

Book Review: Flight Strategies of Migrating Hawks

By Paul Kerlinger. The University of Chicago Press, 1989. 375 pp. Hardcover, \$60.00; softcover, \$19.95.

By William Murphy

This timely book by Paul Kerlinger, Director of the Cape May Bird Observatory, is a milestone in raptor research. He brings together diverse data, provides thoughtful analyses by use of techniques from many disciplines, and, perhaps most stimulating of all, points out the shortcomings of current research and suggests directions for future research. He clearly shows that natural selection favors hawks with flexible migration strategies over those with rigid, stereotypic behavior.

Kerlinger's book is a needed link in the literary chain. Texts by Maurice Broun, Don Heintzelman, and Jim Brett originally got us to the hawkwatches, where we learned to appreciate hawks and hawk migration. More recently, publications such as Bill Clark's *Hawks* and Pete Dunne's *Hawks in Flight* helped advance raptor identification. Over the years the major goal of hawkwatching seems to have shifted from identifying hawks to counting them; in fact, according to Pete Dunne, the hawkwatchers' motto is "Veni, vidi, computave" ("I came, I saw, I counted").

Kerlinger acknowledges that traditional hawkwatching educates the public and allows monitoring of population trends but thinks that to provide data for meaningful analyses of migration we must use much more sophisticated techniques such as radiotelemetry. He claims, and rightly so, that data collected at hawkwatching sites are biased by many factors, the greatest of which is that the sites themselves are popular because more hawks are seen there than elsewhere. Other conspicuous biases that affect the accuracy of hawkwatch counts are the facts that 1) unknown thousands of hawks fly higher than we can see them, 2) many migrate across a broad front, far from any hawkwatch, 3) we miss an unknown but large percentage of them every year at every hawkwatch site, and 4) we obviously miss all that migrate anywhere else. Even though adjustments can be made to minimize known biases, the combination of biases renders hawkwatch data terminally imprecise.

The first part of the book is an overview of raptor migration, ecology and geography, natural selection, research methodology, and atmospheric structure. Then follows an analysis of raptor aerodynamics: flight

mechanics (theory, empirical research), direction (roles of wind, topography, geography), altitude, visibility, flocking, water crossing, speed decisions (maximizing distance traveled), daily distance (simulations, data), and flight strategies. The final part consists of a rigorous analysis of raptor flight along with Kerlinger's thoughts on future research. He ends each chapter with a lucid summary and conclusion--a nice touch, I think. Summarized in Appendix 1 are the migratory tendencies of 133 species of Falconiformes and in Appendix 2 the differential migration patterns among the Falconiformes (seasonal timing of spring and autumn migration, geographic distribution during the nonbreeding season, and species in which males and females migrate or overwinter separately).

The bibliography merits special praise for its completeness and narrow focus, namely hawk migration and supporting subjects. Through this resource a reader can easily find background material to help clarify the more difficult concepts.

The material covered varies from light to very difficult. Kerlinger synthesizes accepted theories with his own remarkable insights, so new ideas are frequent. This slows the reading rate drastically and also makes me inclined to call this book outstanding. At the very least, Kerlinger's treatment of the subject marks a sharp advance in the quality and type of information now available on raptor migration. But for every gain there is a loss. I felt enriched yet crestfallen after finishing the book. Hawkwatchers have become expert at discerning, identifying, and counting hawks. Whether they stand braced against ridge top quartzite facing bitter November winds or broil on sandy shores in August, they assume that they are pushing back the frontiers of science. Yet Kerlinger proves the unreliability of statistics obtained through serendipity. His conclusions are inescapable. We do need more direction to our research, improved methods, and better analyses of the data. We do need increased funding for baseline research. But some hawkwatches are enormously important in monitoring populations of species such as the peregrine falcon. The data accrued at such sites may be imprecise, but it is valuable nonetheless.

Abandonment of these "optical" sites in favor of telemetry-based stations would be a loss.

Kerlinger's overall attitude is positive. He logically develops a basis from which "new" questions might be asked. Instead of "Were these hawks the same ones that were here yesterday?" or "Did I see any of these sharpies here last year?" his methods will enable us to ask much different kinds of question, such as "Why is this hawk gliding while that one rides a thermal?" and "Which technique is more efficient?" and "What decisions will these species have to make when they come to Delaware Bay?" Data generated at hawkwatches by binocular-equipped birders cannot address such questions, or at best the answers will be only speculative, whereas answers will be forthcoming and correct if obtained through the use of techniques described by Kerlinger.

Interesting though the book is to hawk enthusiasts, I think it may intimidate generalist birders looking for easy reading. Kerlinger's work is a motherlode of science, a banquet of fresh ideas. But be forewarned: his is a scholarly work, the reading of which requires dedication and perseverance. As the *I Ching* promises, "Perseverance furthers."