

better account of avian evolutionary history. Until then, I can recommend the current edition of Feduccia's book without hesitation to all ornithologists and others interested in the origin and evolutionary history of birds.—WALTER J. BOCK, *Department of Biological Sciences, Columbia University, 1200 Amsterdam Avenue, Mail Box 5521, New York, New York 10027, USA.*

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The Giant Canada Goose, Revised Edition.—Harold C. Hanson. 1997. Southern Illinois University Press, Carbondale. xxvi + 252 pp., 78 black-and-white plates, 31 tables, 21 figures. ISBN 0-521-63326-5. Cloth, \$29.95.—The first edition of *The Giant Canada Goose*, published in 1965, was a classic monograph spanning topics such as the rediscovery of this subspecies (once thought extinct) to its current annual changes in body composition and its nutrition. As acknowledged in the preface, the revised edition reproduces the first edition in its entirety and adds three appendices, the only new material in the book. However, the world has changed considerably in the last 35 years, and readers of the revised edition who might be expecting current material will find this text to be out-of-date. Nevertheless, for readers that have not read the original edition, the revised edition provides an interesting view into the world of zoology in the mid-1960s. Because the original edition makes up more than 90% of the revised edition, in this review I describe the original edition plus the new material.

The revised *Giant Canada Goose* consists of 15 chapters and three appendices. Chapter 1 is a delightful history of the rediscovery of the Giant Canada Goose, *Branta canadensis maxima*, which was thought to be extinct in the first half of the 20th century. Hanson includes excerpts from numerous letters between scientists (including Grinnell), amateur goose enthusiasts, and federal and state biologists from 1922 to 1940. Correspondence from Alexander Wetmore and Ira Gabrielson is also reproduced in this chapter. The letters provide an engaging view of a time when the most prominent ornithologists were also involved in applied questions of interest to the general public. Of course, except for museums, ornithological research was supported only if it had a directly applied nature. Today's scientists could, nevertheless, learn from the interactions among these different groups who had an interest in Canada Geese.

In Chapter 2, the author analyzes physical characteristics of *B. c. maxima* and related subspecies, including *B. c. canadensis*, *B. c. interior*, and *B. c. hoffitti*.

This chapter contains data available in 1965 on morphological measurements of geese shot by hunters or collected for scientific purposes. Several extensive tables include these data which, in some cases, have been analyzed little beyond the raw state. For those interested in reanalyzing data for comparative purposes, however, this and other chapters provide a rich source of data. This chapter also contains comparisons of plumage characteristics for the large subspecies of Canada Geese. Hanson describes several features of Giant Canada Goose plumage, including the high incidence of white neck rings and white forehead patches. In this chapter, however, Hanson reveals the circular reasoning that has plagued his hypotheses for the past two decades: despite pointing out in the next chapter that the range of *B. c. maxima* is defined primarily by the prairie biome, he indicates that a population of Canada Geese nesting in western Idaho may be *maxima* based on their size. Although it is easy to criticize a text written in the early 1960s, Hanson has not modified his view that variation in size and plumage is primarily genetically determined despite much evidence to the contrary (Van Wagner and Baker 1990).

In Chapter 3, which describes the historic breeding range of *maxima*, Hanson argues that *maxima* was primarily a bird of the midcontinental prairies whose range extended into deciduous forest east of the prairies and the areas surrounding the Great Lakes. Generally, Hanson's account is an interesting compilation of historical records except for the odd hypothesis that the large Canada Geese in western Idaho were *maxima*. The suggestion that the geese in western Idaho, far removed from other purported Giant Canada Geese, were *maxima* is based on morphology. Hanson's reasoning here is circular and ignores much more recent work demonstrating (1) substantial genetic differences among Canada Goose subspecies (Shields and Wilson 1987, Van Wagner and Baker 1990), and (2) the significant role that environmental factors play in determining morphology (Aubin et al. 1993, Leafloor et al. 1998, Sedinger et al. 1998). A lot of wonderful historical information occurs in this chapter, but Hanson's failure to come to terms with much research over the past two decades diminishes the value of some of his conclusions in this chapter.

Chapters 4 and 5 cover the periods of migration and the wintering grounds, respectively. Hanson uses captures and recoveries of banded geese to establish relationships between breeding and molting areas or wintering areas. In Chapters 6 and 7, Hanson describes goose nesting, growth, and development, and in Chapter 8, he describes plumage and morphological characteristics of the sex and age classes.

In Chapter 9, Hanson describes the foods and feeding habits of geese. Limited data existed at the time Hanson originally wrote this chapter in which

he hypothesized that Giant Canada Geese ate primarily seeds, even during brood rearing. More recent studies have found that goslings require relatively high concentrations of protein to support high growth rates (Sedinger and Flint 1991). Thus, the observations that they eat primarily seeds require confirmation. Chapter 10 is short (four pages) and is a review of what was known about endoparasites in the 1960s.

In the next three chapters, Physiology (Chapter 11), Behavior (Chapter 12), and Productivity and Regulation of Populations (Chapter 13), Hanson applies 1960s principles to biology of Giant Canada Geese. These chapters are indicative of the closer linkage between applied and basic biology in the 1960s than exists today. They also show Hanson's broad interests and expertise. Hanson's ideas about cycles of mass and body composition presented here and in his earlier publication (1962) were revolutionary, laying the groundwork for modern studies of nutrient dynamics (Alisauskas and Ankney 1992). Nevertheless, some material in Chapter 11 is outdated. For example, Hanson proposed that amino acids are metabolized during fasting to provide substrates for lipid metabolism, but Cherel et al. (1988) have more recently shown that birds are able to conserve protein until the late stages of a fast.

The chapter on productivity and regulation of populations contains state-of-the-art thinking and methods for the 1960s. Hanson discussed age-specific variation in clutch size and nesting success. He was aware of the presence of nonbreeding females in the population as well as the importance of nonbreeding individuals in population dynamics. Hanson also discussed the analysis of band-recovery data using the composite-dynamic life table approach introduced in the 1950s. Modern capture-recapture approaches have since been developed for many of the analyses presented by Hanson. Although it is easy to criticize 35-year-old analyses, it is important to recognize the contribution made by Hanson in *The Giant Canada Goose*. However, it is also important for readers to recognize that the importance of the revised edition is primarily historical because analyses have not been updated.

The last two chapters, Management (Chapter 14) and Discussion (Chapter 15), are short and draw on data and analyses presented earlier to discuss conservation of Giant Canada Geese. They serve to reaffirm Hanson's hypothesis that large stocks of geese breeding in the mid-continent in the 1960s were descendants of *B. c. maxima*.

Three appendices complete the book. Appendix I provides an update on taxonomic and distributional interpretations based on data collated since the original book. Unfortunately, this appendix depends on Hanson's view that morphological variation is sufficient to differentiate breeding stocks of Canada Geese. Again, Hanson's approach ignores the tre-

mendous advances made using genetic data and the large literature demonstrating substantial environmental control over morphology. I believe that some of the distinct breeding units identified by Hanson in this appendix will be substantiated by genetic data, but others will not.

Appendix II displays a different graphical approach to presenting morphological data. Sample sizes are small, and this appendix offers little that is new. Appendix III presents a small data set using feather mineral profiles to characterize breeding locations of birds captured in winter. Hanson first presented this method in the 1970s (Hanson and Jones 1976). Although this approach is intriguing, we cannot fully evaluate its potential because matches between feather mineral profiles from birds sampled on the breeding and wintering grounds are done in an ad hoc manner. No account is made for variation as a result of sampling alone; rather, high concentrations of a single mineral in the feathers is taken as evidence for a particular breeding location. The data are inherently multivariate, making multivariate evaluation methods more appropriate.

In summary, Hanson made an important contribution when he wrote the first edition of *The Giant Canada Goose*. Those who do not own a copy of the original edition should consider purchasing the revised edition. Those looking for new information in the revised edition, however, will not find it there.—
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Birds of Bolivia, 2.0.—Sjoerd Mayer. 2000. CD-ROM for Windows 95 and higher. Bird Songs International B.V., Wierengastraat 42, NL-9969 PD Westerland, The Netherlands. ISBN 90-75838-04-2. Ca. \$52.00.—South America may be the “Bird Continent,” but learning how to identify South American birds remains a tough slog. Knowledge of voice is critical to identification, but voice is difficult to describe in a field guide. The commercial recordings of Bill Hardy and of John Moore and associates have gone a long way toward meeting this demand, but many gaps remain. One of the more glaring such gaps has been Bolivia, a country with immense diversity in topography, habitats, and birds (more than 1,300 species recorded).

In 1996, Sjoerd Mayer released a CD-ROM, *Bird Sounds of Bolivia* 1.0, that contained vocalizations from more 500 Bolivian species (see *Auk* 115:819–820, 1998). The present disk is a greatly expanded version of the earlier product. The number of sounds has been increased to 2,530 recordings from 941 species (and about 19 hours of sound!). A new feature is the addition of photographs (see below). Therefore, an extraordinary amount of new information is included in the revised edition.

The CD-ROM is easy to install (with the option of choosing English or Spanish), and the programs are easy to operate. Clicking on the variety of symbols and underlined text brings up lists of included families or species, photographs or recordings, details on the location of the recording or photo, and additional information.

To me, the most important feature of the disk remains the sound recordings. These selections usually are long, often 30 or 40 seconds, and sometimes longer than a minute. Another nice feature is that

there usually are two or more recordings for each species, thus providing many more examples of each species' vocalizations than is standard in other cassette or compact disk compilations. Each recording is identified as to vocal type (usually song or call, sometimes other variations such as alarm calls). Each vocalization also is rated as to quality (“A” through “E”). “A” recordings usually are quite good, with the subject coming through loud and clear with few interfering noises. Many “B” and even “C” cuts are quite good as well. “D” cuts are very few, but based on the one that I listened to (the song of *Xiphorhynchus spixii*), these probably do not merit inclusion at all, with the target sound buried in the background. I noticed no “E” cuts at all, and I suspect that recordings of quality “D” and “E” primarily are associated with background sounds (perhaps exclusively so for “E”). Many of the recordings are by Mayer, but he has rounded out the selection with cuts from many other contributors. That Mayer has been able to assemble the range of vocalizations presented here without falling back on an established sound archive says a great deal about the volume of tape-recorded material that has been accumulated in recent years by active field workers. We can only hope that all of these recordings eventually are added to an existing collection.

These recordings do a good job of covering the taxonomic and geographic diversity of the avifauna of Bolivia. Suboscines are particularly well represented, with vocalizations of more than 350 (!) species of ovenbirds, antbirds, tyrant flycatchers, and the like. Included on the disk are a good number of rare or poorly known Bolivian endemics such as Bolivian Earthcreeper (*Upucerthia harterti*), the recently described Bolivian Spinetail (*Cranioleuca henricae*), Yungas Antwren (*Myrmotherula grisea*), Bolivian Blackbird (*Oreopsar bolivianus*), and Citron-headed Yellow-Finch (*Sicalis luteocephala*). Other recordings of particular interest are those that document the first and second records, respectively, for Bolivia of Rufous-fronted Antthrush (*Formicarius rufifrons*) and Red-billed Tyrannulet (*Zimmerius cinereicapillus*). A particular treat in these recordings is that all background sounds are identified as well (and even assigned a quality rating). In a departure from most compilations of bird sounds, some vocalizations of uncertain or unknown identification are presented. Proposed identifications to some of these, in turn, already have been posted on the Internet <www.birdsongs.nl/Bolivia/solutions.htm>.

A good deal of supplemental information accompanies each recording. The date and often the time of day are given for most recordings. And, not only is the location of each recording provided (with the elevation), but one can call up a map that shows the location of the site, along with brief notes on the habitat(s) present and its geographic coordinates.

The disk contains almost 1,400 photographs, rep-