

Migration Strategies of Birds of Prey in Western Palearctic

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BOOK REVIEWS

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Migration Strategies of Birds of Prey in Western Palearctic. Edited by Michele Panuccio, Ugo Mellone, and Nicolantonio Agostini. 2021. CRC Press, Taylor & Francis Group, Boca Raton, Florida, USA. 310 pp. ISBN: 978-0367765439. Paperback, \$99.95 and hardcover, \$242.48.

Michele Panuccio, the first editor of *Migration Strategies of Birds of Prey in Western Palearctic*, passed away in June 2019. At the time of his death, he was pursuing a ground-breaking project that eventually became this book. Panuccio's family asked his colleagues and friends Ugo Mellone and Nicolantonio Agostini to complete the book, and they have honored him with its release. We (MAJ and JFT) appreciated being asked to review this book on raptor migration as both of us are raptor biologists studying the migration of raptors at the Austral- and Boreal-Temperate Regions and the Arctic Circle in the Western Hemisphere.

Migration Strategies of Birds of Prey in Western Palearctic brings decades of observations and knowledge on the migration of raptors between the Palearctic region and the Ethiopian and Oriental regions. This compelling book has assembled contemporary data and inference to answer a wide array of questions on raptor migration raised previously by Zalles and Bildstein (2000), such as where do European Honey-Buzzards (*Pernis apivorus*), Lesser Spotted Eagles (*Clanga pomarina*), and Greater Spotted Eagles (*Clanga clanga*) go once they reach Africa? To what extent do raptors, particularly Ospreys (*Pandion haliaetus*), harriers (*Circus* spp.) and falcons (*Falco* spp.) migrate along a broad front across the Mediterranean Sea? This book represents a further and important step in our understanding of the spatial and temporal distribution of Palearctic raptors.

The book is divided into two main sections: the first section involves a single chapter (Chapter 1) providing an overview of raptor migration science in general. This includes a brief history of raptor migration studies, and migratory behaviors and patterns observed in migrating raptors across the western Palearctic. The first chapter also covers the four primary techniques applied to study the migration movement of raptors (migration counts, banding/ringing recoveries, radar, and satellite tracking), conceptual frameworks to understand the diverse set of migration patterns across species, and ends with a brief overview of the current conservation context for raptors. The second section involves 32 chapters (Chapters 2–33),

which provide species-specific accounts, sorted in taxonomic order. The studied species are the ones that breed across the Palearctic and migrate south on a north-to-south axis to overwinter across Europe, Africa, the Middle East, and Asia, with one exception, the Long-legged Buzzard (*Buteo rufinus*), which migrates on a more or less south-to-north axis breeding during late-autumn and winter in the Middle East and spending the nonbreeding season within the Caucasus.

The combined 33 chapters include a staggering list of over 1300 references encompassing peer-reviewed articles, books, and the so-called gray literature published up to 2020. These chapters were crafted through a remarkable collaboration of 60+ coauthors who contributed the species accounts. Additionally, the book is illustrated with 40+ maps showing the main raptor migration watch sites in the western Palearctic, migration routes of telemetry-tracked individuals during both autumn and spring seasons, schematic representations of the main migration routes for those species that have not yet been tracked individually, the spatial distribution of banding/ringing recovery data, and the breeding and nonbreeding distribution for almost all species.

Also mentioned throughout the book are 32 raptor migration monitoring watch sites where researchers assess the migration phenology and abundance during autumn and spring migration seasons. It is also evident from the data presented that raptor migration studies now extensively use telemetry techniques to understand the annual cycle of raptors in the Palearctic. Indeed, at the time of publication, only three (Levant Sparrowhawk [*Accipiter brevipes*], Eurasian Sparrowhawk [*Accipiter nisus*], and Merlin [*Falco columbarius*]) of the 32 species covered in this book had not been tracked in the Palearctic using telemetry. These innovative techniques allow the tracking of individuals over long distances and long periods (GPS devices) and the recording of behavioral and physiological information (bio-logging), both of which open new paths for research at multiple scales. This book would have benefitted from a descriptive overview of the various technologies used to help the reader understand the robustness of the data on the migration behavior of the assessed species. Moreover, as we are aware from other species and situations (Steenhof et al. 2017), consistency in telemetry terminology across the chapters would have been very helpful for the readers as well.

The information provided in these 32 chapters shows that raptor migration across the Palearctic is diverse in terms of migration behavior displayed at the intra- and inter-specific levels. Species-specific accounts show migration behavior results from variables such as day length

(photoperiod) over the year and life-cycle stage (age-class) that promote behavioral and physical changes which result in migratory movements that do not necessarily represent seasonal movements. Species such as the European Honey-Buzzard, Short-toed Snake-Eagle (*Circaetus gallicus*), and Booted Eagle (*Hieraetus pennatus*) make long-distance and seasonal movements, migrating mostly using thermals and deflection updrafts. In contrast, the migration behavior of the Griffon Vulture (*Gyps fulvus*), Eastern Imperial Eagle (*Aquila heliaca*), and Saker Falcon (*Falco cherrug*), which can sometimes include long-distance movements, appears to be age-dependent. In these species, juveniles exhibit seasonal migration, but soon reach their definitive adult plumage, establish a territory and become year-round residents, losing their migratory tendencies. In other species, such as the Egyptian Vulture (*Neophron percnopterus*), which shows delayed plumage maturation, the immature age-classes remain in the wintering grounds in tropical Africa until they have acquired the definitive adult plumage. As a result, understanding these migratory behaviors is critical because perturbations for any age-class may ultimately drive population dynamics and bring conservation challenges. We believe that interspecific comparisons such as those described very briefly here would have been relevant in a synthesis chapter.

The western Palearctic is roughly defined as Europe, northern Africa, the northern Middle East, and western Asia to the Ural Mountains. In this context, it is unclear why the Crested (Oriental) Honey-Buzzard (*Pernis ptilorhynchus*) and Amur Falcon (*Falco amurensis*) were treated in the species-specific accounts, as both breed in the eastern Palearctic and overwinter in southeast Asia and southern Africa. In contrast, the Cinereous Vulture (*Aegypius monachus*), Northern Goshawk (*Accipiter gentilis*), and Gyrfalcon (*Falco rusticolus*) are absent from the species-specific accounts, though all three breed in the western Palearctic and exhibit seasonal movements (Potapov and Sale 2005, Kenward 2006, Gavashelishvili et al. 2012, Efrat and Hatzofe 2021, Fink et al. 2021).

The book is intended for a wide audience ranging from movement ecologists to professional ornithologists and amateur birdwatchers. However, to better serve such a diverse audience, the book would have benefited from having a glossary to help readers better understand conceptual frameworks. For example, the phenomenon of differential migration (by age and sex) and its consequences in terms of timing and geographical distribution has important implications for conservation of migratory raptors, and definitely warrants a clear definition for the reader to fully appreciate. Additionally, a standardized approach of mapping and reporting all geographical locations mentioned in the text would have helped readers unfamiliar with the region (especially those readers outside of the western Palearctic) through each of the chapters as they progress through the book and become familiar with the geographic locations.

Common definitions are increasingly important in raptor ecology (e.g., Steenhof et al. 2017) and given the wide variety of behaviors observed during migration, clearly defined terms become critical. We believe the book (and future books and peer-reviewed papers on migration) would benefit with clear definitions of several terms used widely throughout the book (e.g., what do “migration strategies” or “western Palearctic” refer to?). Moreover, a general discussion and conclusive chapter following the 32 species-specific accounts would have been helpful for the general reader. We suggest the readers of the book would have benefited from an interpretation and discussion of the diverse migration triggers and distances, as well as the main migration flyways that comprise regional “corridors” and local “routes” along which raptors concentrate while migrating, and locomotion modes (soaring vs. powered flight) as a whole. Thus, defining the set of migration flyways in the western Palearctic is critical to understanding the geographical barriers that individuals from different populations must confront. Because species-specific accounts are arranged in a taxonomic order rather than being sorted according to migration behavior or overall regions (boreal to temperate zone vs. trans-equatorial), it was not easy to get a clear picture of the global migration patterns of raptors through the Palearctic.

Lastly, over the past decade, citizen-science initiatives such as eBird (<https://ebird.org>) have brought new approaches to assess the spatial and temporal movements of migratory species and have contributed to enhance our overall knowledge of population ecology of raptors (Fink et al. 2021, Zimmerman et al. 2022). Indeed, in late 2021, eBird released distribution maps for several migratory Palearctic raptors showing the overall abundance change in space and time for species such as the Black Kite (*Milvus migrans*), Northern Goshawk, Rough-legged Hawk (*Buteo lagopus*), Egyptian Vulture, and Peregrine Falcon (*Falco peregrinus*; Fink et al. 2021). It is likely that citizen science initiatives will increase our understanding of raptor migration across the globe, especially within the context of rapid global changes due to anthropogenic factors. This aspect could also be considered in future research avenues or whenever a second edition of *Migration Strategies of Birds of Prey in Western Palearctic* becomes warranted.

Despite the above comments, we acknowledge that writing, compiling, and editing such a book is no easy task, with or without the guidance of the author who conceived the idea. We appreciate all the hard work that went into creating this book, and agree that it provides the most comprehensive and up-to-date detailed descriptions of migratory behavior for an astonishing 32 raptor species, with accompanying literature cited. We found great benefit to having this book available to us as researchers studying the movement ecology of raptors, and we believe that readers of the *Journal of Raptor Research*, wherever on the planet they reside, will find this book augments their knowledge of migration. Finally, we believe this book will become a necessary reference for future study and

conservation efforts within this broad region, and we agree with the editors that this book will become a tool to transmit passion and knowledge to new generation of ornithologists.—**Matías A. Juhant (email address: matias_juhant@yahoo.com.ar), Instituto de Bio y Geociencias del Noroeste Argentino (IBIGEO-CONICET), Av. 9 de julio 14, Rosario de Lerma, Salta 4405, Argentina, and Acopian Center for Conservation Learning, Hawk Mountain Sanctuary, 410 Summer Valley Road, Orwigsburg, PA 17961 USA; and Jean-François Therrien (email address: therrien@hawkmountain.org), Acopian Center for Conservation Learning, Hawk Mountain Sanctuary, 410 Summer Valley Road, Orwigsburg, PA 17961 USA.**

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