

# ISRAEL: AN INTERNATIONAL AXIS OF RAPTOR MIGRATION

Y. LESHEM

*Israel Raptor Information Centre, Har Gilo Field Study Centre, Doar na Harei,  
Jerusalem 91076, Israel*

## ABSTRACT

Only in the last decade has a preliminary picture of the raptor migration routes over Israel and Sinai begun to emerge. Data collected during autumn and spring migrations at several key points show that two central migration routes pass over Israel and Sinai.

The southern route, over Eilat, is used in spring mainly by Honey Buzzards, Steppe Eagles and Black Kites. In autumn, however, only Steppe Eagles pass over Eilat in large numbers, the other species appearing in small numbers. On the other hand, during autumn migration over Kafer Kassem Honey Buzzards, Lesser Spotted Eagles and Short-toed Eagles are especially numerous.

It appears from the data that Steppe Eagles which pass over Eilat continue to Suez, whilst the autumn migration of Steppe Buzzards and Black Kites lies east of Israel, since these species hardly appear during autumn migration in Israel.

## INTRODUCTION

As long as 3000 years ago, Jewish sages noticed the miraculous phenomenon of bird migration over the Holy Land. Only in the last decade, however, has the full scope of the raptor passage become clear. The aim of this paper is to summarize some recent findings.

The first pioneering work on the subject was by Safriel (1968) in Eilat, but the flight routes were then not completely clear and certain species were incorrectly identified. The major impetus towards further study was given by a group of Danish ornithologists who observed migration mainly in Eilat between 1969 and 1980 (Christensen *et al.* 1981). In the spring of 1977, between 20 February and 17 May, they counted 763,737 raptors in the Eilat mountain area, and estimated the total numbers passing to be much greater. This is the largest raptor count made anywhere during a single migration season. Another significant contribution was the work of Ehud Dovrat, who began in autumn 1977 to observe raptor migration on the western slopes of Samaria, near Kafer Kassem, about 20km east of Tel-Aviv. Only 2200 raptors were counted in the first year. Then, with the aid of the Israel Raptor Information Centre of the Society for the Protection of Nature in Israel, many dozens of volunteers worked simultaneously at several observation points. Thus, in autumn 1981, 149,331 raptors were counted between 30 August and 14 October (Dovrat 1982). In autumn 1982, with further increase in the scope

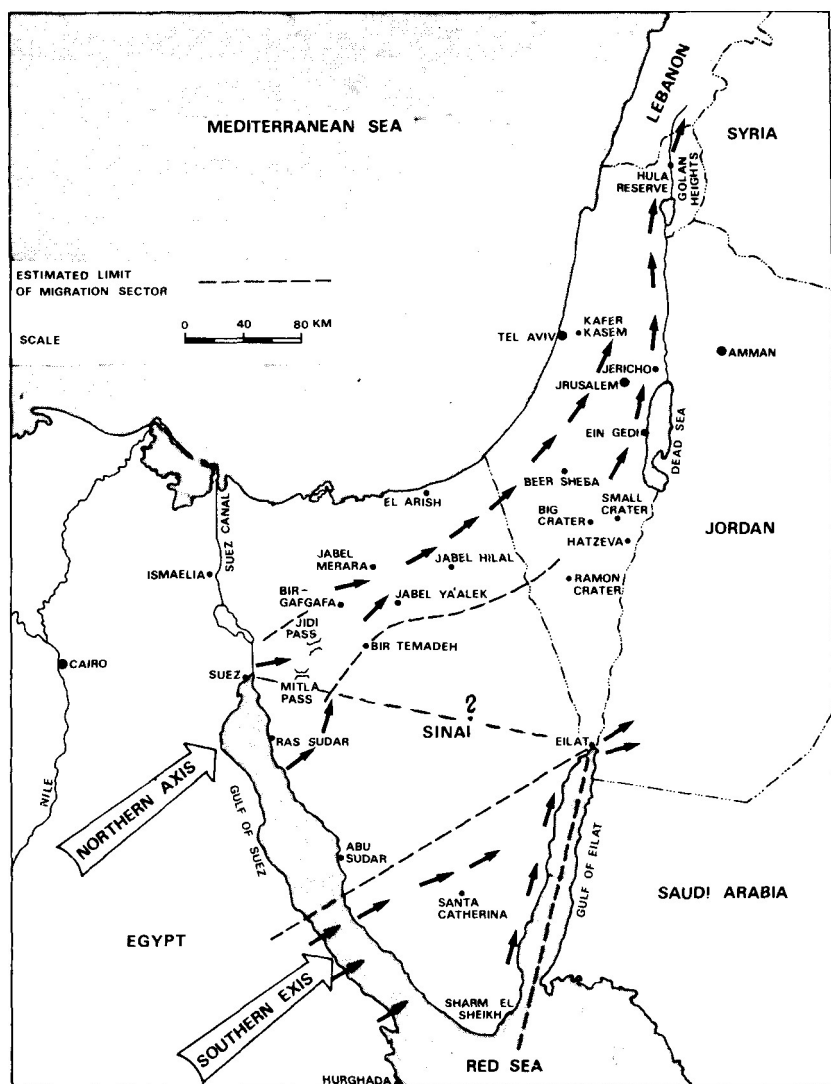


Figure 1: Spring migration routes in Israel and Sinai.

of the survey and the number of observers, 445,263 raptors were observed between 30 August and 14 October (Horin & Dovrat 1983).

Such large numbers passing over Israel during spring and autumn seem to be due to the following combination of factors:

1. Israel is located at the junction of three continents: Africa, Asia and Europe. The Mediterranean Sea constitutes a formidable barrier to the migration of most raptors. Large sectors of the populations of north, central and eastern Europe therefore apparently make their way through Lebanon and Israel, as the shortest and most economical way to Africa and back to Europe.

2. The Syrian–African Rift runs the full length of Israel. The Rift's geomorphological structure, with its cliffs and other sudden changes in elevation (hundreds of metres in some areas), create ideal conditions for air currents, utilized by raptors for soaring and gliding.
3. Israel's central mountain ridge stretches almost parallel to the Mediterranean coast and fairly close to it; this provides further good conditions for migrating raptors.

## MIGRATION ROUTES

Additional surveys were made in Israel and Sinai during the last decade. Observations in Suez in spring and autumn were made by Baha (1981), Baha & Bruun (1981), Bruun (pers. comm. 1982) and in autumn by Bijlsma (1982). In Eilat observations were made in autumn by Shirihi (1981) and in spring by Swanquist (pers. comm.). In Rosh Pinna, north of the Sea of Galilee, observations were made in autumn 1982 by Kadmon (pers. comm.). In Beit Shemesh, west of Jerusalem, observations were made in spring by Hadad (1981) and in Ein-Gedi, on the Dead Sea shore, by Davidowitz (Davidowitz & Leshem 1981). A comparison of the data collected shows that two central axes of migration pass over Israel and Sinai, in both autumn and spring (*Figure 1*). The species composition of migrants seen on the two axes differs appreciably. This can be illustrated by data obtained on the spring migration at Eilat in 1977 (*Table 1*) (Christensen *et al.* 1981) and those obtained for the autumn migration at Kafer Kassem in 1981 and 1982 (*Table 2*) (Dovrat 1982; Horin & Dovrat 1983). It should be emphasized that there are still gaps in observations along the migration routes, and more research is still needed to complete the picture.

The Southern Axis (*Figure 1*), apparently serves as a crossing route over the southern, narrower part of the Gulf of Suez, in a wide segment ranging from Ras Muhammad in the southeast and south of Abu Rodeis in the northwest. The raptors seem to utilize the air that rises along the high mountain ranges of southern Sinai, and advance northeastward until they reach the Eilat mountains. From Eilat they continue northeastward into Jordan, on a route leading them eastward to the Black Sea, through the Caucasus to the USSR.

*Table 1:* Numbers of raptors counted on migration in the Eilat mountain area, spring 1977 (Christensen *et al.* 1981).

<i>Pernis apivorus</i>	225,952
<i>Milvus migrans</i>	26,770
<i>Neophron percnopterus</i>	802
<i>Circus gallicus</i>	220
<i>Circus aeruginosus</i>	125
<i>Accipiter nisus</i>	155
<i>Accipiter brevipes</i>	5,958
<i>Accipiter</i> spp.	1,360
<i>Buteo buteo</i>	315,767
<i>Buteo/Pernis/Milvus</i>	149,264
<i>Aquila nipalensis</i>	19,288
<i>Aquila heliaca</i>	95
<i>Aquila</i> spp.	9,083
<i>Hieraetus pennatus</i>	175
<i>Pandion haliaetus</i>	122
<i>Falconiformes</i> spp.	8,601
Total	763,737

Table 2: Numbers of raptors counted on migration in Kafer Kassem in autumn 1981 & 1982 (Dovrat, 1982).

Species	1981	1982
<i>Circetus gallicus</i>	3,744	7,135
<i>Pandion haliaetus</i>	31	48
<i>Haliaeetus albicilla</i>	1	1
<i>Aquila chrysaetos</i>	2	2
<i>Aquila pomarina</i>	40,932	89,259
<i>Aquila nipalensis</i>	438	296
<i>Aquila clanga</i>	15	33
<i>Aquila heliaca</i>	22	24
<i>Hieraetus pennatus</i>	743	1,176
<i>Buteo rufinus</i>	19	18
<i>Buteo buteo vulpinus</i>	119	77
<i>Buteo b. buteo</i>	11	16
<i>Pernis apivorus</i>	82,425	319,909
<i>Milvus migrans</i>	430	313
<i>Neophron percnopterus</i>	223	301
<i>Gyps fulvus</i>	20	16
<i>Circus aeruginosus</i>	249	398
<i>Circus macrourus</i>	9	20
<i>Circus pygargus</i>	15	12
<i>Circus pyg. /mac.</i>	206	340
<i>Circus cyaneus</i>	7	7
Large raptor—unidentified	2,088	1,984
<i>Accipiter gentilis</i>	2	—
<i>Accipiter brevipes</i>	16,479	21,983
<i>Accipiter nisus</i>	219	384
<i>Accipiter</i> spp.	147	107
<i>Falco peregrinus</i>	7	15
<i>Falco eleonorae</i>	11	44
<i>Falco subbuteo</i>	22	27
<i>Falco vespertinus</i>	228	626
<i>Falco naum. /tinnun.</i>	141	168
<i>Falco</i> spp.	326	794
Total	149,331	445,263

The Northern Axis (Figure 1) leads into the northern edge of the Gulf of Suez. Observations made at the foot of Jebel 'Ataqa' at the port of 'Adabiyeh' in the city of Suez and at Port Tawafiq revealed migrating raptors approaching in numbers those counted at Kafer Kassem. They arrive from the southeast, along the coastal mountains and turn northeast and east over the city of Suez.

Data in central and southern Sinai are too scanty to draw clear-cut conclusions. O. Shimoni (pers. comm.) observed raptor migration in Bir Gafgafa in 1975–77. Here raptors were seen coming from the Jidi Pass area, Lesser Spotted Eagles (*Aquila pomarina*) continued to the Jebel Ya'alek region, and Buzzards (*Buteo buteo*) turned somewhat farther north, towards Jebel Merara (Figure 1).

Another, intermediate axis seems to connect the northern part of the Gulf of Eilat with the northern part of the Gulf of Suez. It is apparently used by Steppe Buzzards (*Buteo buteo vulpinus*), Steppe Eagles (*Aquila nipalensis*), and other species. The details of this route are as yet unknown, but its existence is implied in data from Suez and Eilat.

Groups of migrating raptors were seen in chance observations over the western Negev, Sdeh Boqer, the Large Crater, Ramon Crater and Beersheba, and the cliffs of a-Rif a-Naqa. The craters and cliffs provide excellent conditions for the formation of rising air currents. Large numbers of birds were seen in Ein-Gedi and along the northern part of the Dead Sea and the Judean Desert, as well as farther

along the Jordan Valley and north to the Golan Heights and Mount Hermon. Hadad (1981) counted 12,514 raptors during 40 days of observations in Beit Shemesh (west of Jerusalem). The western margins of the Judean and Samarian mountains seem to constitute the western boundary of the northern migration axis. Thus, the Northern Axis is apparently based in spring on a relatively broad front that moves along the length of the Syrian-African Rift in the east and the hills of Judea, Samaria and Galilee in the west. There are almost no observations of raptor migration along the 'Arava', south of the Dead Sea to the Eilat region (between Gerofit and Hazeva). This is important negative evidence—although indirect—that there is no connection between the southern and the northern axes of migration.

Data are also insufficient to form a complete picture of the autumn migration. In autumn 1982 Kadmon (pers. comm.) observed 80,617 raptors migrating southwards over Rosh Pinna, north of the sea of Galilee. It is clear from Dovrat's observations (1981) that large numbers arrive to spend the night along the crest of the Samarian hills, south of Nablus. They take wing in the morning and fly southwestward, to the western slopes of the Samarian hills, passing over Kafer Kassem between 11.00 and 14.00hrs. It seems that the pattern of two parallel axes is maintained in autumn as well. But the Northern Axis runs mainly along the crest of the hills, west of the Syrian-African Rift, along the hills and foothills of Samaria. Further observations are needed in the Syrian-African Rift during autumn migration as well.

## COMPARISON OF MIGRANTS ALONG THE DIFFERENT ROUTES

A comparison of the numbers of raptor species which pass along the different routes can provide additional understanding of the migration over Israel (*Table 3*).

### **Steppe Eagle (*Aquila nipalensis*)**

This is the commonest eagle in Eilat, in both spring and autumn migrations. In spring, Steppe Eagles arrive in Israel along the Southern Axis (*Figure 1*). They turn east and northeastward from Eilat, apparently heading towards their nesting areas in the USSR, north and east of the Caucasus. In autumn the birds arrive from 'Aqaba' and from south of 'Aqaba' and turn north and northwestward at the northern tip of the Gulf of Eilat. They take a general west-northwesterly direction (Shirihai 1981). Based on the data of Bijlsma (1982), the majority seem to cross the Gulf of Suez at its northern end, which agrees with the direction of their flight from Eilat. It is also the reason for the large numbers of this species observed in Suez. The small numbers observed in Kafer Kassem and Rosh Pinna during the autumn, and in Beit Shemesh during spring, substantiate the assumption that this species hardly passes through the Northern Axis of Israel. Bruun's data for the spring of 1982 (pers. comm.) show that the Steppe Eagle is the commonest eagle in Suez during the spring migration. It would therefore seem that a considerable proportion of individuals of this species which arrive in Eilat return the same way as they came in autumn, over central Sinai, along a route as yet unknown (marked ? in *Figure 1*). Others come from the southwest, along the Southern Axis.

### **Lesser Spotted Eagle (*Aquila pomarina*)**

This is the commonest eagle in the autumn migration in northern Israel, both in

Table 3: Comparative numbers of representative raptor species at different observation points in autumn and spring.

Species	Observation point	Eilat (Christensen 1981) 20.2–17.5.77	Suez (Bruun 1982) 23.2–16.5.82	Beit Shemesh (Hadad 1981) 28.2–14.5.81	Eilat (Shirihai 1982) 24.9–29.11.80	Kafer Kassem (Dovrat 1982) 30.8–16.10.82	Rosh Pinna (Kadmon 1982) 29.8–18.10.82	Suez (Bijlsma 1982) 4.9–5.11.81
<i>Aquila nipalensis</i>		19,288	15,775	36	24,246	296	11	65,000
<i>Aquila pomarina</i>		65	7,755	1,874	2	89,259	2,251	22,000
<i>Buteo b. vulpinus</i>		315,767	80,887	4,224	low numbers	77	526	640
					<1,000			
<i>Circus gallicus</i>		220	3,063	1,215	125	7,135	197	9,400
<i>Milvus migrans</i>		26,770	3,861	476	low numbers	313	166	110
					<1,000			
<i>Hieraaetus pennatus</i>		175	457	127	19	1,176	44	760
<i>Pernis apivorus</i>		225,952	630	219	97	319,609	74,690	80
Total raptors counted		763,737	124,996	12,514	—	445,263	80,617	134,870

Kafer Kassem and Rosh Pinna. The observations of Horin & Dovrat (1983) indicate that most if not all of the world population of this species migrates over Israel. During spring as well, over Ein-Gedi and Beit Shemesh, the Lesser Spotted Eagle is the most common. On the other hand, in Eilat its numbers are negligible, both in spring and autumn. This substantiates the assumption that the species uses only the Northern Axis in autumn as well as spring. On the basis of Bruun's data from Suez, it seems that east of Suez the paths of the two eagle species diverge: *Aquila pomarina* turns northeastward, towards the Negev, the Judean desert and northern Israel, while *Aquila nipalensis* turns east and south-eastward to Eilat, and then again east and northeastward to the USSR.

### **Steppe Buzzard (*Buteo b. vulpinus*)**

This species constitutes the majority of all the raptors that pass over Eilat in spring. It is less common along the Northern Axis at this season. On the basis of Bruun's data, it seems that most individuals fly from Suez to Eilat along the same axis as *Aquila nipalensis*. But *Buteo buteo vulpinus* arriving from Suez constitute only about 25 percent of the total individuals that arrive in Eilat. The remaining 75 percent reach Eilat by way of the Southern Axis.

The numbers of Steppe Buzzards in autumn are very small compared with those in spring. This is true of the Northern Axis, of Suez and of Eilat. It seems that the bulk of the population of this species migrates along a route east of Israel and Sinai; they may cross the Red Sea at its southern tip, in the Bab el-Mandeb area.

### **Black Kite (*Milvus migrans*)**

The migration of this species is rather similar to that of *Buteo buteo vulpinus*. Large numbers appear in spring in Eilat, Ein Gedi and Beit Shemesh. On the other hand, their numbers during autumn are very small in Eilat, Rosh Pinna, Kafer Kassem and Suez. In Suez the numbers of Black Kite in spring are over thirty times larger than their numbers in autumn. This species, as well, seems to make its fall migration along a route running east of Israel.

### **Honey Buzzard (*Pernis apivorus*)**

The dominant species in autumn along Israel's northern migration axis. It appears in greatest numbers in Rosh Pinna and Kafer Kassem. On the other hand, in Eilat and Suez the autumn numbers are negligible, and the southern continuation of their route is not clear. In the spring these birds arrive in Eilat along the Southern Axis, and hardly appear at all along the Northern Axis, from Suez northwards.

### **Short-toed Eagle (*Circaetus gallicus*)**

This raptor appears in relatively large numbers along the Northern Axis during autumn, in both Kafer Kassem and Suez. It apparently returns during spring along a similar route, since larger numbers are observed in Ein Gedi and Beit Shemesh than in Eilat. Only 220 individuals were seen in Eilat during the entire spring migration of 1977. Apparently the migration axis deviates slightly to the east in spring, and therefore the numbers of Short-toed Eagles in Suez are less than one-third the numbers seen during autumn. Numbers are especially large in Ein Gedi and northern Israel.

## **ACKNOWLEDGEMENTS**

Special thanks are due to Ehud Dovrat, who initiated the raptor migration surveys

in Kafer Kassem, and to all the dozens of volunteers who participated in them. Thanks also to Sherif Baha, Bertel Bruun, Gagi Davidovitz, Eyal Kadmon, Ezra Hadad, Steen Christensen, Hadoram Shirihi, Rob Bijlsma, Richard Porter, Reuben Swanquist and all the others who spent long hours and many days making the observations on which this paper is based.

## REFERENCES

- BAHA, S. 1981. Observation on raptor migration in Suez. *Torgos* (Vol. 1), **2**, 21.
- BAHA, S. & BRUUN, B. 1981. Raptor migration survey over Suez, spring 1981. *Torgos* (Vol. 1), **3**, 22–4.
- BIJLSMA, R. 1982. De trek van roofvogels over Suez (Egypte) in het najaar van 1981. *Vogeljaar* **30**, 141–51.
- CHRISTENSEN, S. H. *et al.*, 1981. The spring migration of raptors in southern Israel and Sinai. *Sandgrouse* **3**, 1–42.
- DAVIDOVITZ, G. & LESHEM, Y. 1981. Raptor migration survey in Eilat and Ein Gedi, spring 1981. *Torgos* (Vol. 1), **3**, 9–21.
- DOVRAT, E. 1982. Summary of 5 years survey of raptor migration at Kafer Kassem. *Torgos* (Vol. 2), **1**, 53–115.
- HADAD, E. 1981. Raptor migration survey in the Beit Shemesh area, spring 1981. *Torgos* (Vol. 1), **3**, 17–21.
- HORIN, O. & DOVRAT, E. 1983. Autumn migration in Kafer Kassem, Autumn 1982. *Torgos* (Vol. 3), **1**, 60–85.
- SAFRIEL, U. 1968. Bird migration at Eilat, Israel. *Ibis* **110**, 283–320.
- SHIRIHAI, H. 1981. Autumn migration of steppe eagles over Eilat, 1980. *Torgos* (Vol. 1), **2**, 17–20.