Raptor migration in Israel and the Middle East: A summary of 30 years of field research

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Raptor migration in Israel and the Middle East: A summary of 30 years of field research.—Hadoram Shirihai, Reuven Yosef, Dan Alon, Guy M. Kirwan,

and Reto Spaar. 2000. Special publication for the ''Raptors 2000'' congress of the Raptor Research Foundation and the World Working Group on Birds of Prey, International Birding and Research Center (IBRCE) in Eilat, Israel. 192 pp., 55 color plates, and 43 species accounts accompanied by migration maps, numerous data tables and figures. Copies can be ordered from IBRCE, P.O. Box 774, Eilat 88000, Israel. Hard cover, $50.00.—The migration of diurnal raptors through Israel and the Middle East is a spectacle only to be rivaled by the tremendous migration of New World raptors over Veracruz, Mexico (Ruelas-Inzunza et al. 2000) or the Isthmus of Panama (Smith 1985). Raptors from Palearctic breeding populations ranging from central Europe to Siberia pass through the Middle East in huge numbers en route to and from wintering areas in Africa. Concentrated flights of more than 200,000 raptors in a single season have been recorded at several locations along the margins of the region's large water bodies, for example; the Straits of Bosphorus and the Northeast Pontics on either side of the Black Sea in Turkey; several sites between the eastern Mediterranean and the northern Red Sea in Israel and Egypt; and around the straits of Bab-el-Mandeb, between Yemen and Djibouti, connecting the Arabian Peninsula with Africa at the southern end of the Red Sea. Full-season systematic and short-term exploratory counts at numerous locations have produced an understanding of spatial and temporal dynamics of raptor migration through that region, comparable to the understanding of fall raptor movements around the Great Lakes or throughout the northeastern United States.

Thousands of birdwatchers travel to Eilat, Israel, each spring (and to a lesser extent in fall) to enjoy this migration and to indulge in some of the most exciting bird watching in the Western Palearctic (as many as 300 species can be seen in a single spring migration season in Israel). To date, Israel has been the focal point for much of the migration research within the Middle East, including most of the full-season, multiple-year migration counts that have occurred in the region. As this book clearly shows, tremendous potential exists for additional work in other locations, particularly in Turkey and at the straits of Bab-el-Mandeb. Regular full-season monitoring of raptor migration along this latter route would contribute greatly to understanding raptor migration through the region and monitoring the status of Palearctic migrants. Israel has also been the location of several groundbreaking studies on the flight behavior of migrants using innovative techniques such as tracking radar, sailplanes, and motorized gliders. Those studies have helped to reduce the risk of collisions between military planes and huge flocks of soaring birds during migration by mapping migration routes within Israel and charting the daily, seasonal, and weather-dependant shifts in the flight paths of migrants across the entire 100–200 km wide front of migration between the Eastern Mediterranean and the northern Red Sea.

Raptor Migration in Israel and the Middle East is the first book to summarize previous and ongoing research within that region, and it does so with the dual audience of the amateur raptor-enthusiast or birdwatcher and research scientist in mind. In general, the book will do an excellent job of holding the interests of both of those groups. Much of this book is focused on work that has been conducted in Israel, reflecting both the importance of that country to raptor migration research in the region and the extensive field and research experience of the authors in Israel. Much of this information has been published before. Readers unfamiliar with previous publications will find this book a useful and fascinating summary. Readers familiar with the extensive literature regarding raptor migration in Israel will find little new information in this book, with the exception of the first published trend analyses for long-term migration counts in Israel. Much of the information about raptor migration sites outside of Israel in the Middle East is summarized here for the first time beyond technical reports, conference proceedings, and regional publications such as *Sandgrouse*, or the *Bulletin of the Ornithological Society of the Middle East*. I found these new area- and site-summaries exciting and thought provoking, yet not especially thorough, and I was often left with the desire to pursue source references for additional detail. That may not be an easy task for readers outside of the Middle East given the relative obscurity of some of these sources. I had difficulty acquiring some publications through interlibrary loan or by tracking down publishers from the literature cited. Some publications will be inaccessible to readers without a working knowledge of Hebrew or German.

The book is organized into two main sections. The first 40 pages includes a series of short chapters discussing the history of raptor counting efforts in the region, principal routes and numbers, details of flight behavior, and issues surrounding the monitoring and conservation of migrating raptors in the Middle East. The second section includes 43 different one to four page ''species accounts'' that discuss the same topics in greater detail for each species and include trend analyses for the species that are commonly observed during migration in Israel. One of the highlights of this book for me was the short chapter summarizing flight behavior of migrating raptors in Israel. Although much of this work has been published before, this chapter provided one of the most readable summaries of that topic to date. The authors describe in technical yet comprehensible terms how large soaring birds use updrafts and thermals to minimize energy during migration, how flight strategies vary among species, and how that variation is related to flight morphology and is manifested in the behavior of soaring birds. The chapter entitled

''Principal migration routes and numbers in the Middle East,'' is an updated version of text from *Birds of Israel* (Shirihai 1996) and is an outstanding narrative summary of different routes through the region and the importance of each of the main routes to different species. A short, three-page chapter on conservation provides a review of the problems of shooting and illegal falconry harvest during migration in the Middle East. Conservationists working to address these problems should consult this summary and pursue the references cited therein to focus efforts in specific regions. Additional conservation threats to Palearctic raptor populations from human persecution, environmental contaminants, habitat destruction, and electrocution have been reviewed more extensively elsewhere (Bijleveld 1974, Gensbol 1992, and Tucker and Heath 1994).

Although several important bottleneck sites for migrant raptors have been identified, the tremendous potential for migration monitoring of Palearctic raptor populations throughout this region has yet to be realized. The authors repeatedly emphasize the importance of migration monitoring in that region, particularly for species where reliable status or trend information is scarce from breeding or wintering area studies (e.g. the Steppe Eagle [*Aquila nipalensis*] and the Levant Sparrowhawk [*Accipiter brevipes*]). Trend analyses using linear regression are then performed for 10 species that are commonly observed during migration counts in Israel. Those analyses are based on three data sets: the Kafr Qassem (1978–1987) and Northern Valleys (1988–1998) fall migration counts (which are analyzed separately), and spring migration counts from Eilat (1977, 1983, 1985–1988, 1994, and 1997).

Migration counts are notoriously variable. That variation may be related to variation in observation effort (both amount and quality), the effects of weather (which are often unknown), or real changes in population size (Titus et al. 1989). Variation in observation effort can be controlled by rigorous standardization of count participants, protocols, and effort across years; or by standardizing data after-the-fact to passage rates to adjust for variation in observer effort (i.e. birds per 100 h of observation), by ensuring that count sites and number of observers were the same among surveys, and the same range of dates was sampled in each year. After-the-fact statistical adjustment for variation that results from count relocation is difficult to make. Nearby count sites can have very different views or site characteristics that have an unknown effect on the comparability of count data between sites. Migration in Israel takes place across a wide front and the path of migration shifts throughout the day. Changing the location of the count site within that front, or the proportion of that front that is sampled by a count in different years, may have a profound effect on number of observed migrants.

In the ''Methods'' chapter for the trend analyses in this book, very little information is given about variation in effort among years in those surveys. However, previous publications by Dovrat (1991), Shirihai and Christie (1992), and Lesham and Yom-tov (1996) have detailed the large differences in survey protocols and observation effort across years in each of the three data sets used for trend analyses in this book. Count efforts in Eilat have been particularly variable, ranging from the full-season coverage of two observation posts near Eilat in 1987 to a crew of 30 observers manning two to seven stations daily and using radios to coordinate observation efforts to follow the shifting migration front within a range of up to 100 km of Eilat in 1986 (Shirihai and Christie 1992). Trend analyses for Eilat are performed using raw totals from each of these surveys with no correction for inconsistencies in count methods. Trend analyses for the other two surveys are based on passage rates, although the number of stations that were covered in each of these surveys varied among years and it is unclear if that is accounted for in this standardization.

Effects of weather on count totals may be assumed to be random when surveys have been conducted for a large number of years (Allen et al. 1996). However, variation in weather conditions can have a profound effect on a single year's count totals; and in small data sets, those years can have a strong effect on the results of trend analyses using linear regression—particularly when they occupy high leverage positions (e.g. towards the beginning or end of the time series). That is one reason (along with the naturally high annual fluctuations of many raptor populations) that trend analyses are rarely performed for small migration count data sets. Not all the available years of counts are included in each of the trend analyses for Israel. The first four years of the Kafr Qassem surveys and the first two years of spring surveys in Eilat are discarded from the analysis because of the ''learning curve'' of conducting the first surveys in Israel. This selection of years for analysis reduces the Kafr Qassem data set to six continuous years and the Eilat data set to six years of count data over a 13 year period. Data from the Northern Valleys counts covers 11 years, although data for some species are missing for some years within that period.

The authors find negative trends in their migration data for Lesser Spotted Eagles (*Aquila pomarina*) and Steppe Eagles, and claim that those trends indicate ''. . . global population declines'' demonstrating ''. . . an immediate need for international action.'' Given the seriousness of these claims, I looked more carefully at the analyses and interpretation of trends for those species. A recent and thorough review of the status of Lesser Spotted Eagles found their populations to be stable throughout their breeding range (Tucker and Heath 1994). The trend analyses in *Raptor Migration in Israel and the Middle East* show a significant short-term decline in Lesser Spotted Eagle

numbers only for the Kafr Quassem counts between 1982 and 1987 (results of those analysis are significant when performed for birds per 100 h, and not significant when performed on raw totals). The significance of that decline is driven by two high-count years at the beginning of this six-year time series, which could be the result of observer or weather effects in those years or high productivity for Lesser Spotted Eagles in those two years. Counts of Lesser Spotted Eagles have remained consistent throughout the 11 years of the more recent Northern Valleys surveys, and declines were not observed in these surveys. These results are interpreted as representing a ''global population decline.''

Population trends for Steppe Eagles are more difficult to estimate given that most of their breeding range lies throughout Russia and Central Asia, where breeding-season surveys are not regularly conducted. Lesham and Yom-tov (1998) estimate that 30% of the world population of Steppe Eagles migrates through Israel and Egypt into Africa, whereas the remaining individuals use a more easterly route across Bab-el-Mandeb, or winter in Arabia and eastward throughout the Indian subcontinent and southern Asia. The authors claim a ''global population decline'' for this species as well on the basis of the analysis of migration data from Israel. For unexplained reasons, the data for these analyses are treated differently from all other trend analyses for Eilat in this book. Analyses are based on the variable birds per 100 h (instead of the raw total) and count data from 1977 and 1983 (both high-count years), which were excluded from all other analyses, are included in analyses for Steppe Eagles. The significance of the negative trend in this data set is driven by two particularly high count totals in 1985 and 1986, where observers changed their location throughout the day to follow the shifting front of migration, and two low years in 1997 and 1998, where observers were posted at consistent stations near the town of Eilat, on the eastern edge of the front of migration. Although it is clear that migration counts in Israel could be useful in helping assess the population status of Steppe Eagles, these analyses are based upon a small data sets, which may reflect trends in variation of count protocols, weather, or natural short-term fluctuations of raptor populations, and may not be evidence of long-term trends. Claims of global population declines from migration count data in Israel should be interpreted within the context of the limitations of these small data sets. Greater standardization of count effort and protocols, and the more rigorous analysis of larger count datasets, would inspire greater confidence in trend analyses. To infer a global population decline from this data set, when only 30% of the world population of Steppe Eagles migrates through that region, may be potentially very misleading.

Raptor enthusiasts and birdwatchers traveling to that region will have likely already spent a considerable portion of their book budget on acquiring the outstanding—and essential—regional field guides of Shirihai et al. (1996) and Forsman (1998). This audience may find *Raptor Migration in Israel and the Middle East* worthwhile; however, if the reader's primary interest is learning more about numbers and timing of passage of different species of migrant raptors in Israel and throughout the Middle East, Shirihai and Christie's article ''Raptor Migration at Eilat'' in British Birds (1992) will suffice. Birdwatchers that crave more detail about the distribution of raptors in Israel may want to consult Shirihai's *Birds of Israel* (1996), which contains most of the additional recent count information and provides excellent treatment of the status and distribution of all other bird species within Israel.

The researcher or conservationist with a strong interest in raptor migration through the Middle East will probably want to own this book. However, they should realize that much of the information cited in this book is not synthesized or summarized in enough detail to stand alone, and source references will often need to be consulted. Researchers whose interests lie within the eastern Mediterranean and northern Red Sea migration funnel in Israel and Egypt will want to consult several publications that provide additional detail regarding seasonal and weather-dependant shifts in movements of raptors across this wide front of migration (Shirihai and Christie 1992, Frumkin et al. 1995, Lesham and Yom-tov 1998). Those interested in interpreting this book's presentation of count data and trend analysis from Eilat, Kafr Quassem, and the Northern Valleys are strongly recommended to consult Dovrat (1991), Shirihai and Christie (1992), and Lesham and Yom-tov (1996) to assess the large variation in effort (in dates of coverage, number of observers, and number and location of count sites) among the different annual surveys of raptor migration in Israel.

In closing, this book provides a readable and compelling summary of raptor migration and migration-research in the Middle East using a well organized ''species account'' format that includes many outstanding color photos. This summary is not authoritative; however, references for those desiring additional detail are well cited within the text. This book will undoubtedly introduce many readers to the incredible amount of research that has been done in Israel and the Middle East under less-than-ideal political and financial conditions. Readers should evaluate the interpretation of trend data from Israel very carefully, and in the context of other publications regarding trends for Palearctic raptor populations that rely on all available data from breeding season studies to draw inferences on trends across the entire range of a species (Gensbol 1992, Tucker and Heath 1994, and Hagemeijer and Blair 1997).—CASEY A. LOTT, *HawkWatch International and Audubon of Florida, 1800 South West Temple #226, Salt Lake City, Utah 84115, USA. E-mail: caseylott@hotmail.com*

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