

BIRD STRIKES AT BEN-GURION AIRPORT, ISRAEL 1982-1991

JERRY YASHON and EYAL SHY

Bird Strike Prevention Unit, Nature Reserves Authority,
Ben-Gurion Airport, P.O.B .126, Israel 70100

Introduction

Ben Gurion International Airport resides in an area of intensive agricultural activity. As such it is a contiguous part of the regional ecosystem in which it is located. Indeed, within the boundaries of the airport itself there is ongoing agricultural activity in land adjacent to the runways. However, as distinct from the activity outside the airport boundaries, the type of agriculture allowed within the airport perimeter is subject to the prior consent of the Airport Authority which has veto power over any activity that could conceivably have adverse effects on aircraft safety either directly or indirectly.

As a consequence of being located within an agricultural environment the airport is subject to bird activity congruent with this type of environment. In addition, the close proximity to the airport of a large municipal refuse dump serves as a powerful attractant to birds, especially during the winter months when migrating birds such as gulls and terns are resident in Israel.

In order to cope with the threat from bird activity to aviation safety the Airport Authority maintains a Bird Strike Prevention Unit staffed by the Nature Reserves Authority. This arrangement allows the unit flexibility and the authority to take extraordinary measures regarding animal activity, when deemed necessary, which is not permitted to any other body outside of the Nature Reserves Authority. The priority is to ensure that aviation safety is maintained at the highest possible level with a minimal impact upon the local environmental balance of nature.

Bird Strike Prevention Unit

The Bird Strike Prevention Unit operates from first light to last light throughout the entire week with the exception of Saturday. The runways are patrolled at first light to ensure they are clear of any activity which may threaten aviation safety. Synthetic and recorded distress signals emanating from the patrol vehicle are used to encourage any birds in the area to relocate to less hazardous surroundings. Cracker shells are used to distance birds seen in the air. Routine patrols are carried out during the day to monitor agricultural areas

near the runways and locate any potential problems before they become a threat. Gas cannons operate at sensitive points near the runways and when necessary additional cannons are set up where increased bird activity has been noted. Problem populations are culled on a regular basis. During winter operations the unit also employs specially adapted drone aircraft outside the airport to break up and disperse large flocks of birds near the refuse dump which may endanger aircraft approaching the airport. In this manner the Bird Strike Prevention Unit strives to provide the most effective on site and peripheral bird strike deterrent action given the resources available to it.

Agriculture at Ben Gurion International Airport

As previously noted there is ongoing agricultural activity within the operational area of the airport. The overriding concern is to ensure that all land under Airport Authority control is managed in such a way that bird activity will not be attracted to the airport. Two nearby agricultural communes (kibbutzim) are allowed the use of the available arable land for raising crops. However, the Airport Authority reserves the right to determine which crops are allowed, with a balance being struck between the farmers' need for viable crops which can be marketed and the airport priority that they not attract birds. Accordingly, no seed producing crops are allowed unless they are raised for cattle feed and harvested before the seeds become edible. These include wheat, corn, pensilaria and vetch. Cotton is favored by the airport, however, the large amount of water needed with its related high cost in Israel make it less profitable to raise. Chickpeas have recently been introduced on a trial basis with encouraging results. Land that is not utilized for raising crops is maintained by the engineering and gardening departments who are responsible for containing the spread on any undesirable plant growth which could attract birds.

Despite the careful selection of crops allowed at the airport there always remains some attendant bird activity. Flocks of pigeons search for seeds during planting and immediately afterwards. Cattle egrets follow tractors plowing the fields alert for anything edible that may be exposed. Predators are evident hunting for prey above the fields. There also remains bird activity just outside of the airport perimeter in fields adjacent to the airport that are not limited to specific crops and often do attract birds. All this activity ensures that even in the best of circumstances there remains plenty of work for the Bird Strike Prevention Unit.

Israel
different ec
the north
along the M
down to th
habitats sup
geographical
migrations o
their winter
grounds dur
and rest. H
choose to wi
are exposed
change in p

Bird p
the year in
egret, hood
greater acti
Resident ra
characterize
massive inc
Raptors see
and buzzard
During the
Israel proxi
raptors. T
Gurion Inter
follow.

RESULTS

The r
presented a
at Ben-Guri

Figure
years. Du
occurred at
exactly the
previous five
number of
to informat
airport, the

Environmental Factors

Israel is a small country, but has a variety of climates supporting different ecosystems. This ranges from the lush Galilee and Golan in the north to the arid Negev in the south and from the coastal plain along the Mediterranean Sea to the rolling hills around Jerusalem and down to the lowest point on earth, the Dead Sea. These varied habitats support different resident bird species. Also, because of its geographical location Israel serves as a bridge over which pass great migrations of birds during the autumn from Europe and Asia south to their winter quarters in Africa and back north to their breeding grounds during the spring. During their passage they stop to feed and rest. However, not all of the birds complete the journey and some choose to winter in Israel. As a result of all this bird activity aircraft are exposed to the threat of bird strike from various sources which change in prevalence depending upon the time of the year.

Bird populations resident in and around the airport throughout the year include the chukar partridge, spur-winged plover, cattle egret, hooded crow, lark, pigeon and dove. During the summer months greater activity is evidenced by the stone curlew, swift and swallow. Resident raptors include the kestrel and barn owl. The winter is characterized by the appearance of ducks, coots, lapwings and a massive increase in various gulls, especially the black headed gull. Raptors seen near the airport during the winter include the black kite and buzzard who often hunt in the fields in and around the airport. During the spring and autumn the great migrations which pass over Israel proximate to the airport include storks, pelicans and various raptors. The end result of all this bird activity in and around Ben Gurion International Airport can be seen in the bird strike data which follow.

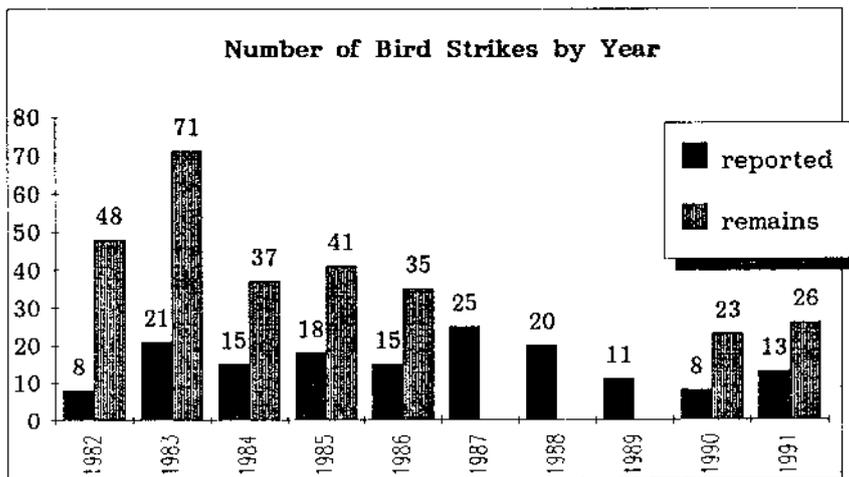
RESULTS

The results of the last five years have been added to the data presented at the Madrid BSCE meeting to show a decade of bird strikes at Ben-Gurion International Airport.

Figure 1 shows the number of bird strikes over the last ten years. During the last five years (1987-1991), 77 reported strikes occurred at Ben-Gurion International Airport, which incidentally is exactly the same number of strikes that had been reported in the previous five years (1982-1986). This in spite of the fact that the total number of strikes changes considerably from year to year. According to information on the number of civilian aircraft movements at the airport, the average number of strikes is estimated to be one per 2500

aircraft movements. The number of incidents in which bird remains were found during 1987-1989 were not included in this figure because not all of them were recorded. During all the years for which information has been collected, the number of cases in which bird remains had been found is much larger than the number of reported strikes.

Figure 1

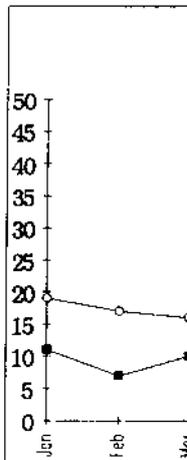


Seasonal changes in bird strikes

The changes in the number of bird strikes during the year for the last decade is shown in Figure 2.

The greatest number of bird strikes occur during the summer and early autumn. Smaller peaks of strikes occur during spring and October. The smaller peaks may be explained by the heavy migration during this period. However, the largest amount of strikes during the summer may be explained by the type of species that collide with airplanes and by their species specific behavior. Also the greater number of aircraft movements during this period is a probable factor.

Figure 2



The bird species

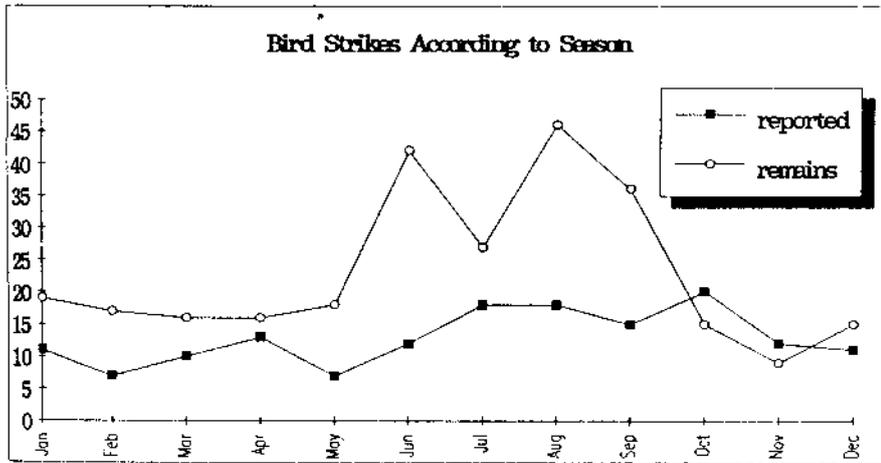
Although hundreds of bird species collide with aircraft each year, only a few species are responsible for most of the strikes. The most common bird species involved in bird strikes among the birds are:

Chukars, s...
kestrels are resi...
breed near the...
migrate in large r...
the large refuse...
Thousands of the...
employing the tec...
their number is s...
less than 7% of th...

During the...
collisions with air...
found on the air...
mainly active at...
attributed to its...
level.

remains
because
which
ch bird
reported

Figure 2



The bird species involved in collisions

Although hundreds of species of birds stay in Israel for varying periods throughout the year, only about 40 of them have been known to collide with aircraft and of those, only ten are involved in about 75% of the strikes. The pie chart in Figure 3 describes the distribution of bird strikes among these species.

Chukars, stone curlews, spur-winged plovers, barn owls, and kestrels are residents in Israel and the first three species tend to breed near the runways, or in the fields near them. Turtle doves migrate in large number during the autumn. Black-headed gulls stay by the large refuse dump near the airport throughout the winter. Thousands of them arrive at the dump early in the season, but by employing the techniques previously described in the winter operations, their number is significantly reduced. This may explain the fact that less than 7% of the strikes involve this species.

During the last decade, stone curlews were involved in 40 collisions with airplanes. However, only in one case were bird remains found on the aircraft, in spite of the fact that this species which is mainly active at night, is often found near the runways. This may be attributed to its behavior which tends to remain on or near ground level.

year for

ing the
during
e heavy
strikes
t collide
greater
actor.

Figure 3

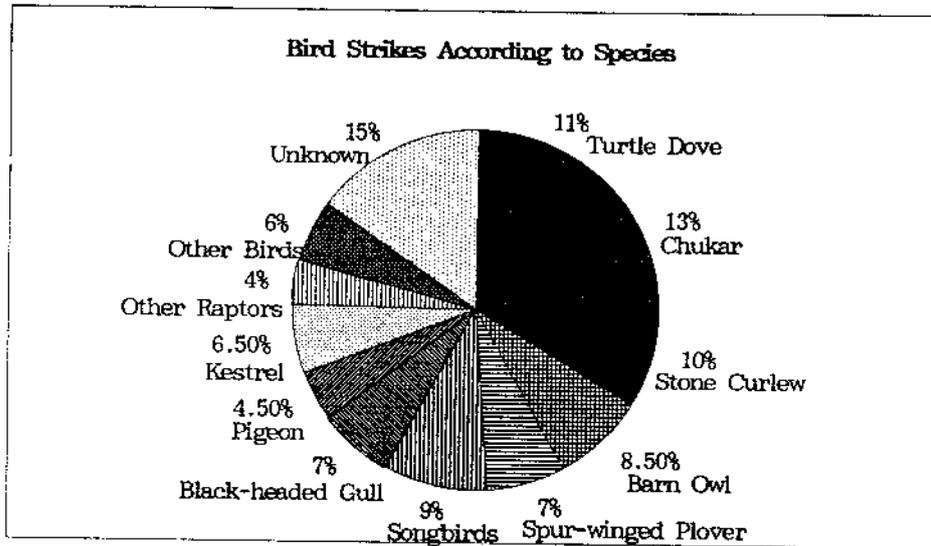


Figure 4



Altitude and flight stage during bird strikes

Figures 4 and 5 show the distribution of bird strikes according to altitude (in feet) and flight stage. These two variables are related. It is clear from the figures that most of the strikes occur up to 100 feet, during take-off and landing. This emphasizes the importance of the measures taken to control bird strikes on the ground near the runways.

The number of bird strikes during take-off is considerably larger than that during the landing roll. This may be explained by the longer "warning" time to the birds by the oncoming airplane (above them) during landing than during take-off. Decreased warning time may also be a factor contributing to the larger number of bird strikes on approach, when engine power along with its associated noise is greatly reduced, as compared to climbing when full power is used.

Distribution of bird strikes during the day

It is clear that the majority of them (about 75%) occurred during the daylight. This is not surprising as most of the bird and aircraft activity takes place during this period.

Figure 5



Figure 4

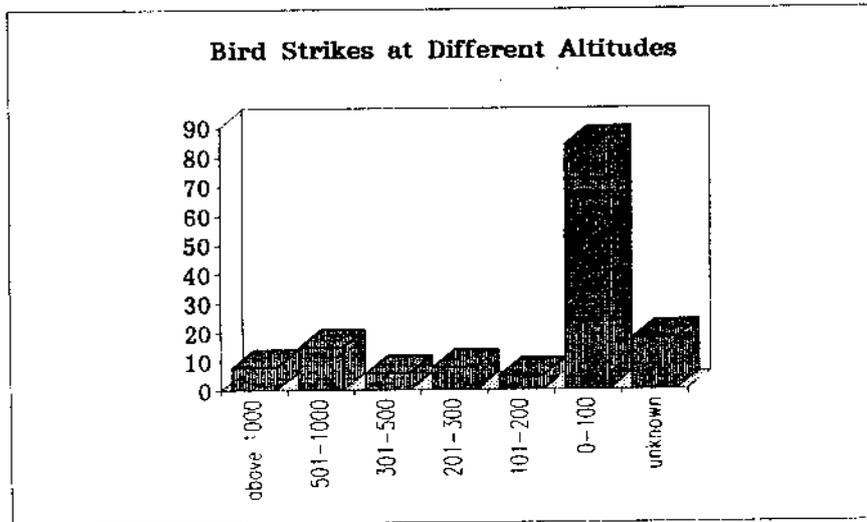
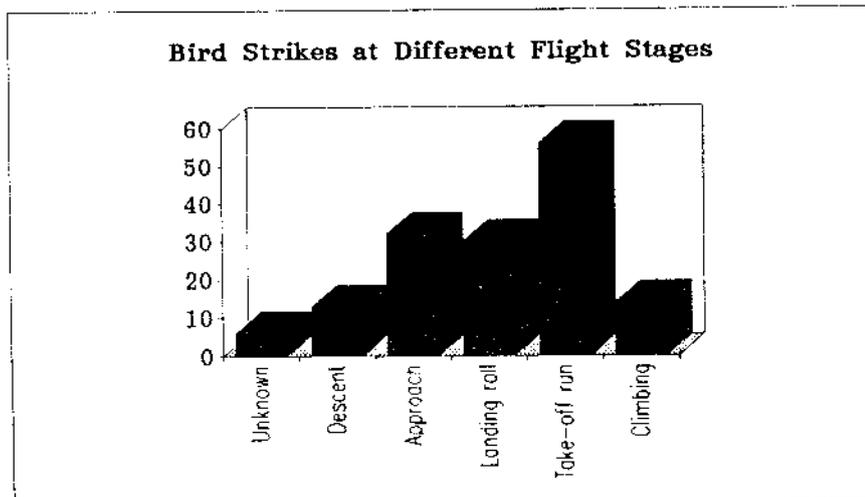


Figure 5



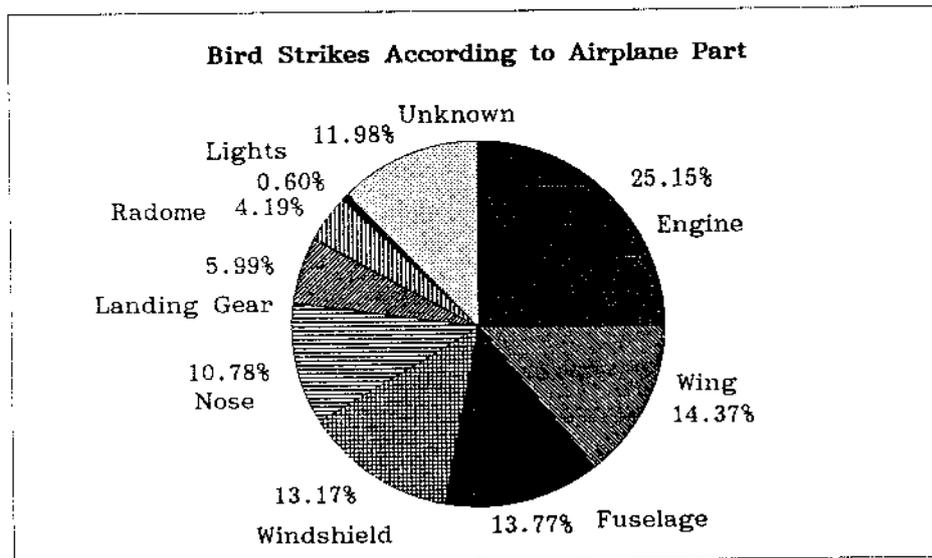
ling to
d. It
0 feet,
of the
ways.
larger
longer
them)
y also
es on
greatly

during
aircraft

The damage caused by bird strikes to airplanes

The distribution of strikes according to airplane parts is shown in Figure 6. As can be seen in the chart the engine has the greatest potential for bird strikes.

Figure 6



Conclusion

Bird strike data at Ben-Gurion International Airport over the last decade have been presented here. When compared with the data for a five-year period that had been presented at the Madrid meeting, it is apparent that the number of bird strikes and their distribution according to season, species, altitude, flight stage, time of the day, and aircraft part struck has not changed significantly during the last five years.

FOOD PREFERENCE OF AT M

Bird Strike Pr
Ben-Gurion

INTRODUCTION:

The Alectoris chuk (pigeon) are common including Air Force the country. The Is aircraft damage du

The chukar is a he escapes by running mainly during take breeding ability a Often they appear runways. For that multiple strikes.

Hundreds and thous space at least twi areas to the feedi almost everywhere. cause other damage

CROP ANALYSIS:

In order to reduce in the bases we ex thier ecological h factors is the food This subject was i stations and espec and pigeons.

Knowledge of their monisor the proble
* removal of prefe
* controlled agric
* creating attract
the birds.
* weed eliminatio