

## BIRD-STRIKE REMAINS IDENTIFICATION FOR THE ISRAELI AIR FORCE

Judy Shamoun and Yoram Tom-Tov  
Tel Aviv University  
Faculty of Life Sciences  
Department of Zoology  
Ramat Aviv 69978  
Israel

### ABSTRACT

Bird strike remains from 1991-1993 IAF bird strikes have been identified from all the IAF airbases, micro-and macroscopically for the first time. Remains were analyzed at Tel Aviv University. Thirty-five different species from 13 different avian orders were identified. Passeriformes were responsible for 36% of all bird strikes. Other orders which were responsible for a large proportion of the bird strikes were Apodiformes, Charadriiformes, Columbiformes, Accipiteriformes and Galliformes. Some of the species commonly encountered by aircraft are Skylarks, Swifts and Alpine Swifts, Stone Curlews, Turtle Doves, Chukars, White Storks, Steppe Buzzards, Kestrels and Lapwings. Sixty percent of the birds involved in bird strikes weighed up to 100g. Most of the birds involved in airstrikes were ground and non-soaring aerial birds. The proportion of bird strikes during March was higher than in all other months.

## INTRODUCTION

During the last decade both the IAF and the Israeli Port Authority have invested time and money in taking preventative measures involving bird control at military airfields and the Ben-Gurion Airport (Beyer 1992, Yashon and Shy 1992). However, in order to properly assess and reduce bird hazards to military and civilian aircraft, one must first establish which bird species are most accident-prone. Though there is a general awareness as to the importance of feather remains identification in the last few years, it is only during the last 2 years that feather remains which have been collected by the IAF have been intensely identified both micro- and macroscopically. The following is a report on the identification of IAF birdstrike remains from 1991-1993 examined at Tel Aviv University.

## MATERIALS AND METHODS

IAF feather remains, along with related data concerning each birdstrike, were sent to Tel Aviv University for analysis. All remains were initially washed in warm water and detergent, rinsed in warm water and then air-dried, or dried with an air blower. Afterwards, slides of downy barbules of the remains were prepared for light microscope examination. Slides were prepared according to the technique developed by Dr. Roxie Laybourne of the Smithsonian Institute, Washington DC, USA. Slides of the remains were compared to slides of a reference collection of 150 fairly common bird species previously prepared. Once bird order or family was determined microscopically, feather remains were compared macroscopically to bird skins in the Tel Aviv University Museum. Throughout this study no sample size is given for security reasons.

## RESULTS AND DISCUSSION

All feather remains were identified to their respective orders, but only 80.8%, 73.1%, 63.1% were identified to the family, genus and species level, respectively. All of the remains that were identifiable only to the order level were Passeriformes. During 1991-1993 the remains of a total of 35 different species belonging to 13 different avian orders, were identified. Passeriformes were responsible for 36% of all birdstrikes. Other orders which were responsible for a large proportion of the birdstrikes (Fig. 1) were Apodiformes (18%), Charadriiformes (16%), Columbiformes and Accipiteriformes (10% each), and Galliformes (8%). Specific species which are involved in over 2% of all birdstrikes are Skylarks *Alauda arvensis* (8.5%), Swifts *Apus apus* and Alpine swifts *Apus melba* (6.9%), Stone Curlews *Burhinus oediceramus* (5.4%), Turtle Doves *Streptopelia turtur* (3.8%), Chukars *Alectoris chukar* (3.8%), White Storks *Ciconia ciconia* (3.1%), Steppe Buzzards *Buteo buteo vulpinus* (2.3%), Kestrels *Falco tinnunculus* (2.3%), and Lapwings *Vanellus vanellus* (2.3%). Though passeriformes appear the most "accident prone", almost half the number of avian species found in Israel are passerines and they are generally more numerous than most non-passerines, so that the chance of striking a passerine is high. In addition, on the species level, passerines, except for Skylarks, do not stand out. On the other hand, the swifts are represented by only 4 species in Israel. The Galliformes are also represented, in Israel, by only 4 species, and Chukars are responsible for most of the strikes involving this order. Though Charadriiformes have the largest representation in species number, after Passeriformes, it is only three species, Lapwings, Spur-winged Plovers *Vanellus spinosus*, and Stone Curlews that are responsible for most of those strikes.

If birdstrikes were spread out evenly throughout the year we would expect approximately 8% of the strikes per month. However, during March over 16% of the birdstrikes occurred (Fig. 2). The high peak in March is caused mainly by passerines, swifts and Galliformes. It is difficult to assess whether this peak is a result of spring migration since the species involved have resident and migrating populations. The slight peak of bird strikes in January-February is caused mainly by Skylarks, and Charadriiformes, specifically Lapwings. In general, most of the passerine strikes occurred during the winter (Fig. 3) and during most of those months passerines were responsible for a majority of the bird strikes (Fig. 4).

Generally, during the summer most strikes were caused by swifts (Fig. 4). The slight peak of birdstrikes in June was mainly caused by Stone Curlews (Fig. 4), possibly young birds, since Stone Curlews are known to nest at airbases. Most of the pigeon and dove strikes occur during the summer (Fig. 3), these birds often nest in and near airbases, and this once again may be a result of young, less experienced birds being more "accident prone". It is important to note that migrating raptors do not form a significant proportion of birdstrikes. This probably reflects the success of the special flight paths and altitudes adopted by the IAF during migration (Leshem 1992).

Analysis of the weights of the birds involved in bird strikes (in cases where weight class was known) revealed that 60% of the birds involved in birdstrikes weighed up to 100 g (Fig. 5). Passerines and swifts whose species were not known were assumed to fall into this weight class. Birds weighing 101-500 g made up the second largest weight class (22%). This group included doves, pigeons, Chukars, Spur-winged Plovers, Lapwings, and Stone Curlews. Birds weighing above 3000 g (3.7%) were White Storks.

The bird strikes were also analyzed according to bird activity (Fig. 6). Ground birds including larks, Chukars, Plovers and Stone Curlews, Galliformes, and pigeons and doves which forage and nest in fields in and around the airbases, seem to cause most of the strikes (35%). This trend may reveal a need to work more intensely on birdstrike prevention inside airfields. Non-soaring aerial birds were involved in 23% of the strikes, and included swifts and swallows. If these birds are found to also cause damage, possibly because of their flocking behavior, it may be worth investigating how to limit this particular bird hazard. Soaring birds caused only 13% of the strikes. Passerines which did not fall into any of the above categories were also responsible for a large number of strikes, but not more than is expected in relation to the number of passerines found in Israel.

Figure 1 - Percent of birdstrikes involving particular avian orders

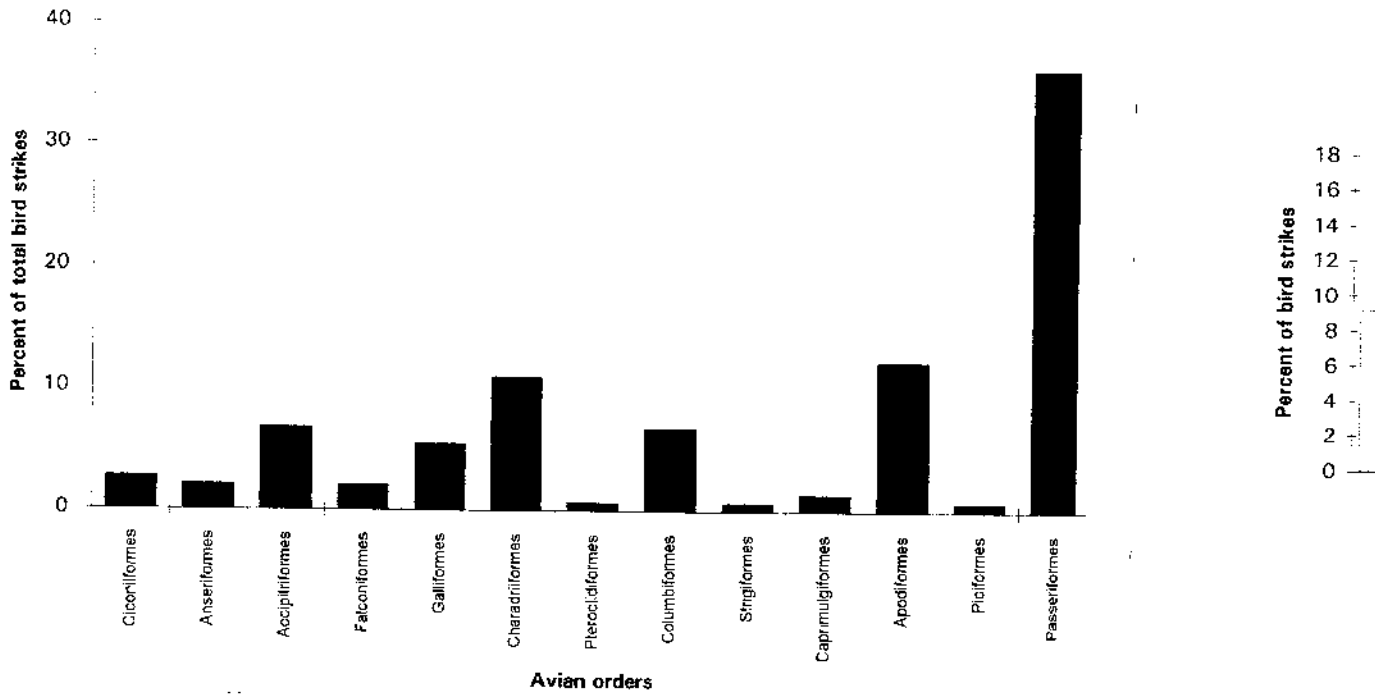
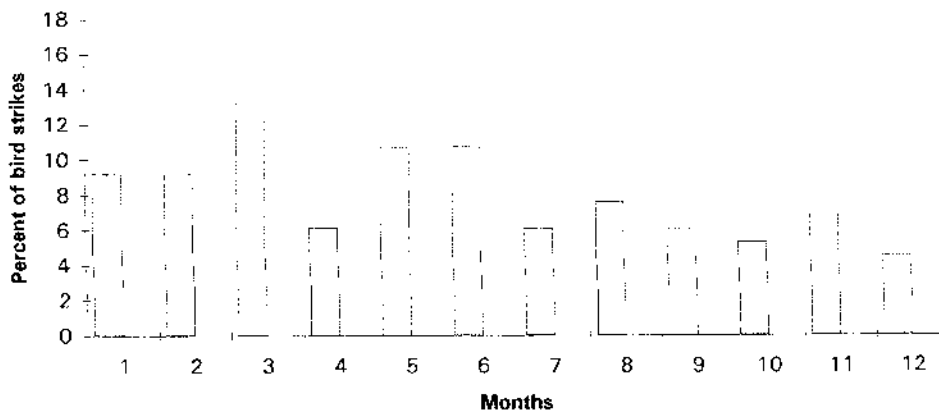


Figure 2 - Percent of bird strikes per month



Passeriformes

Figure 3 - Percent of birdstrikes of each order, per month

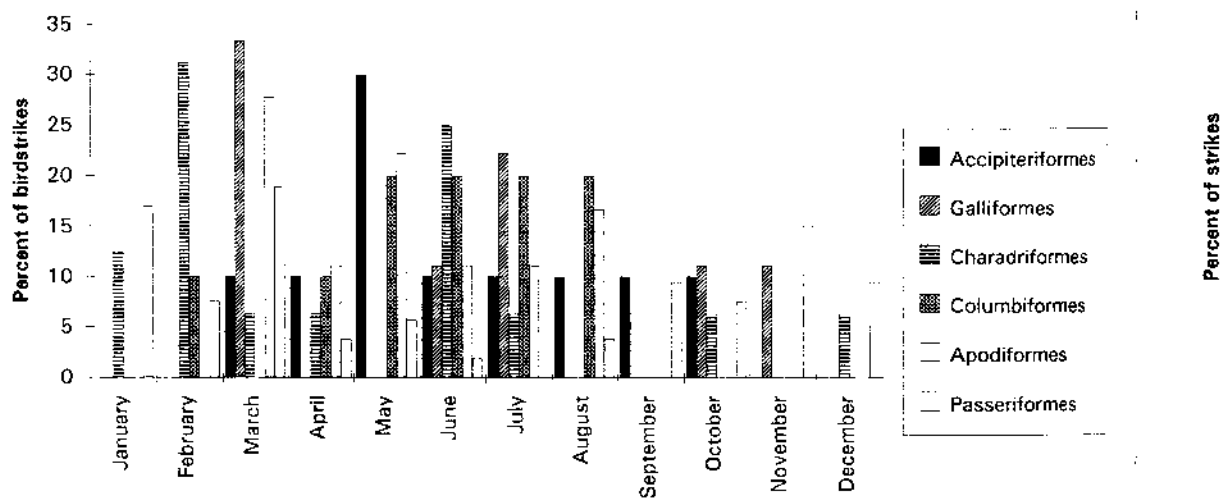


Figure 4 - Avian orders involved in birdstrikes each month

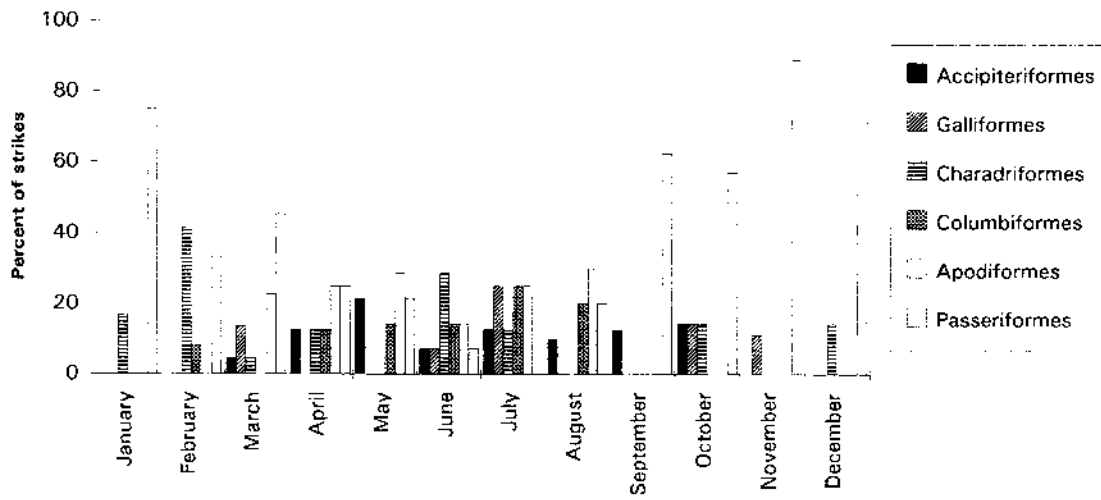
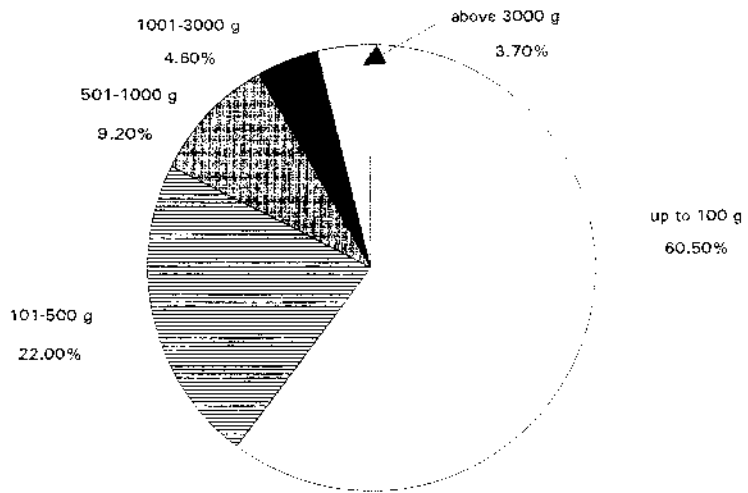


Figure 5 - Weight distribution of birds involved in strikes

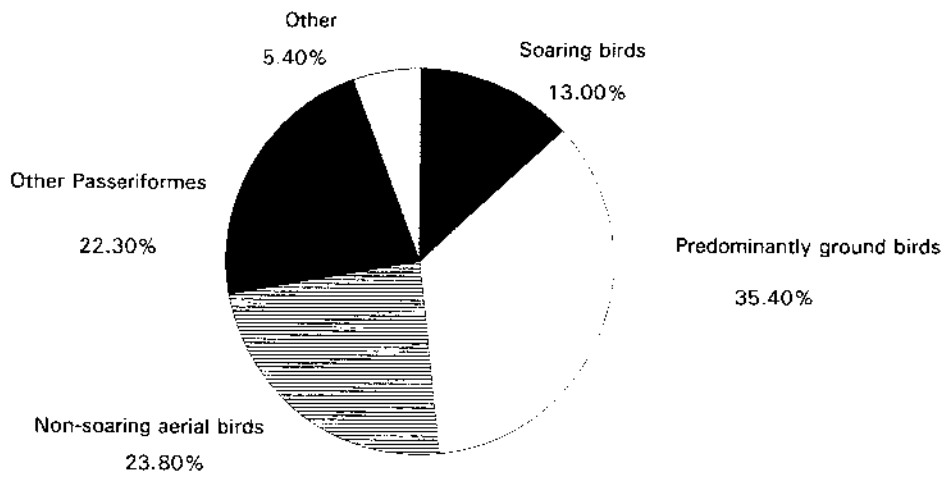


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**Figure 6 - Activity distribution of birdstrikes**



#### ACKNOWLEDGEMENTS

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#### REFERENCES

- Leshem, Y. (1992). Predicting regularity of bird migration in global bottleneck areas, on a daily, seasonal and yearly scale, and its implementation in Israel Air Force and civilian flight. 21st Meeting Bird Strike Committee Europe, Jerusalem, Working Paper 21.
- Petreaanu, D. and Abbady S. (1988). It's a bird, it's a plane, it's a problem. IDF Journal 14 pp 14-17.
- Yashon, J. and E. Shy (1992). Bird strikes at Ben-Gunon Airport, Israel 1982-1991. 21st Meeting Bird Strike Committee Europe, Jerusalem, Working Paper 35.

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