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BEHAVIOR OF THE GOLDEN EAGLE: AN ILLUSTRATED ETHOGRAM.

David H. Ellis (illustrated by N. John Schmitt). 2017. Hancock House Publishers Ltd., Surrey, British Columbia, Canada. 96 pages. \$29.95 (paper). ISBN: 978-0-88839-078-3.

Author David H. Ellis and illustrator N. John Schmitt deliver precisely what is promised in *Behavior of the Golden Eagle: An Illustrated Ethogram*. This “little volume,” as the author coins it, represents a single source for defining, identifying, and describing behaviors of the Golden Eagle (*Aquila chrysaetos*). With the inclusion of Schmitt’s exceptional drawings, the book is a piece of art, as well as the most useful manual describing Golden Eagle behaviors. Nearly four decades earlier, Ellis (1979) authored the very first Golden Eagle ethogram—the set of repeated standard behaviors for a species called action patterns—and in his new book, he has now synthesized and refined these descriptions to provide the true essence of the species in a format that is widely accessible and useful for many other species.

Ellis has published more than 100 papers on birds of prey and has studied Golden Eagles across the world in their extensive northern circum-hemispheric range. As author of *Enter the Realm of the Golden Eagle* (Ellis 2013), he collected and contributed to a nearly 500-page non-fictional anthology of accounts of the Golden Eagle in its habitats around the world. Schmitt, a decorated wildlife artist and biologist, specializes in scientifically accurate depictions of birds. Among other products, his artwork is highlighted in two field guides on raptors in different parts of the world (Clark 1979, Clark and Schmidt 2017). In Ellis and Schmitt, we see a pair of highly qualified individuals collaborating to produce a remarkably unique view of Golden Eagles and their behaviors.

The brief introductory chapter is co-authored by Ellis and James W. Grier, who currently is a Professor Emeritus at North Dakota State University and was my graduate school advisor for my doctoral research and dissertation. Grier is an internationally recognized eagle biologist and an author of an early animal behavior textbook (Grier 1984). The Introduction to *Behavior of the Golden Eagle: An Illustrated Ethogram* sets forth the foundation of the science of ethology and would be beneficial to anyone who is interested in better understanding animal behavior and what specific postures likely mean in certain contexts. The chapter provides rationale for the naming system for behaviors being predicated on actions (i.e., *Bill Wipe*) rather than assumed functions (i.e., *Cleaning Bill*). The Introduction also serves as a bit of history lesson to provide context for the discussion that follows. There is, however, no clear distinction of Grier’s participation and contributions here and elsewhere in the book, and a general reference to “we” throughout the text confounds the contributions among Ellis, Schmitt, and Grier.

A good deal of the behavioral information appears to come from direct observations by Ellis and is described using past tense as if he were writing a scientific report. Indeed, the book includes a Methods section, but in lieu of describing the methods used to collect the reported data, the section focuses on standard recommendations for conducting research on Golden Eagles, such as maintaining an appropriate distance from nests. This could be avoided by a more descriptive section heading such as Eagle Research Methods. These irregularities may lead to minor confusion to the reader, but the information and knowledge shared throughout the text is relevant and accurate.

The book is sectioned into the major behavioral categories that might be expected including maintenance (sleeping, care of body surfaces, thermoregulation), locomotion (flight, ambulation, swimming), predation (locating prey, attacking, subduing, preparing), ingestion and elimination, social behaviors, territoriality, and parental care. What is truly unique about Ellis’ approach is that the behaviors are covered in chronological order from the perspective of the bird: action patterns appearing earlier in life are described first, while parental behaviors of mature eagles are described last. Sequential ordering and more than 50 numbered figures (including more than 100 hand-drawn illustrations by Schmitt of eagles in various postures and planes) make it easy to visualize the behavioral repertoire of the eagle and to understand the terms describing each behavioral act

Aside from the exceptional flow displayed in the Introduction, the text relies on brief descriptions and definitions of behaviors to drive the narrative. Of course, the book is not intended to be a novel, but not every reader will find the long series of behavioral descriptions to be engaging. Behaviors are described in sufficient, but succinct detail, and frequently include a deep knowledge of the species and anecdotes to support inclusion of the action in this ethogram. Readers who are looking for concise, but explicit, descriptions of action patterns will appreciate this format and find it easy to use

The softcover format of the “little volume” seems unique considering its utility as a manual for studying eagle behavior. The almost cartoonish cover art does not belie the quality of the science within. In general, the behavioral descriptions have been refined through several decades of working with the species and are logical in arrangement. There are times when certain behaviors, particularly vocalizations, are based upon a single observation or similar accounts from other scientists. These behaviors seem to have been included to provide a breadth of potential vocalizations, while other physical behavioral actions were combined for the sake of space and establishing standard definitions.

The book provides many user-friendly accessory sections including a Table of Contents that provides a full outline of specific behaviors, a brief Glossary that focuses on falconry-based vocabulary that often are misused in ethology, a

Thematic Appendix that provides behavior terminology listed under themed sections, and an Alphabetical Index of all behaviors described. An excellent list of references and deference to broader works reinforce Ellis' goals in producing this work. The Conclusions section focuses on using the book to identify aberrant or new behaviors to identify signs of illness or stress.

In summary, *Behavior of the Golden Eagle: An Illustrated Ethogram* is a fantastic resource for anyone interested in better understanding the Golden Eagle, closely related species, or using the ethogram to develop research guides for loosely related species. This book represents a wealth of primary source knowledge gained from nest watching, raising, and living with Golden Eagles. This book is designed for the scientist, the birder, and the enthusiast, and will serve each equally well. My hope is that this review will help people recognize what they are getting with this publication—an excellent set of behavioral characteristics of Golden Eagles built upon a lifetime of observations that can be used to guide investigations and investigators well into the future.—*Jeremy E. Guinn, Department Chair, Environmental Science Department, United Tribes Technical College, 3315 University Drive, Bismarck, North Dakota 58504, USA.*

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