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The Goshawk

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Pileated Woodpeckers (*Dryocopus pileatus*). The detected birds are described as flying like loons; they are fast, agile, and incredibly wary. If there is one red flag that stands out in all the searches including Hill's, it is that the birds are almost never seen perched, and they are seldom seen by more than one observer at a time.

If and when the Ivory-billed Woodpecker is sufficiently documented by physical evidence, Hill's bark adhesion measuring device and his detailed descriptions and photographs of potential Ivory-billed foraging evidence, including bark peeling, bark stripping, and chiseling, should prove quite valuable. I did find some of his evidence a bit underwhelming. The photo of a cavity-ridden old cypress on p.148 looks suspiciously like aged knotholes from old fallen branches rather than woodpecker-excavated holes. Hill's contention that only woodpeckers can excavate large cavities in living trees is probably true, but certainly there are animals out there that can enlarge cavities, including all of the woodpeckers, raccoons (*Procyon lotor*), various tree squirrels, and insects, plus various fungi and wood rot.

The evidence collected is suggestive, and the sightings plausible but exasperatingly short. Both students and professor had hoped for much more. Still one must remember that no one is an expert at finding ivory bills, despite claims to the contrary. Tanner was taken to his Tensas River birds, and his one-day August search and subsequent write-off of the steamy Pearl River belie any thorough survey of a southern river system. Read the now six books on the subject, do some bottomland kayaking and bayou wading, dodge a few hazards, and your knowledge base can be as good as the next person's. If the bird still exists, maybe it will be the deer hunter or angler with a camera who finally captures ornithology's most wanted portrait, not phalanxes of birders and kayakers tromping and paddling through the bottomlands and scaring the woodpeckers to the next county.

Hill notes that virtually no remote swamp in the Florida panhandle has been legitimately searched for Ivory-billed Woodpeckers since collectors stored their shotguns 100 years ago. Until these swamps and those great river swamps in the Carolinas, Louisiana, Arkansas, and elsewhere are thoroughly searched by repeated visits of competent observers in the narrow window of opportunity that these difficult ecosystems present, any final chapter on this species shall be left unwritten.

Perhaps it is the collective guilt of losing the most abundant bird ever to grace the North American skies, the Passenger Pigeon, *Ectopistes migatorius*, which engenders among ivory-bill searchers a reluctance to accept the possible fate of another magnificent bird that steeply declined at about the same time that the pigeon population winked out. Perhaps there's an incentive to make things right for the species this time around. No doubt, too, it is partially the rich cultural heritage of a bird storied in tales and art, from Audubon's superb portrait and the hotel room–destroying capers of Wilson's captive young bird to the early photographs and James Tanner's intimate natural history of a single family of Louisiana ivory bills for his doctoral dissertation. I clearly remember the words of the late Maryland ornithologist Rick Blom, terminally ill in a Pearl River, Louisiana motel room, and able to search the forests for only an hour or two a day, saying that any birder worth his salt *had* to participate in this search, for no ornithological quest on the North American continent could be more fulfilling.

Perhaps the 21st century Ivory-billed Woodpecker is only the bird woman Rima from William H. Hudson's *Green Mansions*, calling one to adventure and self-assessment in the green canopies of the mystical bottomland forests. If conservation gains and natural history knowledge result from these investigations, even if no Ivory-billed Woodpecker is ever photographed, the efforts will not be in vain. The cypress-dwelling Chimney Swift *Chaetura pelagica*, golden swamp warbler, wintering Rusty Blackbird *Euphagus carolinus*, and snake with the white mouth will still have a home.

Followers of the ongoing ivory-bill saga will turn each page and follow each kayak stroke in great anticipation of learning clues to the natural history of this enigmatic species, while nonbelievers will likely remain unconvinced of the woodpecker's existence. The openness and abundance of the data that Hill shares with the reader should, however, impress even the most cynical of doubters. The author has made an important contribution to the natural history of the Florida panhandle and, if the search efforts ultimately prove fruitful, to the life history of one of the continent's rarest birds. —ROBERT P. RUSSELL, U.S. Fish and Wildlife Service, Division of Migratory Birds, 1 Federal Drive, Fort Snelling, MN 55111-4056, E-mail: Robert_Russell@fws.gov

The Goshawk.—Robert Kenward. 2006. T & AD Poyser and Buteo Books, London and Shipman, VA. 360 pp., 10 black-and-white and 23 color illustrations. ISBN-13: 9780713665659; ISBN-10: 0713665653. $52.50 (cloth).

Your first encounter with goshawks (*Accipter gentilis*) often leaves an impression that lasts a lifetime, especially if it involves being attacked by an angry female as you approach too close to her nest. I still clearly remember my first encounter when, as a 7th grader, I was invited to the field by two falconers who were hunting a brace of goshawks (i.e., two birds hunting simultaneously) in the scrub oak–covered foothills just west of Denver, Colorado. Both birds sprang from the falconer's fist as a cottontail rabbit (*Sylvilagus nuttallii*) darted through the scrub oak. The inexperienced juvenile goshawk tried to follow the rabbit's every move until a quick 90° turn left the young hawk grounded below a wire fence. Meanwhile, the other goshawk, an experienced six-year-old female, gained elevation to watch the action. The female then began a powered dive that was perfectly timed to the moment the rabbit tried to shoot across a small opening. She struck the rabbit with such force that both predator and prey tumbled and crashed through the surrounding brush. Goshawks have also left their impression on human history, riding on the fists of Japanese shoguns as status symbols or when providing game to the family cooking pot of 18th century falconers. Therefore, it is fitting that a treatise on goshawks be written by a scientist whose life experience extends beyond scientific inquiry to include a visceral and heartfelt relationship with the species. Robert Kenward's handsome book *The Goshawk* is such a work.

Kenward's book is organized into 10 chapters, with a prologue, forward, and appendices. The brief prologue describes an experience that Kenward had with his captive goshawk, Miss Piggy, a subject of his studies on predation. The prologue and forward set the style for the book, as Kenward begins each chapter with an interesting anecdote, which softens and lightens the book's scientific focus. The chapters span the life history and management of goshawks, including taxonomy, weights and measurements, nesting and brood rearing, movements, diet and prey selection, demography, human interactions, and conservation. Kenward's passion for conservation is an important strength of the book. He ends each chapter with a conservation message, and the final chapter is dedicated to that topic. The first appendix is simply a list of scientific names mentioned in the text, and the second, a list the references that were cited in the figures. The book is thoroughly indexed so it is easy to locate subjects and

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is visually interesting, with 137 figures and 23 color photos displayed on eight center pages. Readers will especially look forward to the first page of each chapter, each of which is graced with an excellent line drawing by Alan Harris.

Goshawks are distributed broadly across Eurasia and North America. This diverse landscape contains barriers to gene flow, which fosters ecotypic variation of physical and behavioral attributes depending on population connectivity (Mayr 1970). Chapter 1 helps readers sort through the differences in goshawk plumage characteristics and races that extend across the species' Holarctic distribution. This topic can be confusing, given the variation in size and plumage of goshawks across clines and the often-conflicting nomenclatures and taxonomies present in the literature. Based on physical measurements and coloration, the author describes four racial types across Eurasia, including *gentiles, buteoides, schvedowi* and *albidus.* The North American racial type, *atricapillus*, separates from Eurasian types, but it is still unclear if this race should be split into two additional races: *laingi* on west-coast islands and *apache* in the southwestern U.S. A discussion of ecotypic variation of races from a genetic perspective would have been an excellent addition if those data were available. Kenward did use genetic relationships to discuss goshawk evolution relative to other species; goshawks (and other accipiters) are most closely related to harriers (*Circus*) compared to other taxa within Accipitridae.

Chapter 2 provides a detailed look at the variation in linear measurements and seasonal changes in mass that occur within sexes based on banded birds and museum specimens. Persecution of goshawks in central and southern Sweden in the 1970s allowed researchers to study seasonal changes in body composition based on collected birds. The author interprets these measurement data within an ecological context relative to foraging and reverse-size dimorphism (i.e., females being larger than males). In evaluating reverse sexual size dimorphism, Kenward considers alternative hypotheses that include female dominance, benefits of dietary separation for feeding young or overwinter survival, nest defense, and the combined advantage of nimble males for foraging and enhanced reserve storage in females. This latter hypothesis may be particularly plausible because female goshawks, like other raptors, may be especially vulnerable to egg damage in their oviducts compared to other avian taxa due to the strenuous effort required to capture prey. Meanwhile, data suggest that a small body size may give nimble males a foraging advantage, with better hunting ability, load carrying, and flight endurance per unit food. Thus, the author contends that both the vulnerability of females and dietary divergence between sexes may convey an evolutionary advantage for reverse dimorphism in goshawks that depends on diverse assortments of prey.

Chapters 3 and 4 provide detailed discussions of nest selection, behavior, egg production, incubation, feather growth, molting, and rearing of young. These issues are fundamental to conservation because they directly affect productivity and population persistence. Kenward begins this section by describing the physical characteristics of nests, including the structure and composition of forests that provide nest sites and nest stands (100–200 m radii from nest). He then describes parental behavior during nesting and the development of young until fledging based on populations across the species' distribution. Described behaviors include courtship, flight, calling, territoriality and nest building. Although the North American race *atricapillus* exhibits ecotypic differences from Eurasian races in term of size, coloration, and some behaviors (e.g., nest defense), it is unclear if ecotypic differences may extend to habitat selection at nest sites. Kenward mentions that goshawks nest in mature forests, but he stresses the breadth of habitats used for nesting, including the urban parks of Hamburg. This emphasis downplays the importance of managing the spatial and temporal configuration of mature forests that provide primary nest habitat for many North American populations. Habitat selection across ecological scales receives less consideration than other issues, such as factors affecting clutch sizes and sex ratios.

Understanding movements and population connectivity is especially important to the conservation of insular populations at the southern extent of the species' range. Chapter 5 begins by explaining how bird bands, radio tags, and other markers have been used by scientists to decipher goshawk movements. Based on marked birds, Kenward discusses patterns of dispersal as influenced by sex and food abundance. He then broadens his discussion of movement to include migration and the periodic irruptive movements of goshawks nesting in boreal forests of North America in response to changing snowshoe hare (*Lepus americanus*) densities. Winter movements receive only a cursory discussion due to limited data. Kenward ends the chapter by discussing prenuptial movements and site fidelity. His effort to discuss movements and site fidelity within an ecological context is an important strength of the chapter.

Goshawks employ a short-stay or salutatory hunting strategy (O'Brien et al. 1989, Kennedy 1991) when foraging. Chapters 6 and 7 provide detailed discussions of this foraging strategy in terms of flight distance, perch times, habitat use, and prey selection. The detail presented in these discussions will satisfy the most ardent goshawk enthusiast but may overwhelm casual readers. For example, nearly 14 pages are dedicated to describing foraging behavior across lowland Britain and Fennoscandia based on research from the early 1970s to the present. The author also provides brief discussions of goshawk foraging in North America. Based primarily on European studies, Kenward informs readers of how prey abundance affects goshawk spatial use, and how latitude, altitude, and seasonal factors affect the diets of nesting birds. We also learn that diets differ at a continental scale with goshawks foraging more on mammals in North America compared to Europe.

Goshawks face significant challenges when selecting prey because they forage on highly mobile species within diverse landscapes and habitat types. Kenward takes a mechanistic approach in understanding goshawk predation and its impacts on prey populations by investigating the specific factors that affect encounter and detection rates relative to attack success. Based on flying trained hawks at quarry and his own field observations, the author explains how flock size and other factors affect prey vulnerability and selection. Kenward is also interested in how raptor predation affects prey populations, given the heavy persecution of goshawks in Europe by hunters, game farmers, pigeon fanciers, and poultry keepers. He provides a balanced review of predation studies, some showing that goshawks cause "predatory depression" of prey populations, whereas others document little impact. The author concludes by stressing that diverse interest groups need to work together in order to find the innovative solutions necessary to reduce goshawk predation on game farms.

In Chapter 8, Kenward considers the demography of goshawk populations in terms of productivity, mortality rates, and density. He discusses how clutch size, weather, predation, and disease influence the size of fledged broods. Readers then learn about the spatial and temporal variation in productivity. For example, four pages are dedicated to a discussion of how prey abundance, such as changing grouse densities, influences brood size. The author also describes how individual characteristics, like the age of the female,

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influence productivity. This is important according to Kenward because a small percentage (8%) of females produce over 50% of offspring. Thus, the high fitness of a few females provides a mechanism for natural selection to act rapidly in goshawks. The chapter also presents an overview of age-specific survival rates based mostly on European banding and telemetry studies. The author ends the section by presenting simplified population models given estimated vital rates and by discussing population regulation in terms of territoriality and male provisioning. Although the author synthesizes demographic information when possible, in this chapter, like the rest of the book, he presents information on a study-by-study basis that may be tedious to some readers.

Kenward concludes the book with chapters on falconry and conservation, which are worthwhile additions, given the prominent role that goshawks have played in human history. He begins his discussion of falconry by presenting a general history of the sport followed by several pages that describe the steps for training goshawks. Next, he describes mortality factors and rates of trained goshawks and their use in captive breeding programs. Discussing falconry in a scientific context is important because preservationists and wildlife mangers often have conflicted views of the sport. Falconers served goshawk conservation in Europe by reestablishing populations in Britain and by providing expertise in raptor handling and captive breeding, yet there remains concern that taking wild hawks may reduce local populations. The author has an obvious personal interest in falconry, and he has used trained hawks to study goshawk foraging and breeding behavior. He concludes the chapter by stressing how the techniques developed by falconers to trap and relocate hawks have effectively reduced predation on game farms without the need to destroy goshawks.

Kenward thinks that goshawks are important to conservation due in part to their vulnerability to human-induced pressures, but also because their common and widespread status allows for conservation opportunities. He begins his discussion of conservation with a succinct review of how pesticides affected goshawks in Europe. Next, he discusses how well-intentioned efforts to protect and propagate Eagle Owls (*Bubo bubo*) resulted in increased predation on goshawks in Europe, and how anthropogenic reductions on prey populations may have increased the vulnerability of populations in times of food shortages.

A primary conservation concern of land managers in North America and in parts of Europe is the effect on goshawks of forest management and habitat protection. Habitat concerns receive cursory mention, but the conservation chapter would have benefited from an in-depth discussion of forest management as a primary issue. Kenward repeatedly states that goshawks are adaptable to human disturbance and that they are able to nest in small forest stringers and woodlots. Although true, forest management is still of primary conservation concern for the species (Squires and Kennedy 2006), and it seems appropriate for this book to have included a substantial discussion of the subject. Kenward concludes this chapter by stressing the importance and efficacy of conservation built on trust and cooperation. He contends that conservation partnerships start with shared knowledge, and he hopes this book is a step toward that end.

I enjoyed the book and found it both interesting and informative. The primary strength of Kenward's book is that he compiled a detailed account of goshawk ecology in one volume that extends across the species' range. The number of studies referenced in this book across the species' Holearctic distribution is truly remarkable. Most of the studies discussed in the book are from Europe and provide new and interesting insights to North American readers. Some discussions of the species' life history are based on anecdotal data with small sample sizes, while others are based on rigorous research. The level of detail in chapters varies according to our understanding of goshawk ecology. Many aspects of goshawk life history are still poorly understood, and our limited understanding is often a function of small sample sizes; the inclusion of sample sizes in the text and especially the figures would have helped with interpretation. Another important strength Kenward's book is the conservation theme that ran throughout the work.

In summary, the in-depth approach of this book will appeal primarily to researchers, ornithologists, raptor enthusiasts, and falconers who will benefit from the detailed account of goshawk life history. The appeal to a general readership may be limited, but the anecdotes throughout the book broaden its audience by providing a connection to the author. This book should be included in university libraries as an authoritative reference on goshawks.

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