
SOARING BIRD MIGRATION SURVEY IN THE NORTHERN VALLEYS OF ISRAEL, AUTUMNS 1988 - 90

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translated from hebrew by Esther (Kuki) Lahman

Migrating soaring birds have been counted over central Israel during the autumns of 1977-1987, in the Kefar Kassem Survey. This was summarized in several publications in Hebrew by Ehud Dovrat (see Dovrat, in this volume). As a result of events in Samaria since the end of 1987, the survey was moved to a safer area - the Northern Valleys of Israel.

During 1988-1990 a wide variety of data on migration was gathered. This article is not meant to be a complete analysis of the data gathered. Its purpose is to give the reader an idea of some of the more important phenomena observed. Much of the material is still being analysed, and we hope to publish detailed summaries in the future.

Organization and Methods

The organization and methods of the Northern Valleys Survey were basically similar to the Kefar Kassem Survey (see Dovrat, in this volume). However, a number of logistic changes were made which influenced the methods used: firstly, the identity of the observers changed. The Kefar Kassem survey was held near the largest urban centre of Israel, and was manned by Israeli birdwatchers. Only a minority of these observers participated in the Northern Valleys survey and their place was taken largely by foreign volunteers. Dozens of volunteers, from 13 different countries, participated in the survey and did about half the work. The foreign birdwatchers were put up at the many kibbutzim - small communal settlements-spread across the Northern Valleys. This enabled uniform deployment of observation points across the country, as opposed to the Kefar Kassem survey, where stations were

more concentrated in the west.

The Northern Valleys Survey used the method of multiple observation points. In 1988 we tried to place the stations according to data gathered in Kefar Kassem. However, we soon found that the migration areas lay further to the east. As we broadened the observation net we discovered significant passage of birds in unexpected areas and at unexpected times. We learned that migration over the Northern Valleys differs from what we knew from Kefar Kassem and could not be predicted on the basis of existing data. As a result, the survey in 1988 had certain faults, and no significant information was gathered east of the 44th km from the Mediterranean. In following seasons we broadened the survey area while increasing the distance between stations. In autumn 1990 observation posts at the edges of the survey were placed at a minimal distance of 4 km from each other, while more central stations were placed at the distance of 2 km apart. Thus, despite the limited number of observers, we were able to cover most of the breadth of the country (between 12 km east of the sea and the Jordanian border, about 61 km east of the sea).

Many double countings of Honey Buzzards and Lesser Spotted Eagles occurred and we had to delete up to 25% of the numbers recorded in 1988 and 1989. As a result of the increased distance between observation points in 1990, the number of double counts decreased significantly.

As opposed to raptor counts, most of the White Stork and Pelican flocks were counted by more than one observation post. The numbers which appear in the tables were calculated after deletion of the double counts which constituted most of the numbers recorded.

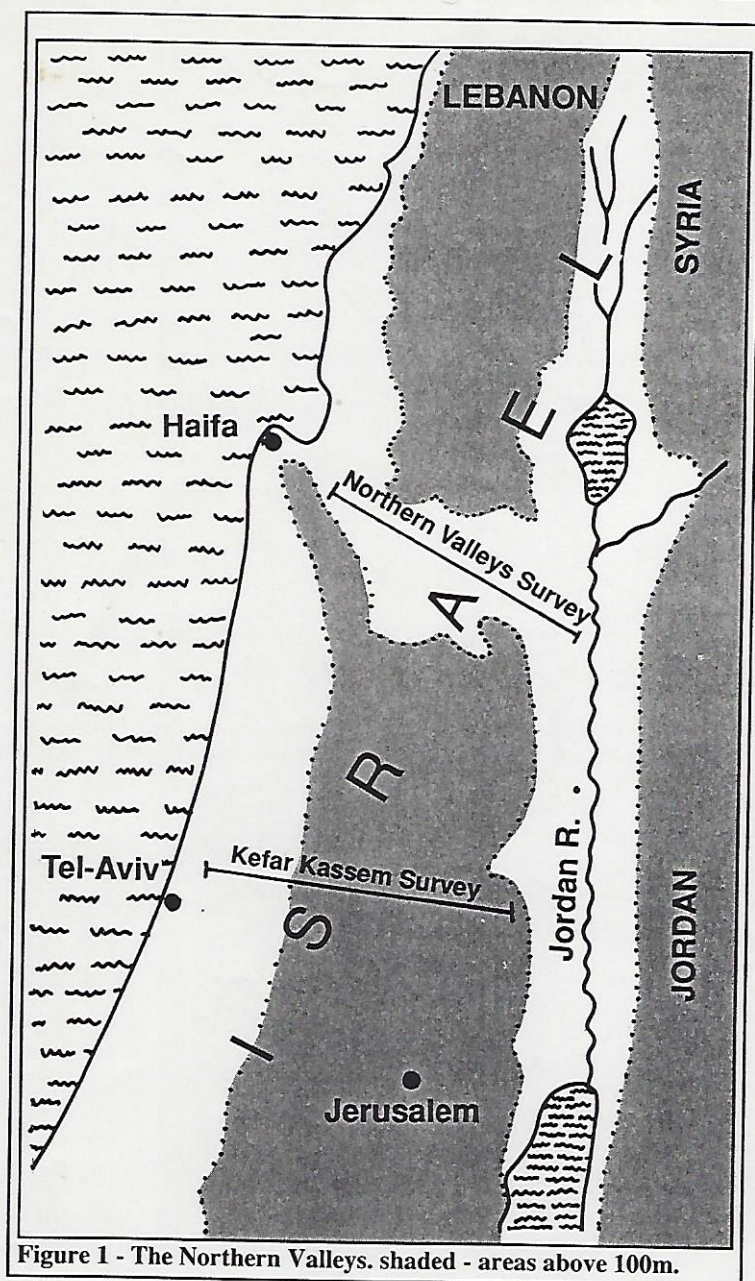


Figure 1 - The Northern Valleys. shaded - areas above 100m.

The valley area is located about 60 km north of the Kefar Kassem survey line. This is a very low area, surrounded by hills up to 500 m above sea-level to the north and south. The Jordanian mountains rise gradually to the east up to an altitude of over 800 m. The valleys to the west are at sea level, and descend to 235 m below sea level

at the most easterly observation point. Temperatures in the valleys are relatively high compared to Samaria - about 30° C average in August in the west and 35° C in the east. Temperature falls to about 20° C in October. During the survey season there is almost no rain. There is a regular daily wind regime - when the raptors take off there is no wind; at 09:00-10:00 a northwesterly wind begins, gaining strength to about 30 km/h at about 14:00. In the Kefar Kassem area the wind is a bit weaker and in a more westerly direction.

Results

The Migratory Flow along Israel- A Comparison between the Kefar Kassem Survey and the Northern Valleys Survey

The results of both surveys are basically similar. However, after three counting seasons in the north, several systematic differences have become obvious. This comparison has certain limitations: there are no significant data from the northern valleys before the autumn of 1988, or from Kefar Kassem after the autumn of 1987. Also, in both areas, the surveys were incomplete, especially in the east, and so there are some doubts as to the exactness of some of the migratory patterns we have defined.

It was believed that more birds fly over the Kefar Kassem area

than the Northern Valleys: birds entering Israel from northeast (Jordan), seen in the Northern Valleys, would be joined by others arriving from northwest (the Mediterranean) resulting in a higher count in the more southern area.

Observations from the Jordanian border area prove that soaring birds do indeed enter Israel

from the northeast: in the Northern Valleys Survey many White Storks and Honey Buzzards were observed entering Israel from the East. Additional observations between the valleys and up to 180 km to the south show storks entering Israel from the east. From these observations we would expect to find more storks the further south we go; however, the results of the surveys do not confirm this expectation: in the eastern part of the Northern Valleys more Honey Buzzards and many more storks were counted than in the eastern sectors of the Kefar Kassem survey. We believe the explanation for this apparent contradiction lies in the more extensive coverage of Eastern Israel in the Northern Valleys Survey. There is no doubt that a significant percentage of the White Stork population overflying the area enters Israel south of the Northern Valleys.

Our data on other species are very limited. The proportion of the Honey Buzzard population entering from Jordan is unknown. Even less is known on the migration of Lesser Spotted Eagles: we assume that the arrival of Lesser Spotted Eagles from Jordan is rare in both areas, but have almost no direct evidence to support the assumption. In short, less birds arriving from the East were seen in the Kefar Kassem survey, despite the favourable geographical location which enabled more extensive counting. The count of Steppe Buzzards exemplifies this situation well: Steppe Buzzards fly over Eastern Israel only, yet the numbers of this species recorded in the Northern Valleys are many times greater than in the Kefar Kassem survey.

Raptor migration surveys were always held at inland locations. At the Mediterranean coast only random observations were recorded. In these observations, raptors - mainly harriers and falcons - were seen migrating over the sea and entering Israel from the west. Since we lack regular observations from the coast, it is difficult to estimate the size of these populations. The Kefar Kassem survey extended closer to the sea than the Northern Valleys survey, but seasonal counts of harriers and falcons were similar in both surveys. This would mean that not many harriers and falcons entered Israel via the sea. Despite this, the number of harriers and falcons counted in both areas was relatively high at the westerly observation points. It is also reasonable to assume that part of the populations skip both areas and arrive overland south of Central Israel.

Other raptor species were not observed arriving from the sea, except in rare instances. Most observations were of Honey Buzzards and Black Kites, and it would seem that other raptor species, as well as storks and pelicans, do not migrate over the sea. Rare cases of large birds arriving from the sea are known. We assume that these are digressions from the regular migration route, possibly as a result of unusual weather conditions.

The Structure of Migratory Routes According to Distance from the Sea - A Comparison between the Kefar Kassem Survey and the Northern Valleys Survey

One of the fascinating discoveries of the Kefar Kassem surveys was the large concentration of raptors along a corridor several km wide: year after year one of the observation points counted more raptors, of almost all species, than any other. Migration over the Northern Valleys throws new light on this phenomenon. We discuss here only the migration of Honey Buzzards, but the principle is similar for Lesser Spotted Eagles, Levant Sparrowhawks and some other raptor species. The main difference between species is the location of their migratory routes relative to the sea. The daily migration axis is closely related to the roosting zones. Landing for roosting was observed mainly in dense thickets of large trees, but Honey Buzzards were seen landing in fruit tree groves and sparse woods as well. In Kefar Kassem we found Honey Buzzard roosts east of 48 km from the sea. In the Northern Valleys they were found roosting 38 km from the sea and further east. This broadening of the roosting area leads to another significant difference: in the Kefar Kassem survey most of the passage was recorded west of the roosting sites, with a maximum 32 km west of known roosting sites. In the Northern Valleys on the other hand, 66% of the Honey Buzzards flew over areas which were also used as massive communal roosts.

Differences between the surveys were found in the migratory areas as well. Three new phenomena were observed in the Northern Valleys survey:

- 1) All the species passed over in relatively uniform density along a broad front.
- 2) The migration axis is easterly relative to the one defined in the Samaria survey.
- 3) The migration axis drifts about 20 km to the

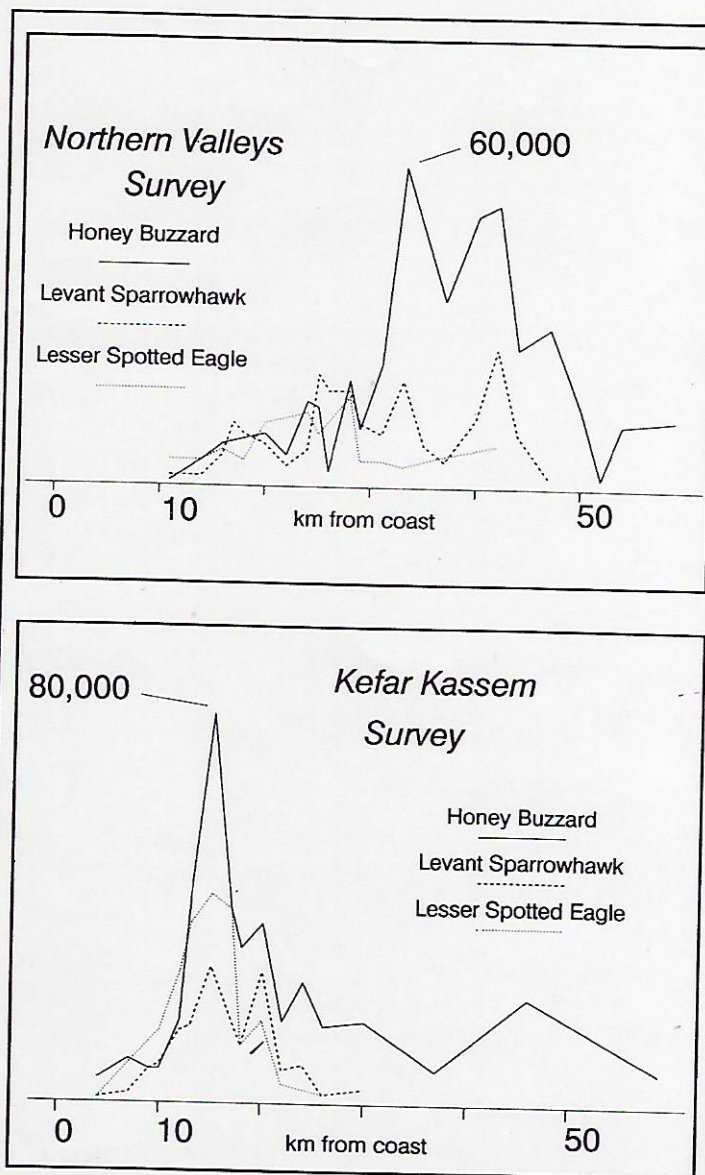


Figure 2 - Distribution of Honey Buzzards; Levant Sparrowhawks and Lesser-spotted Eagles in relation to the distance from the sea (The numbers are averages of all observation seasons in Kefar Kassem and the Northern Valleys. Note: the vertical scale varies in these graphs, maintaining a ratio of 1: 2: 4 between Honey Buzzard: L.S. Eagle: L. Sparrowhawk). Notice three points: 1. The Kefar Kassem curves are steeper than the ones from the Northern Valleys. 2. The curve maxima coincide in Kefar Kassem, but are separate in the Northern Valleys. 3. The complete curves of all three species coincide more in Kefar Kassem than in the Northern Valleys

west during the season.

In Kefar Kassem the migration route remains relatively narrow during all hours of the day. In the Northern Valleys, more scattered migration could be observed: Honey Buzzards appeared at all hours of the day over stations far apart. Scattered migration during the morning hours suggests that the Honey Buzzards arrived in the survey area from disperse roosting sites. It is possible that the concentration of the morning migratory axis in Kefar Kassem is influenced by the lack of forests in the area as compared to the Northern Valleys.

The location of the migration area in the Northern Valleys relative to the sea, is more easterly than the corresponding area in Kefar Kassem. The main flight direction in both surveys is south-southwest (in other words parallel to the coastline). Nevertheless, the main passage of raptors in Kefar Kassem is between 11-25 km east of the sea, compared to 20-51 km from the sea in the Northern Valleys. The reasons for this difference are not clear.

During the season, the migration axis changed location more in the Northern Valleys, than in Kefar Kassem. Fig. 2 shows that in Kefar Kassem the maximum numbers of the three species pass over the exact same section although there is not complete coincidence between the migration areas of the main raptor species. In the Northern Valleys passage of the different species was spread out over a larger area and maximum

numbers were found in the centre of each area, far apart from each other. The different migration areas of each of the common migrators, coupled with their different periods of passage, caused the migration axis to move during the season. Most of the passage occurred as follows:
15.8-15.9 - **White Stork** - 48-62 km from the sea (and no doubt east of there).

28.8-19.9 - **Honey Buzzard** - 17-62 km from the sea (and possibly further east? ; maximum site: 32-51 km from the sea).

14.9-28.9 - **Levant Sparrowhawk** - 16-46 km from the sea

23.9-11.10 - **Lesser Spotted Eagle** - 12-44 km from the sea (maximum site: 14-31 km from the sea).

This movement of the migration axis to the west seems to be the rule. The Steppe Buzzard, however, digresses from this rule and migrates from the end of September till approximately the end of October, 43 km from the sea and further east (probably also beyond the Jordanian border). The Northern Valleys Survey provided only a partial picture of this species' migration, and it seems that a much larger population than the thousands counted so far passes over the eastern part of Israel.

The migration of the White Pelican also does not fit the rule described, but since this species circumvents topographical barriers and migrates from one water reservoir to another, it is difficult to define its migration axis.

Daily Movements of the Migration Axis in the Northern Valleys

During the Kefar Kassem survey a daily pattern of shifting of the migration axis was discovered. Most of the information on this movement was collected on Honey Buzzards, but the principle is similar for most of the other species (with differences in the distance from the sea). According to Dovrat (1982) the axis shifts gradually throughout the day; this movement can be divided roughly into several areas (see fig.3):

1. The roosting area - short passage during take-

off and landing.

2. The skipped area - the area where very few Honey Buzzards are seen after take-off and before landing.

3. The morning and afternoon passage area.

4. A narrow area of constant passage from morning to afternoon.

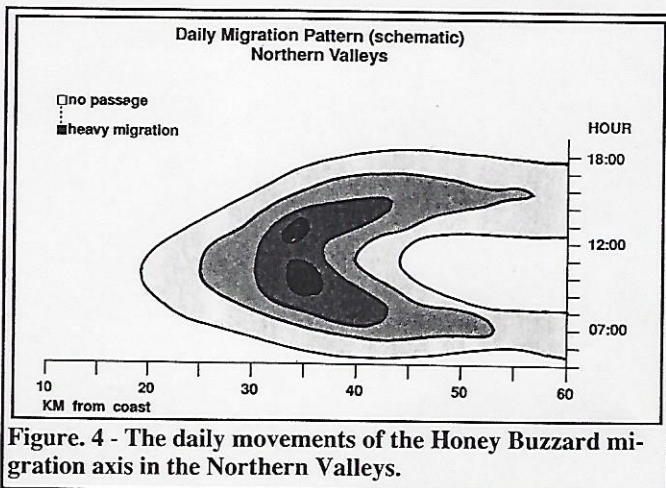


Figure. 4 - The daily movements of the Honey Buzzard migration axis in the Northern Valleys.

5. The area of noon passage. In the Northern Valleys we also found daily movement of the migration axis as seen in figure 4.

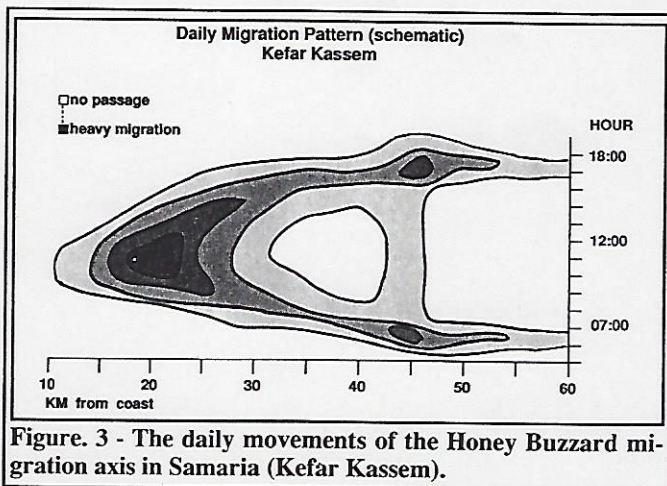


Figure. 3 - The daily movements of the Honey Buzzard migration axis in Samaria (Kefar Kassem).

Despite the basic similarity between the daily movements of the migration axis in Kefar Kassem and the Northern Valleys, there are several differences.

1. "Morning and afternoon passage" and even

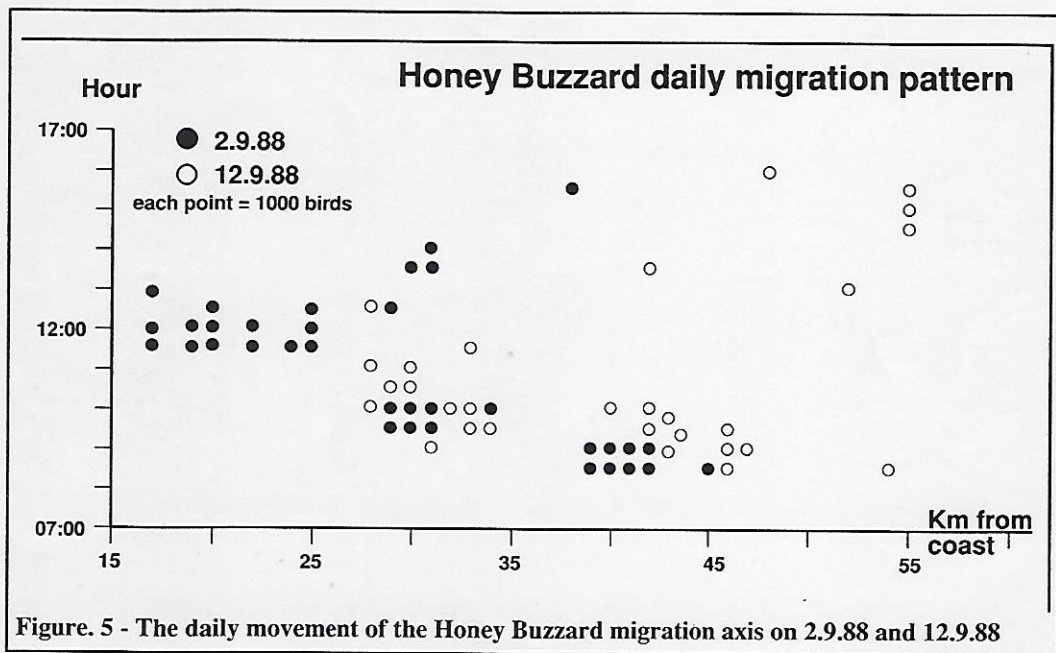


Figure. 5 - The daily movement of the Honey Buzzard migration axis on 2.9.88 and 12.9.88

"constant passage" appear in roosting areas in the Northern Valleys.

2. The "constant passage area" is wider in the Northern Valleys, compared to Kefar Kassem.

3. In the northern valleys, there is no area that the axis "skips". This is explained by the overlap which exists between the roosting area and the active migration area, as opposed to complete separation between these areas in Kefar Kassem. When the survey started operating in the Northern Valleys, it seemed that migration in this area was very irregular. In addition to the general dispersion of numbers described in the former section, it seemed that migration took place during all hours of the day over a very broad area. After three survey seasons, it became obvious that Honey Buzzards will appear for many hours of the day over an extensive area. Nevertheless, the axis movement within the limits of each separate day usually occurred according to the rules we knew from Kefar Kassem: the width of the "constant passage area" never surpassed several km during a single day, and the width of the "noon passage area" reached only about 10 km. The seasonal range of these areas exceeded the daily width by more than 10 km. A similar pattern was seen in the Lesser Spotted Eagle within a smaller range.

The study of the daily movements of the migra-

tion axis uncovered a seasonal phenomenon which has so far been identified only in Honey Buzzards: a general drift of the migration axis westwards during the season. In other words, early migration waves passed over more to the east than later ones. In the example in figure 5 we can see the curve that expresses numbers according to hours during 2.9.88 "displaced" as a whole about 10 km west on 12.9.88. At this stage of the study, it is still unclear whether this displacement of the curve occurs regularly.

The daily migration pattern can change, not only with distance from the sea, but also with length of day. We expected to find a shorter daily migration period as a result of shorter day length towards the end of the season. This is partly true for Honey Buzzard and Lesser Spotted Eagle: in mid-October, the Lesser Spotted Eagles fly 2-3 hours less per day compared with the daily migration of Honey Buzzards in early September. There could be other explanations for this difference, such as different soaring conditions.

Variability in Migration in the Northern Valleys

In the former sections we reviewed the characteristics of raptor migration in the Northern Valleys, trying to find regular patterns. We mentioned that in the Northern Valleys many

deviations from such patterns were found. Similar deviations appeared in Kefar Kassem as well, but usually on a smaller scale.

The discussion of irregular data focuses attention

had ever been observed in Kefar Kassem or in the Northern Valleys. 74,000 Honey Buzzards were counted that day, and presumably, these were only half the number that passed over that

Table 1: Northern Valleys Survey total counts by species 1988-90

Species	1988	1989	1990	Fluctuation %
Honey Buzzard	374000	300000	437000	31
Black Kite	1063	1131	1694	37
Short-toed Eagle	3008	2492	3806	35
Sparrowhawk	620	1150	821	46
Levant Sparrowhawk	40560	41237	41722	3
Booted Eagle	622	842	800	26
Lesser Spotted Eagle	74198	56533	83695	32
Steppe Eagle	224	156	214	27
Egyptian Vulture	124	284	161	56
Marsh Harrier	751	1534	1472	51
Pallid/Monatgu's Harrier	274	810	512	66
Red-footed Falcon	2836	4942	4194	43
White Pelican	34275	18839	36622	49

Fluctuation = (highest - lowest count)x100 / highest count

on the methods used in the surveys. The number of White and Black Storks and Steppe Buzzards "rose" by hundreds of percents between 1988 and 1990. This increase is, however, a result mainly of the extension of the survey eastward, and we have no information on the real difference in numbers.

The extension of the survey eastward also influenced the Honey Buzzard count, although the situation here is more complex:

The maximum count in 1990 - 437,000 - testifies to the improvement in the survey organization. In 1989 only 300,000 were counted, and we have no doubt that in that season less Honey Buzzards passed over the survey area than in 1990. In 1988 374,000 Honey Buzzards were counted, but in our opinion more flew over during this season than in 1990: the survey was held in an organized manner only up to the 43rd km from the sea and the extreme eastern stations recorded 26% of all Honey Buzzards. Furthermore: on the maximum migration day - 11.9.88, the Honey Buzzards passed over at greater altitudes than

day in the survey area.

From our data, we will try to estimate roughly the number of Honey Buzzards that flew over the Northern Valleys in the extreme seasons: about 400,000 in 1989 and about 700,000 in 1988. Even if these estimates are far from exact, there is no doubt that fluctuations of tens of percents exist from season to season. As we can see in Table 1, this fluctuation is within the range of fluctuation of other species' counts.

Significant fluctuations were also observed during these three years in the daily numbers of each of the dominant species. Honey Buzzards migrate in very concentrated waves, with extreme differences between adjacent days. We do not know the connection between local weather conditions and these migratory waves, with the exception of irregular occurrences of strong easterly winds or rain. Nevertheless, we should mention that the influence of weather on migration in Israel has not yet been thoroughly studied.

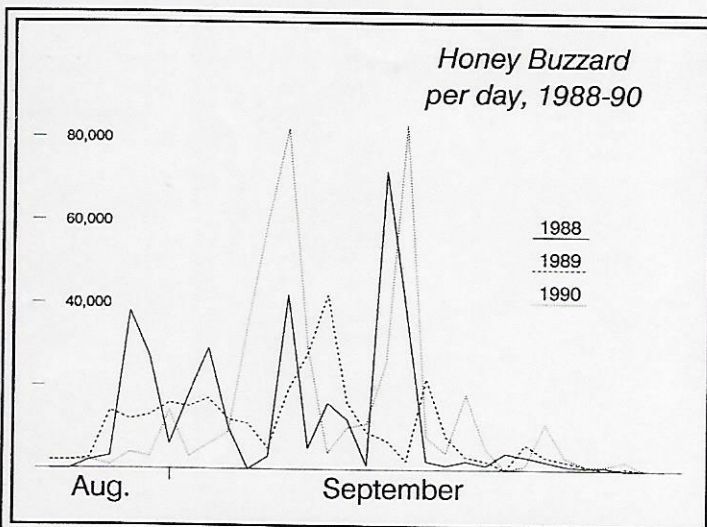


Figure. 6 - Daily numbers of migrant Honey Buzzards in the Northern Valleys

Comparison of daily numbers of Honey Buzzard migration, shows similarities between migration waves during the three years of the survey. Migration starts with a sudden wave between 28.8 to 3.9. The next wave is from 4.9 to 9.9, and the last wave from 11.9-12.9. Migration gradually stops after the last wave. In 1988 these waves were seen most clearly, and the distribution of numbers according to days during this season is completely non-random. There is a possibility that the relatively large number of Honey Buzzards that passed over in 1988 was related to the appearance of all three waves in entirety. In Kefar Kassem similar waves to those in the Northern Valleys were observed, but with differences in size and times of appearance. A comparison between 10 survey seasons obviates the arbitrariness of the appearance of the waves, no less than it teaches about the division of the season into regular migratory waves.

Other species of raptors migrate in waves as well, but the distribution of daily numbers is more even, and the peaks arrive more gradually. Migration waves of the White Stork, on the other

hand, are even more concentrated than those of the Honey Buzzard. During a single day, 2.9.90, about 26% of all the White Storks counted during the season were recorded. A similar daily concentration appears rarely in raptors, but never such a concentration of flocks. 32,000 storks passed over within a mere 30 minutes, over one observation point!

Irregularities in the choice of passage area were observed in raptors also. During the most massive migration day ever observed in the Northern Valleys, 11.9.88, massive Honey Buzzard migration was recorded from 25 km from the sea and eastward, to the boundary of the survey area. This massive passage occurred simultaneously in different locations and at noon extended over at least 23 km. A completely different pattern was observed during another day with very massive migration, 12.9.90. About 54% of all Honey Buzzards counted that day,

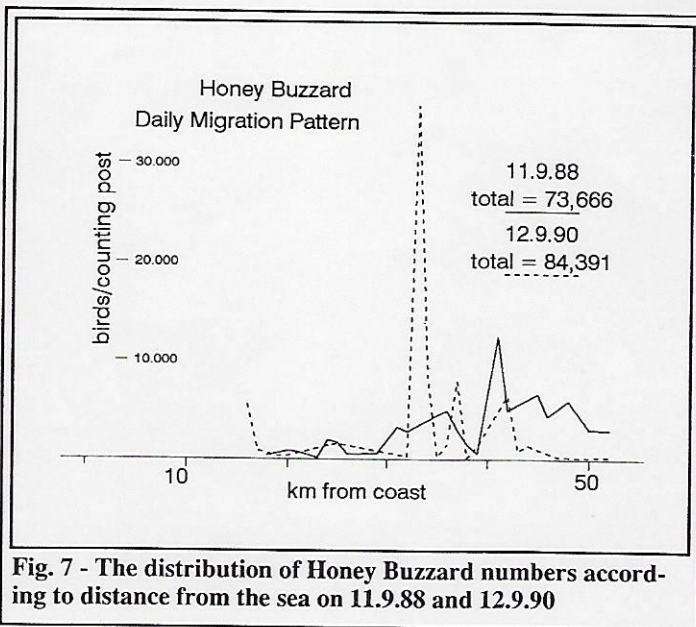


Fig. 7 - The distribution of Honey Buzzard numbers according to distance from the sea on 11.9.88 and 12.9.90

passed over in a corridor a mere 2 km wide, during more than 3 hours.

Different passage areas on different days were observed in other species as well, however, the smaller the total number, the greater the importance of single flocks, making it difficult to reach conclusions about single days.

We conclude this section with a focus on the passage hours of Honey Buzzards. As mentioned in the previous section, migration occurs throughout the day - as seen in Keffar Kassem and also in the Northern Valleys, during the first 2 years. In 1990 Honey Buzzard migration deviated from this rule, and about 80% of the Honey Buzzards passed over during 08:00- 12:00 - a sort of "morning passage" which extended into the middle of the day. Honey Buzzards passed over the entire maximum passage area- 30-48 km from the sea - during these hours. In days of strong migration the passage was spread up to the 17th km from the sea, and the morning drift of the axis to the west was barely felt. Only in the far east - 61 km from the sea, was migration recorded mainly in the afternoon. Data from the east are not sufficient to determine if this is a regular

Honey Buzzards that were seen in previous seasons roosted up to 400 km north of it. (Calculations are according to average migratory speed of 40 km/h.) This daily passage raises some questions. If the migration waves seen each morning in 1990 contained all the Honey Buzzards which passed over the area, then an area 240 km long remained empty of Honey Buzzards between waves. Regular gaps such as these between migration waves do not seem feasible. It would seem more logical to assume that the distribution of Honey Buzzards north of the survey area was continuous, but for some reason we were unable to see the flocks arriving from northerly roosting sites. Radar data from western Israel prove that not many Honey Buzzards passed over west of the survey area or at altitudes beyond our scope. As a result, we conclude that if the "missing Honey Buzzards" actually exist, they circumvented the survey area daily to the east. However, we have no data on irregular easterly passage in 1990.

During the rest of the season Lesser Spotted Eagles were seen migrating during the hours known from previous years. Daily movements of the axis were clearly visible, and many eagles were seen between 11:00-13:00 in typical "noon passage". In the afternoon no massive migration was observed, but in the morning many eagles were seen taking off. These eagles probably roosted in the forests extending north of the survey area (about 23-30 km from the sea).

It is worth noting that White Stork flocks, as opposed to raptors, appeared in the Jordan Valley at irregular hours, from early noon on. It would seem that the stork migration route is influenced by the presence of fish ponds, and

many flocks landed in ponds several hours after leaving their roosts.

In this section we described a variety of phenomena for which we have as yet no explanation. We have looked for solutions so far with methods adapted to the unique character of the migration survey. The survey is based largely on the

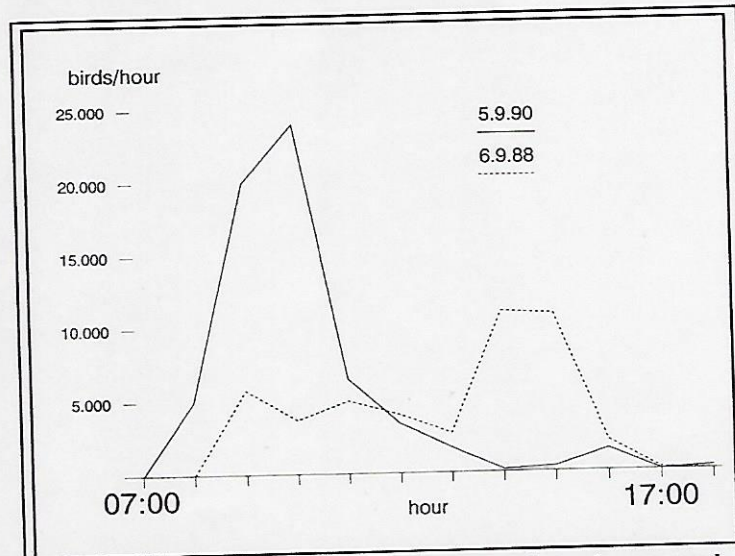


Figure 8 - The distribution of Honey Buzzard numbers according to the hours of the day on 6.9.88 and 5.9.90

drift of the axis to the west or just isolated flocks.

Migration hours of Honey Buzzards in 1990 repeated themselves each morning, till it seemed that we had a new set of "migration rules". These Honey Buzzards roosted along an area extending 160 km north of the survey area, whereas the

work of volunteers, and its natural development is in breadth and not depth. We have succeeded in the field of population counts and mapping of migration routes and their times. This mapping is still incomplete, and we also feel the lack of academic research on other aspects of migration. There are serious financial limitations for research of this sort in Israel, and it is no less hard to find the people interested in specialising in this field. For these reasons we have turned to foreign birdwatchers during the last years to come and participate in migration study. Many have already joined the surveys we organize and we will be more than happy to accept new participants.

Remarks On the Summary Table of the Survey (Table 2)

Due to lack of space, the daily figures by species for autumns 1988, '89 & '90 had to be omitted. Interested parties may receive a copy from: A.Tsovel, IRIC, Har Gilo, D.N. Zfon Yehuda, 90907 Israel.

Some of the numbers appearing in the summary table are not accurate. The origin of these inaccuracies is with birds wandering around the area, in addition to migrating flocks.

Wandering is negligible in **Honey Buzzards**, **Lesser Spotted Eagles** and **Levant Sparrowhawks** and also does not influence the count of species seen hunting daily in the area: **Sparrowhawk**, **Booted Eagle** and the three **harrier** species.

In the following species these inaccuracies are more signifi-

cant:

The **Short-toed Eagle** is a common summer visitor, and we are uncertain when it starts migrating.

Table 2: Total Autumn Counts by species, Northern Valleys 1988, 89 & 90.

Species	1988	1989	1990
Osprey	52	66	78
Short-toed Eagle	3008	2492	3819
Lesser Spotted Eagle	74198	56533	83701
Steppe Eagle	224	156	214
Imperial Eagle	9	18	3
Spotted Eagle	42	50	30
Booted Eagle	622	842	811
Bonelli's Eagle	2		8
Long-legged Buzzard	43	62	25
Steppe Buzzard	934	2166	1952
Buzzard	5	6	3
Honey Buzzard	347397	300972	437432
Black Kite	1063	1131	1734
Egyptian Vulture	124	284	161
Griffon	76	39	62
Marsh Harrier	751	1534	1516
Hen Harrier	4	1	9
Montagu's Harrier	47	103	55
Pallid Harrier	12	46	26
Mont./Pall. Harrier	215	661	446
Goshawk	6	7	3
Levant Sparrowhawk	40560	41237	41722
Sparrowhawk	620	1150	868
Peregrine	15	12	17
Eleonora's Falcon	17	8	15
Red-footed Falcon	2836	4942	4200
Hobby		15	19
Kestrel sp.		52	200
Others (unident,rare,etc.)	1576	2520	1488
Total Raptors	474458	417075	580632
White Pelican	34275	18839	43425
White Stork	73153	122851	188721
Black Stork	828	3524	2936
Bee-eater		6344	2873
Pratincole sp.		1934	847

Other raptor species recorded (counts): White-tailed Eagle (1), Golden Eagle (1,4), Red Kite (1), Black Vulture (1), Lanner (1,1), Saker (1), Lanner/Saker (2), Merlin (2).

The **Black Kite** and both **stork** species are common winter visitors, and we are uncertain when they stop migrating.

Errors of tens of percents are possible in the counts of common residents - the **Long-legged Buzzard** and the **Kestrel**, and in the count of another rarer resident - the **Griffon Vulture**.

Errors of this magnitude are also possible in the counts of another, uncommon passage migrant and winter visitor - the **Osprey**. A significant percentage of these **Ospreys** hunt at fish ponds during the survey season.

For some species we are completely uncertain whether the individuals recorded are not locals which were flying in the migration direction:

The **Hobby** which spends the summer in Israel is the commonest of these species.

The **Buzzard** is a common winter visitor, but only few were seen during the survey, usually while hunting.

The **Golden Eagle** and **Bonelli's Eagle** are rare residents, and their migration is very doubtful. Nevertheless, in the autumn of 1990, many more **Bonelli's Eagles** were seen hunting in the area, than are known to be resident there.

The **White Pelican** is the only massive migrant whose count is very inaccurate. The inaccuracies result from this species special habit of wandering in different directions during its entire migration season, as well as the fact that its dense flocks can be seen for great distances - sometimes more than 10 km - making double counts difficult to eliminate accurately.

Acknowledgements

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We thank the many birdwatchers (about 150!), whose invaluable help enabled this survey. Due to lack of space, we regret that it is not possible to mention them all.

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Finally, a warm thank to Ehud Dovrat who assisted in this work and gave many useful comments, and especially for his work in Kefar Kassem which is the base for the present survey.

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