if the rate of migratory species impacts are increasing relative to the rate of non-migratory species, then the increasing rate of total collisions collision can be attributed to changes in their migration or population.

FIG. 1: Bird Strikes per Annum at LaGuardia

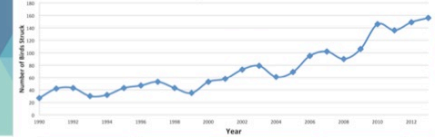


FIG. 2: Air Traffic at LaGuardia Airport

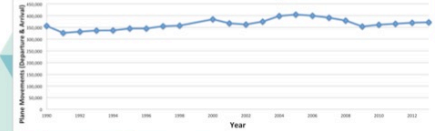
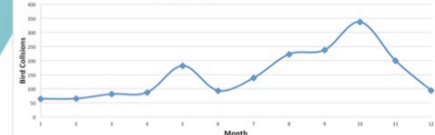


FIG. 3: Total Monthly Frequency of Bird Collisions At LaGuardia



$$\begin{aligned} Bird_{total} &= Bird_{in} - Bird_{out} - Bird_{dead} \\ Bird_{dead} &= Bird_{in} - Bird_{out} - Bird_{total} \end{aligned}$$

FIG. 6: Migratory Species Impact

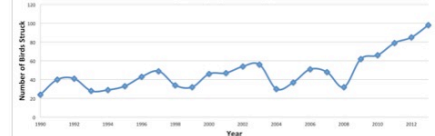
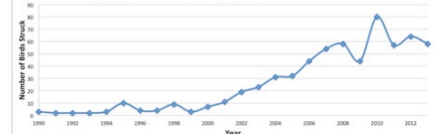


FIG. 7: Non-Migratory Species Impact



DISCUSSION

Since air traffic at LaGuardia has not seen a steady increase, but has actually remained relatively constant since 1990. It can be concluded that it is not responsible for the steady increase in bird collisions we see up to the present.

The data in Fig.6 and Fig.7 shows us that, in relation to the impacts on native birds, the weight of migratory bird impact data is actually lessening. The rate of increase of the non-migratory birds is clearly larger. For most of the 1990's, we see hardly any non-migratory bird impacts, then, suddenly around 2000, the numbers explode to 40-60 times their 1990's values. Meanwhile, the migratory species impacts only grow by a factor of 3-4 from the 1990's to the present. This illustrates that the migration birds population or their migration patterns are not responsible for the increase in collisions, or at least, it is not any more responsible for the increase than the collisions of non-migratory birds. Also, since there is no reason to believe, from NY DEC data, that the bird populations surrounding LaGuardia are exploding, we can establish that the effect of either group on the increased impacts is negligible.

CONCLUSIONS

Thus, as the data does not point towards changing migratory patterns, increased bird population, or drastically increasing air traffic at LaGuardia airport, our results suggest that it seems to be better data collection that is leading to an increase of collisions over time. The FAA has distributed awareness-raising materials such as the 24,000 posters distributed to more than 4,000 airports about why controllers should report collisions, provided guidebooks on addressing wildlife hazards. What is important is that we can assert that increased collisions at LaGuardia are not increasing with traffic or bird activity and that avian flight hazards is, for the moment, a controlled danger.