

The migration of Lesser Spotted Eagle *Aquila pomarina*, European Honey Buzzard *Pernis apivorus*, Levant Sparrowhawk *Accipiter brevipes* and White Stork *Ciconia ciconia* over Northern Israel – a balance over 30 years of counts

Thomas Krumenacker

Abstract. Israel is located at a bird migration bottleneck of global importance. On its entire north-south extension the country is part of the Eurasian-East African flyway and the Great Rift Valley, the second most important migration route on a global scale. Thanks to its geographical situation as a land bridge between Europe, Asia and Africa, an estimated 500 million birds pass over Israel during spring and autumn migration. Nearly the entire world populations of some species, such as the Lesser Spotted Eagle *Aquila pomarina* and the Levant Sparrowhawk *Accipiter brevipes*, pass over Israel twice a year. A large part of the Western Palearctic population of the White Stork *Ciconia ciconia* migrates here, as well as the biggest proportion of the East European and Asian population of European Honey Buzzard *Pernis apivorus*. Since the 1980s bird migration over Northern Israel has been systematically recorded. Data gathered during the annual survey of soaring birds between 2000 and 2012 are analysed in this paper. Additionally a list with details of all seven raptors that were ringed in Poland and refound in Israel is provided.

Abstrakt. Migracja orlika krzykliwego *Aquila pomarina*, trzmielojada *Pernis apivorus*, krogulca krótkonogiego *Accipiter brevipes* i bociana białego *Ciconia ciconia* przez północny Izrael – podsumowanie wyników 30 lat badań. Izrael znajduje się w wąskim gardle migracji ptaków o światowym znaczeniu. Na całej swojej długości na linii północ – południe, kraj jest częścią szlaku Eurazja – Wschodnia Afryka i Great Rift Valley, drugiego najważniejszego szlaku migracji w skali globalnej. Dzięki swemu położeniu geograficznemu jako pomostu lądowego pomiędzy Europą, Azją i Afryką, nad Izraelem przelatuje około 500 milionów ptaków podczas wiosennej i jesiennej migracji. Prawie całe światowe populacje niektórych gatunków, takich jak orlik krzykliwy *Aquila pomarina* i krogulec *Accipiter brevipes*, przelatuje nad Izraelem dwa razy w roku. Migruje tu duża część populacji zachodniopalearktycznego gatunku bociana białego *Ciconia ciconia*, jak również największą część populacji wschodnioeuropejskiej i azjatyckiej trzmielojada *Pernis apivorus*. Od lat osiemdziesiątych XX wieku migracja ptaków nad północnym Izraelem jest systematycznie rejestrowane. Dane zgromadzone w czasie rocznego badania ptaków szybujących między 2000 i 2012 są przedmiotem analizy w niniejszej pracy. Dodatkowo podano listę ze szczegółami wszystkich siedmiu ptaków drapieżnych zaobrazkowanych w Polsce i odnalezionych w Izraelu.

Material and method

This analysis is based on the complete original counting data gathered during the Northern Valleys Survey in more than a decade from 2000 to 2012 by countless volunteers. Altogether the counters spent more than 70 000 hours in the field to gather all the data. These data are compared with published analyses of counts in previous decades (Leshem & Yom-Tov 1996, Shirihai 1996, Alon et al. 2004) and with recent findings concerning the populations in the breeding areas. With the data of the last decade it is also possible, for the first time, to analyse the entire 30-year period of migration counts in Israel and to gain important information on population sizes and long-term developments. With regard to the Lesser Spotted Eagle, an additional survey among experts in the major breeding areas was conducted in winter 2012/2013 to compare the current knowledge on the distribution and estimated population size with the numbers counted in Israel.

Introduction: Bird migration over Israel

Bird migration has always inspired people in all parts of the world. Any birdlover who has ever seen one of the seemingly endless streams of raptors gliding effortlessly along a mountain chain – or storks, eagles and buzzards soaring together in the same thermal to gain height to continue their journey over thousands of kilometers will want to know and see more of this wonder of nature. And Israel is among the best places in the world to witness this phenomenon.

The exact scale of bird migration over Israel is hard to establish as a lot of it takes place during the night and at very high altitudes. Numerical data vary significantly and are sometimes difficult to validate. Nevertheless the use of modern technology, like Radar, combined with traditional methods such as ringing programs and long-term monitoring of visible migration in spring and autumn surveys, has shed some light on the phenomenon and provided science and birdwatchers alike with in-depth knowledge.

Due to its geographical location at the gateway of the three continents Europe, Asia and Africa, and, given its function as a land bridge the number of migrating birds over Israel is vast and according to survey data only outnumbered by places like Veracruz in Mexico or Panama, both along the Trans-American Flyway, connecting North and South America. Whereas the total number of soaring birds passing Veracruz, for example, is much higher – counts put the number of raptors during autumn migration between 5,3 and 6,5 million birds, the species variety in Israel is at least as high with 35 raptor species recorded, compared to 32 in Veracruz (Newton 2008, Shirihai 1996).

Most experts estimate the total number of migrating birds over Israel at about 500 million in each migration season. Some surveys, based on radar- and infrared-monitoring put the number of nocturnal migrants over Israel in autumn at about 400 million birds. Also the variety is spectacular: Not less than 280 bird species have been recorded passing over Israeli airspace during migration.

For several species a safe passage over Israel and neighboring countries is even vital for their survival as nearly all or a substantial part of their global population migrates in a small corridor over the country. This is the case, for example, for Lesser Spotted Eagle and Levant Sparrowhawk with almost 100 percent of the global population passing over Israel .

Also most of the estimated 500 000 Eurasian White Storks migrate through Israel, mainly from central and eastern Europe. The same goes for the bulk of the European population

of Honey Buzzard. Also the vast majority of Great White Pelicans breeding in the Western Palearctic pass through Israel and depend on places to roost and feed (Leshem& Yom-Tov 1996, Newton 2008).

Migration can be watched in Israel at almost any time of the year. In late spring or early summer some species may still be on their way north to the breeding grounds while others pass Israel already on their way south. For many migratory species Israel is about halfway on their journey. Autumn migration takes place from mid- June to mid-December. Spring migration starts as early as mid-January and may well run into mid to late June. Highest numbers are counted in the more traditional periods between mid to the end of August to November and early March to mid- May. Species that winter south of the Sahara pass through Israel early in autumn and late in spring. Short-distance migrants mostly pass late in autumn and the first half of spring. In general, migration in autumn is much more concentrated in the northern and central parts of Israel and in spring most of the raptor passage happens in the south (Shirihai 1996).

As different bird groups have different needs and have therefore developed different migration strategies (diurnal/nocturnal migration, clapping flight/soaring) also the migration routes differ significantly. Additionally even birds of the same species can have different migration periods and routes depending on their origin and age, for example. And, of course, the most important factor for some bird species during migration, the availability of food, may change from year to year along the flyways and alter the routes the birds take or the period of time they stay in one area. On all flyways weather conditions, especially wind, can immediately lead to short term changes in small-scale migration patterns and should be taken into consideration by any birdwatcher.

Israel owes the unique numbers of migratory birds to its geographical situation close to the eastern end of the Mediterranean Sea, at the gateway of the landmasses of Eurasia and Africa, located along major migration routes. Most importantly the entire length of the small country is part of the Eurasian-East African Flyway, one of the five major routes for soaring bird migration in the world. More than 1,5 million raptors travel along this system of overland corridors from northeastern Europe and western Siberia through the Middle East into southern Africa which makes it the most important route for long-distance migrants from the Palearctic. For much of its course this flyway follows the Great Rift Valley, as it does in Israel. This route comprises the Northern Valleys along the borders with Lebanon and Syria, the Jordan River Valley, the Dead Sea and the Arava-Valley down to the Gulf of Eilat on the Red Sea. Out of the existing six major bottlenecks for Palearctic birds migrating between Eurasia and Africa the Rift-Valley-Route is the most important. Numbers are considerably higher than, for example, along the second major route, the Western European-West African Flyway with the Straits of Gibraltar as its main bottleneck (Newton 2008).

Within Israel the major part of raptor-migration takes place on three main tracks, described from north to south (Alon et al. 2004, Leshem 1985, 1989, Leshem & Yom-Tov 1996, 1998). The western axis runs from the Northern Valleys and Eastern Galilee west to the Samarian and Judean Mountains, parallel to the coastline towards the West Negev into Northern Sinai. The eastern axis runs from the north through the Hula-Valley, to the east of the central mountain chain along the Jordan Valley, the Judean Desert, the Negev Mountains into central Sinai. The southern axis cuts across the southern tip of Israel from northeast to southwest from Jordan, along the Southern Arava over Eilat and Eilat Mountains towards Sinai in Egypt. Sometimes the western and the eastern axes are described as two legs of one flyway, as the streams of both

separate only along the central mountain chain, or – on the way north – the flyways meet in the north of Israel on spring migration. Of course, the strictness of compliance of the birds with these routes can change due to weather conditions. With easterly winds birds on the western axis may drift westwards and fly over the open sea.

The Northern Valleys Survey of Soaring Birds (NVS)

Since the 1980s bird migration over Northern Israel has been systematically recorded. In the early years the Survey was conducted as the „Kfar Kassem Samaria Survey“. The counting area was located, in parts, within the occupied Palestinian territories. Due to growing tensions the Survey was relocated about 60 kilometers north and renamed the „Northern Valleys Survey“. From 1988 onwards until today the NVS has been conducted in the same place and under comparable parameters.

The NVS is a joint project of the Israel Ornithological Center (IOC), Tel Aviv University and the Israeli Air Force (IAF). The Israeli Air Force is the main financier of the project and benefits from the birdcounts by being provided with real-time information on big flocks of birds that could pose a danger to air-traffic. Every single flock with substantial numbers of White Pelicans, Lesser Spotted Eagles, Honey Buzzards, White Storks or Cranes is reported to a liaison officer of the Air Force. Often the Air Force reacts by shutting specific parts of the airspace for a short period of time until the birds have passed. Also the delay of take-offs or landings of fighter planes from airbases in affected areas proved to be an effective tool to avoid birdstrikes during the main migration seasons. Since the beginning of the cooperation between ornithologists and the Armed Forces the number of dangerous collisions between birds and aircrafts has been reduced significantly. No deadly incidents have occurred at all. According to Yossi Leshem, a Professor at Tel Aviv University and architect of the cooperation between the Air Force and ornithologists, the implementation of the warning systems and flight restrictions has reduced the number of air collisions by 76 percent. An estimated one billion dollars were saved between 1984 and 2010.

The NVS covers a strip of about 60 kilometres wide from the Mediterranean Sea in the west to the Jordan Valley in the east. Migration is recorded each year from about August 10 to October 15. The survey is conducted by a different number of about 10 ground observers who are dispatched in a line from the west (Mediterranean Sea) to the east (Jordan River Valley/Jordanian border), covering the entire extension of the country.

However, a number of factors limit the comparability of counts: The most important factor is probably the weather-related shift of the migration axis or drift outside the covered observation area (Leshem & Yom-Tov 1996). This problem is reflected for instance in massive fluctuations of the inter-year counts of White Storks. Other weather-related factors, different knowledge, motivation and experience among counters in different surveys and different survey periods over the years limit the comparability. Also the success of a survey is heavily dependent on the experience and correct assessment of the migration situation by the respective director who decides which posts are manned with counters and when. Despite these factors, the count results provide important data with regard to the minimum population size and long-term developments of populations.

The analysis presented here for the years 1990-2012 is based on the original counting data provided by the Israel Ornithological Center, and I want to thank the director Dan Alon warmly for their provision.

The passage of the Lesser Spotted Eagle *Aquila pomarina*

Nearly the entire population of this species migrates over Israel in spring and autumn. Low numbers of Lesser Spotted Eagles have also been recorded migrating over the Straits of Gibraltar. Between 1998 and 2009 a total of 47 birds were counted there (Onrubia et al. 2011). Also, single records are reported annually from other places in the Mediterranean, but the numbers seem to be negligible in comparison to the numbers of birds using the flyway over Israel.

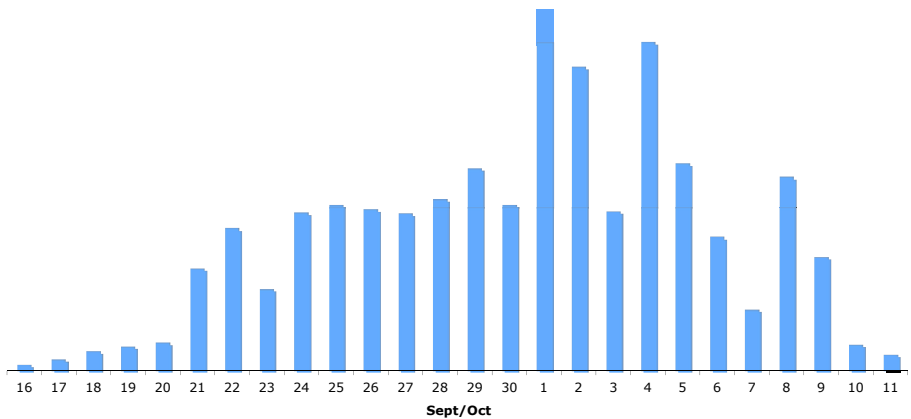


Fig. 1. Phenology pattern of Lesser Spotted Eagle migration over Northern Israel 1990-2012
Ryc. 1. Wzór fenologiczny migracji orlika krzykliwego w północnym Izraelu w latach 1990-2012

In Northern Israel the first individuals show up from the last week of August and the numbers begin to rise sharply in the second half of September, culminating usually between September 25 and October 5 (Shirihai 1996 Shirihai et al. 2000, Alon et al. 2004 and own calculations). Between 1990 and 2012 the peak migration days were between September 21 and October 8 in a time span of 18 days. The average peak day was October 1. October 1 and 4 each have been peak days four times between 1990-2012.

The timely arrival at the breeding grounds is considered essential for the reproduction success (Meyburg et al. 2007). Based on data from birds fitted with satellite transmitters, Meyburg et al. found late arrivals of some birds and discussed whether that may reflect a general shift of migration patterns with negative consequences for reproduction. A systematic shift of migration on a large scale should be reflected in the counts in Israel. However, a comparison of the data for the periods 1982 to 1990 (Leshem & Yom-Tov 1996) with the data concerning 1990-2012 shows no major change in the phenology in Israel in autumn. In both periods, 1982-1990 and 1990-2012, more than 90 % of the birds passed between September 21 and October 5. Also the average peak day was confirmed as being October 1. Nevertheless there have been indications of later than usual migration in Israel in recent years that deserve further attention in the light

of the crucial importance of the annual cycle for the reproductive process, e.g. on October 17, 2008 more than 6000 Lesser Spotted Eagle were recorded (J. Meyrav, pers. comm.).

The comparison of the magnitude of Lesser Spotted Eagle migration during the migration peak also shows a stable situation. Based on the average of 1982-1990, 21.6 % of the season total passed on the peak day (Leshem & Yom-Tov 1996). For the period 1990-2012 the average was 25.7 %. Migration can be even far more concentrated. In some years the skies over Northern Israel are virtually packed with Lesser Spotted Eagles: On October 1, 2000, 54.5 % of all birds in that season passed and on Oct. 4-5, 2008, 53 000 Lesser Spotted Eagle or 64 % of the season's total passed. Also constant is the period of time in which 90 % of the seasonal total passed. In both analyses 1982-1990 (Leshem & Yom-Tov 1996 for 1982-1990) and in the figures analysed here for 1990-2012 it took an average of 15 days.

Seasonal totals of Lesser Spotted Eagle and discussion

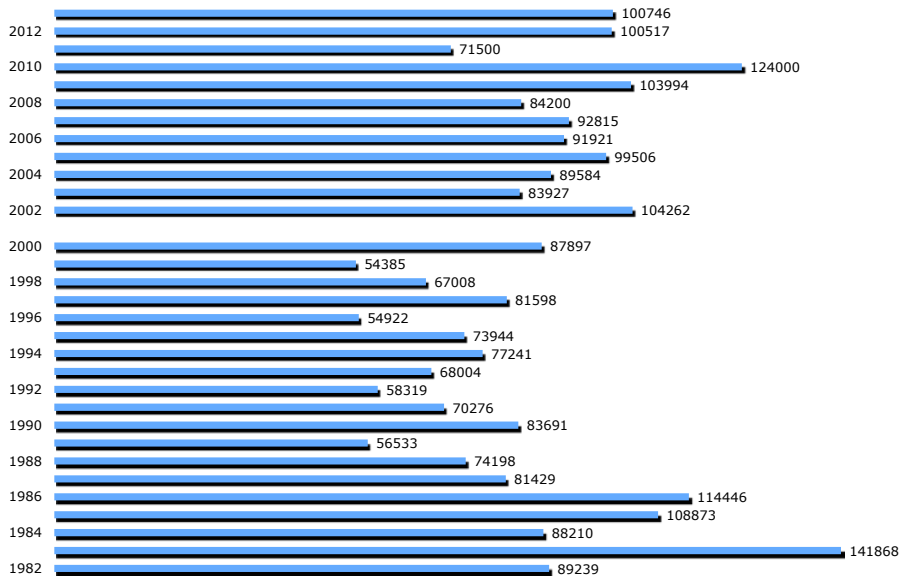


Fig. 2. Yearly totals of Lesser Spotted Eagles counted during autumn migration in northern Israel in the years 1982-2013

Ryc. 2. Roczne liczebności orlika krzykliwego Eagles w czasie jesiennej migracji w północnym Izraelu w latach 1982-2013

The numbers of Lesser Spotted Eagles registered during autumn migration over northern Israel vary significantly over the years. Some fluctuations are easy to explain such as the low number in 2011 when the survey was suffering from major logistical problems preventing counters from counting on a possible peak-day.

From the late 1980s throughout the 1990s a steep decline in Lesser Spotted Eagle numbers is apparent. However, with all due caution, an encouraging trend can be seen in the recent years.

After the massive decrease during the 1990s with historically low count results a recovery can be seen from about the turn of the millennium onwards. Between 2004 and 2010, the number of birds recorded on average significantly increased by about 25 000 or 35 %. The 30-year-average is 85 944 Lesser Spotted Eagles, well above the average of the low years but still well below counts of the Kfar Kassem period. The last few years show a positive trend: The six-year period 2007-2012 shows an average of over 96 000 Lesser Spotted Eagle, the highest numbers since the start of the NVS. The 2010 figure of 124 000 birds represents the second highest count in history.

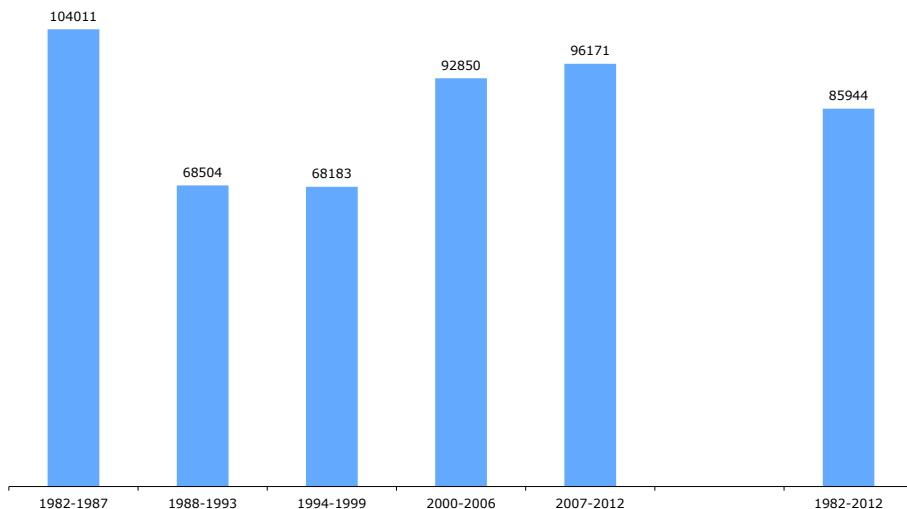


Fig. 3. Autumn migration of Lesser Spotted Eagle 1982-2012, average yearly totals in six-years-groups and in long-term average

Ryc. 3. Jesienna migracja orlika krzykliwego w latach 1982-2012, średnie roczne liczebności w grupach sześcioletnich oraz w długoterminowej średniej

There are some indications for the assumption that the Lesser Spotted Eagle numbers may be even higher than counted during the NVS:

- The problem of an eastward drift/shift of migration axis and the consequently non-recognition of some of the birds by the counters also applies to the Lesser Spotted Eagle, although to a much lesser extent than e.g. for White Storks. Rohde (in lit.) regularly observed larger groups of Lesser Spotted Eagles during his Black Stork *Ciconia nigra* censuses along the Jordanian border in the years 2005-2012, east of the area covered by the NVS. He puts the number at between 3000 and 5000 per season (pers. comm.).
- In some years the eastern observation stations within the NVS range have not always been fully occupied.
- In some years significant numbers of Lesser Spotted Eagles have been counted more or less by chance after the end of the Survey season in mid-October.

- d. Shirihai (1996) states that the regular migration axis stretches far east of the areas covered by the NVS, citing an “alternative and parallel route” that leads in a strong westerly direction south of the Dead Sea.

The Migration Season 2013

The counts during the migration season 2013 can be characterized as being within the average on a relatively high level. There are no indications for major changes compared to the years before. During the counting period from September 24 to October 15 a total of 100746 Lesser Spotted Eagles were registered. This is a stunningly similar number compared to the 100517 Eagles that were counted in the migration season 2012. The 2013 result exceeds the longtime-average (1982-2012) of 85 944 birds by far and also is higher than the average of the „good“ years 2007-2012 when, on average, 96 171 Lesser Spotted Eagles were counted. Still they are far apart from the numbers that were registered in the record years 1983 or 2010 in which 141 000 respectively 124 000 Eagles were logged.

Also the migration pattern of 2013 is rather in line with the previous years although there is one noteworthy fact: Only on the peak day a five digit number of Eagles was counted in 2013. In nearly all other Survey years at least two, often also three days with more than 10 000 passing Lesser Spotted Eagles are registered. Accordingly, the period in which 90 percent of the season total was registered comprises 18 days in 2013 and lies above the long-term average of 15,2 days. Still, this is not a significant aberration as the main migration period has varied between 8 and 20 days since the beginning of the Surveys. The peak day of the year 2013 was September 30 when 26 360 Eagles were recorded. Also in this parameter 2013 is not exceptional as the average peak day for the entire period 1990-2012 is on October 1 with an average of 25,7 percent of the total migrating season. Interestingly, in 2013 also, some big numbers passed relatively late with 5508 Lesser Spotted Eagles counted on October 10. and 3624 birds on October 11.

Bringing together migration counts and breeding population estimates

The breeding populations of the Lesser Spotted Eagle are confined to central, eastern and south-eastern Europe and the adjacent areas, such as the European part of Russia and the Caucasus eastwards to the Caspian lowlands and Iran. Belarus, Latvia, Poland and Romania are hosting by far the largest known breeding populations. The world population is estimated to comprise about 20 000 pairs or 42 000 to 57 000 mature birds (BirdLife 2012).

A review of recent Russian-language literature and, additionally, a survey undertaken by the author in winter 2012/2013 among the experts on this species in each country leads to the up-to-date estimation of the Lesser Spotted Eagle population which is shown here:

The exact eastern distribution limit of Lesser Spotted Eagle is still unknown. It is apparent that the species inhabits a much larger territory east of the western border of Russia than assumed some years ago. From the early 2000s onwards an extension of the breeding ranges towards the east was observed in Russia and Ukraine alike. A. Michenko and S. Domashevsky (pers. comm.) suggest that the trend continues. Michenko et al. (2001) estimated that the potential distribution area of Lesser Spotted Eagle in the European part of Russia comprises 400 000 square kilometres or more. Since then, other regions have been confirmed as being occupied by Lesser Spotted Eagles and it can be stated that Lesser Spotted Eagles inhabit at least parts

of all eastern and central regions within the European part of Russia. Breeding of Lesser Spotted Eagles was confirmed for the following regions („Oblasts“) in recent years according to the survey among local experts: Kaliningrad, Leningrad, Pskov, Novgorod, Tver, Vologod, Yaroslavl, Ivanovo, Vladimir, Smolensk, Moscow, Bryansk, Kaluga, Tula, Ryazan, Voronezh and Orjol (pers. comm. from V. Dombrovski, A. Mischenko, Melnikov et al. 2001, Mischenko et al. 2001, Sapelnikov et al. 2008, Solovkov 2008). Breeding of Lesser Spotted Eagles is suspected without having breeding records so far in the following regions: Lipetsk, Kursk and Tambov (A. Mischenko, pers. comm.).

Table 1. Recent information on breeding pairs of Lesser Spotted Eagles
Tab. 1. Najnowsze informacje na temat par lęgowych orlika krzykliwego

Belarus	3200-3800 (V. Dombrovski, pers. comm.)
Latvia	3600 (U. Bergmanis, pers. comm.)
Romania	2500-2800 (Milvus Group)
Poland	2300-2800 (J. Lontkowski, T. Mizera, pers. comm.)
Lithuania	1500-1800 (Found. for Dev. Nature)
Ukraine	1500 (Domashevsky, pers. comm.)
Slovak Republic	800-900 (S. Danko, M. Dravecky, pers. comm. Danko & Karaska 2002)
Estonia	500-600 (U. Sellis, pers. comm.)
Bulgaria	500 (T. Michev, L. Profirov, pers. comm.)
Russia, Europ. part	350-400 (A. Mischenko et al. 2001, see text)
Northern Caucasus	200-250 (Abuladze 2001, Belik et al. 2008)
South Caspian Lowland/Iran	min. 500 (Meyburg 1996)
Kaliningrad region	100-150 (G. V. Grishanov, 2008)
Turkey	80-3000 (BirdLife, Meyburg 1996)
Germany	102 (T. Langgemach, pers. comm.)
Greece	67-90 (U. Bergmanis, pers. comm.)
Georgia	60-70 (A. Abuladze, 1996, BirdLife)
Croatia	50-70 (BirdLife)
Azerbaijan	20-100 (BirdLife)
Hungary	40-45 (BirdLife)
Armenia	48-52 (Aghabayan et al. 2008)
Serbia	10-30 (U. Bergmanis, pers. comm.)
Bosnia Hercegowina	1-10 (BirdLife)
Macedonia	5-10 (BirdLife)
Albania	2-10 (U. Bergmanis, pers. comm.)
Slovenia	0-5 (U. Bergmanis, pers. comm.)
Moldova	2-5 (U. Bergmanis, pers. comm.)
Czech Republic	1 (F. Pojer, L. Viktora, pers. comm.)
France	0-1 (F. Jiguet pers. comm.)
Total	18 038-23 201

The size of the areas now confirmed as at least being partially populated (without those areas with only suspected breeding) comprises well over 750 000 square kilometres, an area much larger than the whole of the Ukraine. This indicates that the population of Lesser Spotted Eagle in Russia is much bigger than 350 to 400 breeding pairs.

The NVS in recent years showed average numbers of about 100 000 Lesser Spotted Eagles. Following Meyburg (1996) with the assumption that about half of all Lesser Spotted Eagles counted in Israel are breeding adult birds, this would correspond to a breeding population in recent years of about 25 000-31 000 pairs. These are between about 2000 and 13 500 pairs more than estimated by the experts in the respective breeding grounds (see table 1). Even the higher figure does not seem to be exaggerated in the light of the improved knowledge about the distribution range of the species in Russia. The assumption of a density of 1 breeding pair per 100 square kilometers in those regions that are most likely populated by Lesser Spotted Eagles in Russia would lead to an estimation of a breeding population in Russia of about 7500 pairs. The relatively low assumption of 1 pair/100 square kilometers seems at the same time appropriate as not all parts of the Russian regions known to host Lesser Spotted Eagles are inhabited. In any case the world population estimate by BirdLife of about 20 000 breeding pairs seems to be too low.

European Honey Buzzard

The European Honey Buzzard is common throughout Europe and western and central Asia and winters in west and central Equatorial Africa. Honey Buzzards from western, central and northern Europe migrate via a western route and cross into Africa over the Straits of Gibraltar. Also a substantial number of birds cross the Mediterranean Sea at various other points, notably at the Straits of Messina in Italy. East-European and western and central Asian birds migrate via the Middle East and cross Israel. The European population is estimated at 110 000 to 160 000 breeding pairs and assessed as stable. The world population is estimated at between 350 000 and one million birds (BirdLife 2013).

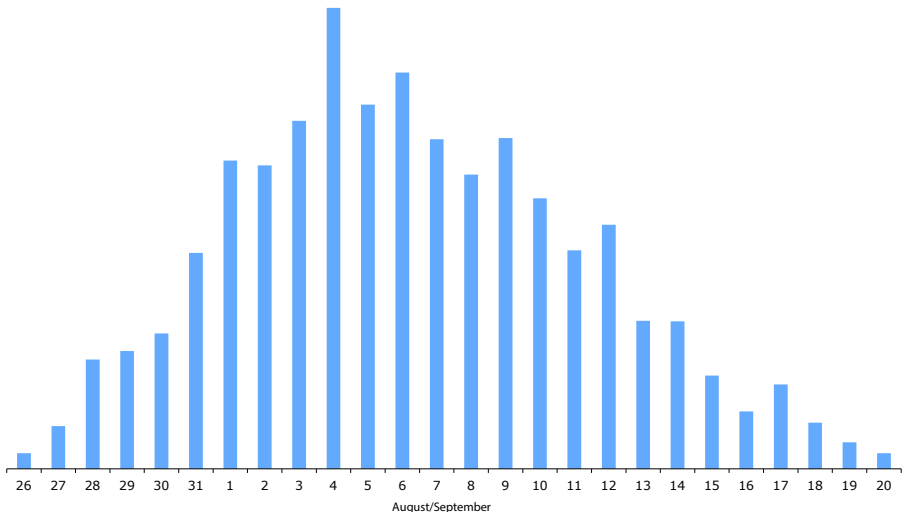


Fig. 4. Phenology pattern of Honey Buzzard migration over Northern Israel 1990-2012
Ryc. 4. Wzór fenologiczny migracji trzmielojada w północnym Izraelu w latach 1990-2012

The migration of Honey Buzzards over Israel is relatively concentrated

90 % of the season total of Honey Buzzards usually migrate within a period of two weeks from August 31 to September 13 (Leshem & Yom-Tov 1996, Alon et al. 1999, 2004, author's calculations). In the period from 1990-2012 (with detailed data from 20 years available) the migration reached its peaks between August 31 (2001) and September 13 (1995, 2003). Average peak day was September 6. September 4 was the most common peak day, with highest season totals in four years. Between 9.7 % (2004) and 30.3 % (2009), on average 18 % of the annual total passed on peak days. The highest daily total so far was registered on September 2, 1982 when 128390 birds were counted. The phenological data are largely in line with previous studies (Alon et al. 2004) for the period 1990-1999 and Leshem & Yom-Tov (1996) for the period 1982- 1990. Major changes cannot be identified in any of the parameters mentioned.

The number of Honey Buzzards counted in Israel is relatively stable over the entire period. The fluctuations do not necessarily reflect a change in population size. Like the White Stork, the migration corridor of the Honey Buzzard also reaches east into Jordanian territory (Shirihai 1996, Alon et al. 1999) and consequently parts of the population are not recorded by the NVS.

In Israel for the last decade since 2002, on average 360 000 European Honey Buzzards were counted per season. This is well above the long term average. The figure should be even higher as the low numbers counted in 2012 do not reflect a decline in numbers passing but is due to the fact that on several days during the peak of Honey Buzzard migration no counts were conducted (D. Alon, E Haviv, pers. comm.). The eastern population of the Honey Buzzard apparently can be counted in a much more concentrated passage about 1000 kilometres north of Israel on the east side of the Black Sea near Batumi in Georgia. In the fall of 2012 in Batumi 648 000 Honey Buzzards were counted (Batumi Raptor Count 2012). Taking the results from Batumi into account and considering further that in Israel a significant number of birds migrated that did not pass Batumi before but crossed the eastern Mediterranean at various points or migrated along the western Black Sea coast and the Bosphorus (maximum count in Burgas in the fall of 1996 more than 23 000 birds (Michev 2011), Bosphorus in spring 2010, 11 170 birds (K. A. Boyla, pers. comm.), that many Honey Buzzards cross the Mediterranean Sea further west (alone Messina 27 000, Newton 2008). Adding those Honey Buzzards that reach Africa via the Straits of Gibraltar (on average 55 000 per fall season, Onrubia et al. 2011), it seems to be appropriate to estimate the population of European Honey Buzzard as being close to the higher end of the official estimate of 350 000 to one million birds.

Levant Sparrowhawk

The Levant Sparrowhawk breeds from southeast Europe to the Urals, western Kazakhstan and Iran. Main breeding areas are Russia (1500-3000 pairs), Greece (1000-2000 pairs) and the Ukraine (1000 pairs). Levant Sparrowhawks winter mainly in the eastern Sahel in sub-Saharan Africa. The world population is estimated to comprise at the most 7700 breeding pairs (BirdLife 2004, Hagemeyer & Blair 1997, Shirihai et al. 2000). It is believed that almost the entire world population migrates through Israel.

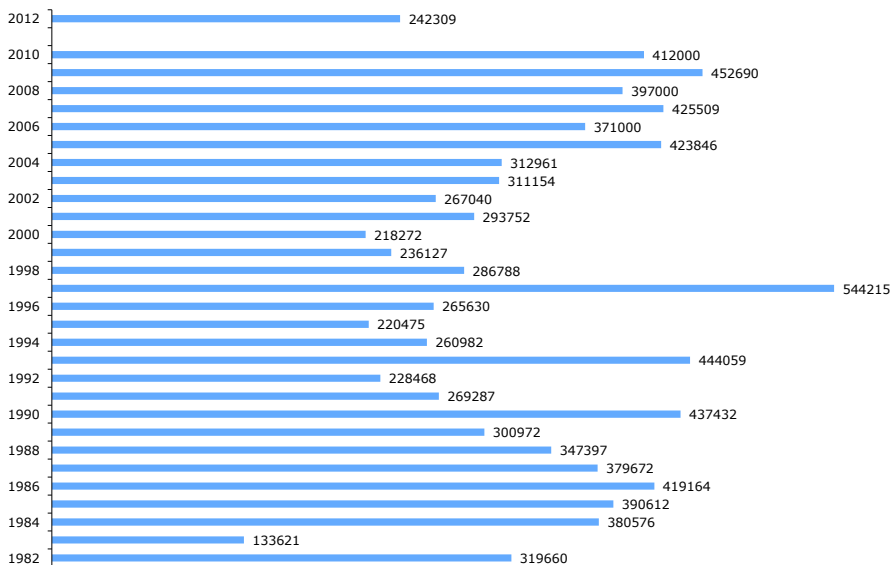


Fig. 5. Yearly totals of Honey Buzzards counted during autumn migration in Northern Israel in the years 1982-2012

Ryc. 5. Roczne liczebności trzmielojada w czasie jesiennej migracji w północnym Izraelu w latach 1982-2012

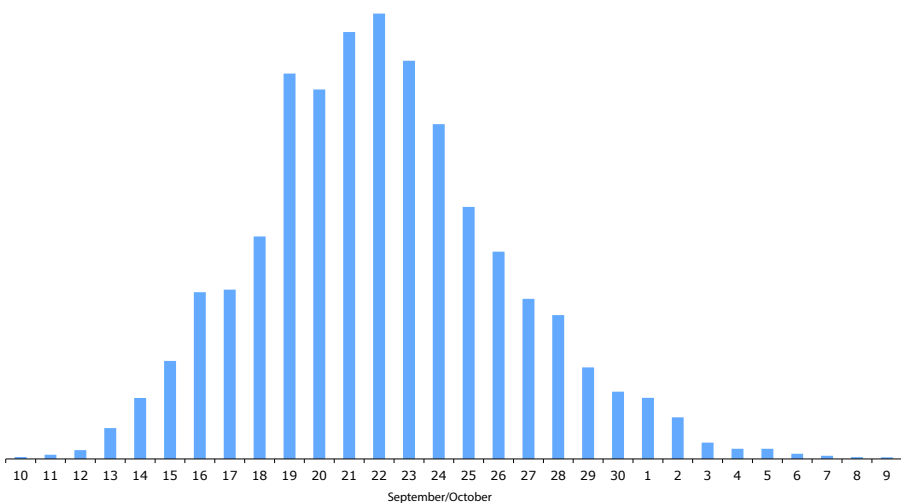


Fig. 6. Phenology pattern of Levant Sparrowhawk migration over Northern Israel 1982-2010

Ryc. 6. Wzór fenologiczny migracji krogulca w północnym Izraelu w latach 1982-2010

The passage of the Levant Sparrowhawk is very concentrated: On average about 90 % of the season total passes within 13 days between September 14-26 (Leshem & Yom-Tov 1996, Alon et al. 1999, 2004, Shirihai et al. 2000 and own calculations). According to the data analysed by the author from 1990-2012 the migration reaches its peaks between September 19 (1996) and September 28 (2006). Average peak day was September 22. September 23 has been the most frequent peak day (four times). On peak days between 10.3 % (2007) and 25.8 % (1995), on average 18.1 % of the season total were recorded. The highest daily total that was registered in the period from 1990 to 2012 was on September 20, 2008 when 14 380 birds were counted. The new data do not show any significant new trend in phenological data: Peak day for the period 1982-1990 was September 21 with on average 17.1 % of Levant Sparrowhawks passing on that day (Leshem & Yom-Tov 1996).

The counts in Israel show a significant increase in Levant Sparrowhawk numbers over the past decades. Numbers of consistently below 30 000 birds per season at the beginning of the 1980s were followed by years with about 40 000 individuals in the late 1980s and early 1990s. The last decade of the last century was characterized by large fluctuations, but still showed on average higher numbers than the years before. A strong decline with successive years of only about 35 000 birds, was followed by a strong increase in the last decade. Compared to the early years of the survey the average number of birds per season has more than doubled in the period 2004-2013 (with data of eight years available within this period). The counts in Israel clearly show that the population size of Levant Sparrowhawk (max. 7700 breeding pairs, BirdLife 2012) is underestimated. The assumption that about 40 percent of the Levant Sparrowhawks counted in Israel are breeding birds does not seem to be exaggerated. This would put the population size to about 12 600 breeding pairs, assuming that even 50 percent are breeding birds would lead to a population estimate of 16 500 breeding pairs – more than twice the number currently estimated officially (BirdLife 2012).

The migration season 2013

This year's count concluded with 47 549 birds logged by the surveyors. This is the lowest number in a decade (the last year with a lower number counted was 2002 with 35496 birds). Despite this fact the number of Levant Sparrowhawks counted this autumn is perfectly in line with the average yearly totals calculated over the entire time period from 1982 to 2013. Still, the counts during many years in the time period from 2003 onwards until 2010 indicated a remarkable increase in birds, supporting hopes of an increase in population. The 2013 result brings the counts back to the spheres that were normal for a long period of time. It will be very interesting and important to monitor the migration of this little known bird of prey in the years to come. It is known that the destruction of habitats especially along river valleys lead to a decline in Levant Sparrowhawk populations in some areas. Only with further data would it be possible to establish whether we witness a strong decline in numbers or not. Conclusions need to be drawn very carefully regarding this species especially as Levant Sparrowhawks are among the more difficult birds to monitor. They often migrate very high and in dense flocks, which sometimes consist of well over a thousand individuals, making it very tricky to establish correct numbers. On the other hand already missing out on a few of those flocks during a survey period can affect the counting result of this rare bird significantly. To mention another problem: Levant Sparrowhawks are also known to migrate during the night or late after sunset which constitutes another source of inaccuracy.

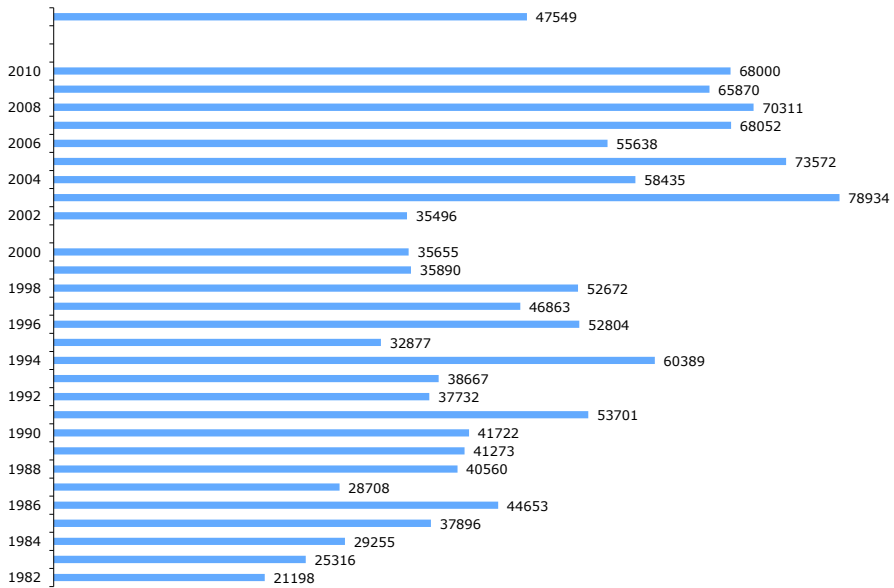


Fig. 7. Yearly totals of Levant Sparrowhawks during autumn migration in Israel 1982-2013
Ryc. 7. Roczne liczebności krogulca w czasie jesiennej migracji w północnym Izraelu

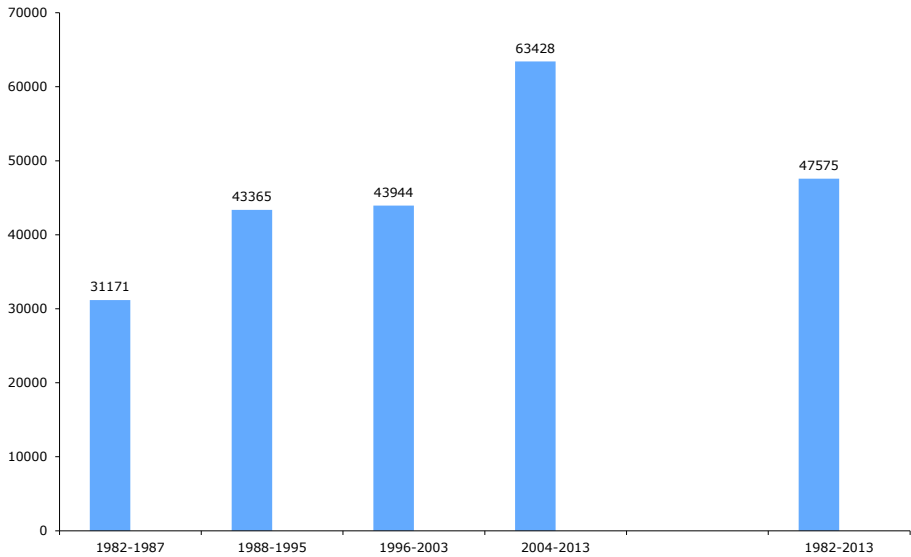


Fig. 8. Autumn migration of Levant Sparrowhawk 1982-2013, average yearly totals in six- and eight-years-groups and in long-term average
Ryc. 8. Jesienna migracja krogulca w latach 1982-2013, średnie roczne liczebności w grupach sześciolletnich i ośmioletnich oraz w długoterminowej średniej

With regard to other parameters the 2013 season was rather unspectacular and mostly in line with the long-term findings. Peak day was September 26. In the entire survey period from 1982 to 2013 the Peak day varied between September 19 and 28, on average the migration peaked on September 22.

On the peak day this year 6732 Levant Sparrowhawks were registered, which represents 14,2 percent of all birds counted during the season compared to the long-time average of 17,1 over the entire survey period since 1982. The vast majority of birds (90 percent) passed through within 15 days. This was a bit but not significantly longer than on the long-time average of 13 days.

The passage of White Stork

White Storks migrate via the western or the eastern flyway to and from their wintering quarters in southern Africa. The route over Israel is frequented by large numbers of White Storks from the eastern European strongholds of the species: Poland, Ukraine, Belarus, Lithuania, Latvia and Russia. The eastern route is the most important migration route for the species. According to the stork census the eastern and southeastern population comprises 78 % of all nesting pairs (180 000) (Molina & del Moral 2005).

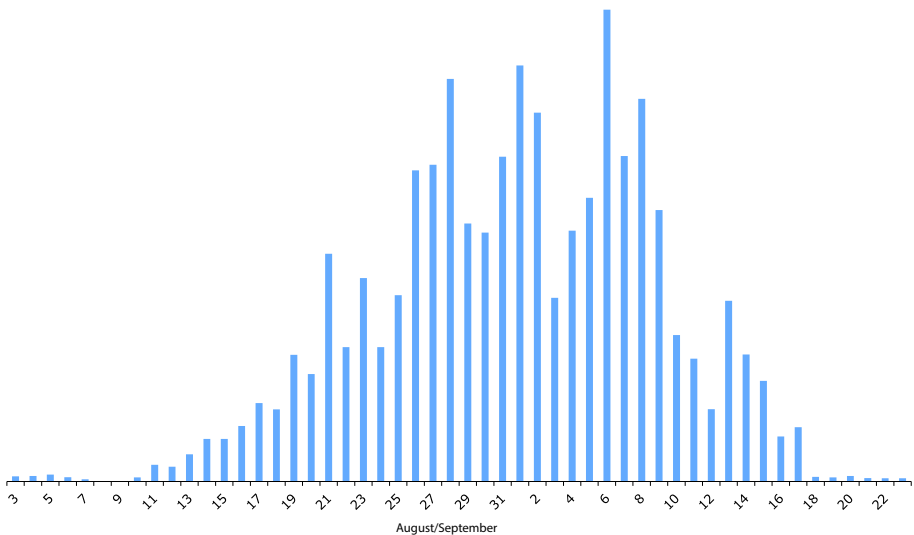


Fig. 9. Phenology pattern of White Stork migration over Northern Israel 1990-2012

Ryc. 9. Wzorzec fenologiczny migracji bociana białego nad północnym Izraelem w latach 1990-2012

90 % of White Stork migration takes place in a time span of 15 to 33 (average 23) days (Alon et al. 2004). The passage peaks between August 23 and September 13 (average September 7, Shirihai 1996, Alon 2006). Spectacular concentrations can occur during peak days. In the period analysed by the author a historical record daily total of 151 856 migrating White Storks

was recorded on September 6, 1997. According to the 6th Stork Census organized by BirdLife and the German NABU Wildlife Protection Society in 2004/2005 (Thomsen & Hötter 2006), the world population of White Stork was estimated at about 230 000 breeding pairs, a sharp rise from 166 000 BP counted in the 5th Census ten years before (Thomsen & Hötter 2006, Molina & del Moreal 2005). About 180 000 pairs migrate via the eastern route (Molina & del Moreal 2005).

The stork census showed an increase in the western population by 89 % and in the eastern population by 28 % within ten years. The data analysed here reflect the increase of the eastern population: A comparison of the numbers counted in 1995 (5th census) and 2005 (6th census) shows an increase by 39 %. Summarized data in seven- and six-year groups around the years where stork censuses were also conducted (1990-1996 and 2005-2010) show an increase in numbers of storks of 22 %. The continuing upward trend is also confirmed by the results for the last three years available for this analysis (2008 to 2010) in Israel. Here the number of storks has been consistently at or above 310000, numbers that have been counted for the last time in 2005. White Storks cross northern Israel in a corridor 53 to 61 kilometres east of the Mediterranean very close to the Jordanian border along the Rift Valley (Alon et al. 2004). This means that the phenomenon of weather related drifts or shifting of migration axis is especially applicable for this species. Also many White Storks regularly migrate further east along Jordanian territory. This can make up about 50 % of the season totals (Y. Leshem, D. Alon, pers. comm., Leshem & Yom-Tov 1996, 1998, Shirihai 1996). This fluctuation is also mirrored in the large variation in the yearly numbers counted in Israel. Therefore the significance of counts in Israel with regard to population trends is limited. The generally accepted number of storks passing over the region in autumn is about 600 000 birds (Leshem 1989, D. Alon, Y. Leshem, pers. comm.).

The main bottleneck for the **western population** is the Straits of Gibraltar. On average (1999 to 2011) 58 000 White Storks were counted here each season (Fundacion Migres 2012). Onrubia estimates the actual number of White Storks at 150 000 per season (pers. comm.).

To estimate the world population the Maghreb population and the increasing number of White Storks that winter in Europe must also be taken into consideration (31 000 in 2004, Molina & del Moral 2005). Adding the estimated number of birds migrating over Israel and the adjacent part of Jordan (600 000) together with those crossing into Africa in Gibraltar (150 000), taking also into consideration the birds wintering in Spain (32 000) and finally including the Maghreb population (36 000 calculated as follows: 9000 BP with an average of two fledglings) results in a world population estimation in autumn of at least 818000 birds. Based on individuals (not breeding pairs) this means that around 73% of all White Storks use the flyway via the Middle East on migration.

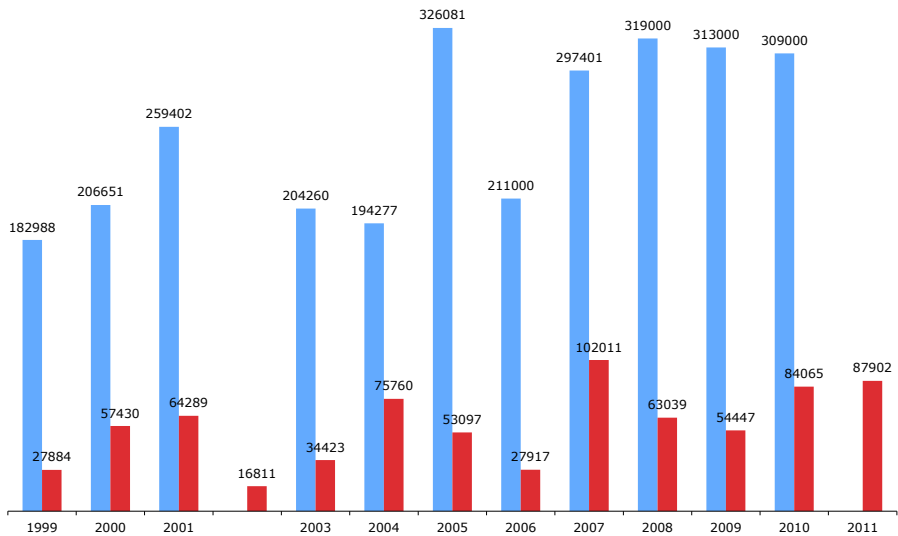


Fig. 10. Season totals of White Stork Migration over Israel (blue) and the Straits of Gibraltar (red) 1999-2011

Ryc. 10. Liczebność sezonowa migracji bociana białego nad Izraelem (niebieskie) i Cieśniną Gibraltarską (czerwony) w latach 1999-2011

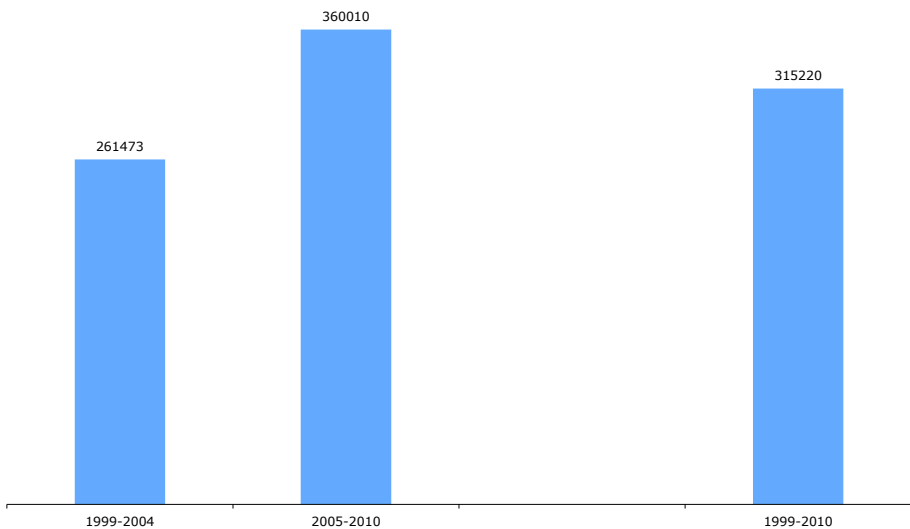


Fig. 11. White Stork combined season totals Israel and Gibraltar 1999-2010 in six-years groups and long-time average

Ryc. 11. Bocian biały w łącznych podsumowaniach sezonowych w Izraelu i Gibraltarze w latach 1999-2010 w grupach sześciolletnich i długoletniej średniej

Ring recoveries from Poland

So far seven raptors that were ringed in Poland were refound in Israel – two Greater Spotted Eagles *Aquila clanga* and five Lesser Spotted Eagles.

Species	Date	Location Poland	Ringer	Code	Location Israel	Date	Distance in kilometers
Greater Spotted Eagle	23.07.2008	Biebrzan-ski Park	G. Maciorowski	3 D	Hula Lake	21.02.2009	2492
Lesser Spotted Eagle	11.07.2009	Gorlice	J. Stój	A 12	Ha Horesh Forest	05.10.2012	2214
Lesser Spotted Eagle	29.06.2010	Kłoda Duża	J. Wójciak	J 9	Ben Shemen Forest	1.10.2010	2415
Lesser Spotted Eagle	04.07.2012	Zydrano-wa	M. Stój	D 34	Sde Eliezer	30.09.2012	2148
Greater Spotted Eagle	27.07.2012	Biebrza National Park	G. Maciorowski	6 C	Lohamei Hagetaot	07.01.2013	2489
Lesser Spotted Eagle	28.07.2011	Rogalice	J. Lontkowski	VW	Wadi Lavan	18.05.2013	2639
Lesser Spotted Eagle	07.07.2011	Jagodne	J. Wójciak	C 96	Negba	01.07.2013	2358

Threats to migrating birds in Israel

Unlike in neighbouring Arab countries hunting is not very popular and the hunting laws are much stricter than elsewhere in the region. This is of tremendous importance given the barbaric scale of bird-hunting in many countries of the region, especially Syria, Lebanon, Jordan, Turkey and Egypt. Nevertheless, migrating birds face problems from various sources also in Israel: Ongoing development and nature destruction for construction, infrastructure and agriculture put pressure on roosting areas, as does the increase of outdoor activities, especially the omnipresence of cross-country motorcycles and cars. It would be a simple and very effective protective measure to close the few roosting-forests for Lesser Spotted Eagles to cross-country vehicles in autumn for a short period of time during the peak of the migration. The omnipresence of cats is a serious threat especially for exhausted passerines (Yom-Tov 2003). Illegal shooting (especially raptors) and poaching in the Arab population centers and by the army of foreign workers constitute further threats to migrating birds. Secondary poisoning is another serious threat to breeding and migrating raptors alike. According to Yom-Tov et al. (2012) 38 percent of all wildlife poisoning cases are caused by illegal use of pesticides. Nearly a quarter of them are caused by cattle ranchers who quarrel over grazing areas and poison each other's herds, whose carcasses are then consumed by raptors (Leader et al., 2009 in Yom-Tov 2012). During a 3-year survey period from 2006 a poisoning event was detected on average every third

day (ibidem). The Mediterranean population of Griffon Vulture has been sharply reduced by secondary poisoning. The last dramatic event took place in 2011 when a pair of White-tailed Eagles – that was part of a 20-year reintroduction effort – was found poisoned (Yom-Tov 2012).



Photo 1. Migrating Lesser Spotted Eagles
Fot. 1. Migrujące orliki krzykliwe (fot. T. Krumenacker)



Photo 2. Resting White Storks during migration in the Negev desert
Fot. 2. Odpoczywające bociany na migracji na pustyni Negev (fot. T. Krumenacker)

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