

HEAVY METALS IN GREENLAND SEABIRDS. By CHRISTIAN OVERGAARDNIELSEN and RUNE DIETZ. Meddelelser om Grønland, Bioscience 29. Copenhagen: The Commission for Scientific Research in Greenland, 1989. 26 p., 1 fig., 8 tables, 7 appendices, refs. Softbound. DKK 35,50 excl. VAT and postage.

This book is written in the style of a scientific article. It presents original data obtained as part of a research project initiated in 1985 on heavy metals in the Greenland marine environment. As explained in the introduction, *Heavy Metals in Greenland Seabirds* is the first of a series of papers, each dealing with a particular section of Greenland's marine ecosystem.

The book reports the concentrations of zinc, cadmium, mercury and selenium in muscle, liver and kidney of 14 species of seabirds collected from six Greenland districts. The initial table lists the species by common and scientific names and abbreviated species codes. Thereafter, only the scientific name is used in the text, and the abbreviated species code is used in the tables and appendices. This makes it difficult for a reader not familiar with the scientific names to follow along easily.

The table of contents is very useful in directing the reader to the different analytical treatments of the data. These treatments include inter-organ correlation of element concentrations, intra-organ association of elements, age dependence and sex dependence of element concentrations, geographical variation in element concentrations within Greenland and within the Arctic, and a comparison of arctic and temperate regions. The abstract is concise and summarizes the results very well. Concentrations were found to vary widely within species and to increase with age. No significant differences between sexes were found. Muscle, liver and kidney concentrations were found to correlate positively for cadmium, mercury and selenium, whereas only liver and kidney concentrations correlated mutually for zinc. The three organs analyzed for all species showed a large excess of selenium over mercury, and the intra-organ association of elements was strongest for zinc and cadmium in liver and kidney and for mercury and selenium generally. All four elements showed consistently higher concentrations in birds from north-western and northeastern Greenland than in those from southern Greenland.

In addition to the concentration data, the authors have included information on body and tissue weights and dry weight percentage of the tissues in the appendices. This information is a welcome addition to any scientific paper reporting contaminant data in that it broadens the potential usefulness of the data base.

The opening paragraph of the introduction of the book focuses on the role of marine animals, particularly fish and marine mammals, in the native diet. The birds are described as contributing "... a welcome variation in the diet." The rationale for including seabirds in the study, however, is not presented until the last paragraph of the introduction. When they are finally introduced, seabirds are described as "... a side line in the marine ecosystem... only worthy of... some interest to compare the level of metals... with that of other consumers exploiting the same food resource." I find this somewhat of a slight with regard to the importance of seabirds in the marine ecosystem and their potential value as indicators of environmental contamination.

The study birds were bought from local hunters, thus providing "... a representative sample bagged for local consumption." The theme of marine animals as part of the native diet is developed quite strongly in the introduction and carried through the materials and methods section. This theme is not reflected in the title of the book or in the abstract or discussion of results. I suspect that it was meant as more of an introduction to the series of papers than this particular one dealing with seabirds. This should have been made clear at the outset, since the role of seabirds in native diet is never mentioned again in the paper after the materials and

methods section. This is actually quite a shame, since it would have made an interesting discussion point.

The discussion includes some comparisons of metal levels found in the literature for seabirds from both temperate and arctic regions. There is no discussion, however, of possible sources of the metals found in the birds or of the influence of the annual cycles (i.e., migration, egg-laying, moult) or feeding habits of the various seabird species on the metal levels found.

Overall, this book contains a substantial amount of useful data, but is somewhat lacking in interpretation and discussion of the results. Due to the analytical nature of the presentation of the material, the book would be mainly of interest to the scientific community as an additional arctic contaminants data base.

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BIRDS OF THE SEWARD PENINSULA, ALASKA: THEIR BIOGEOGRAPHY, SEASONALITY, AND NATURAL HISTORY.

By BRINA KESSEL. Fairbanks: University of Alaska Press, 1989. 330 p., 17 tables, 21 figs., 11 illus., maps, index, bib. Hardbound. US\$34.95.

Long awaited by boreal ornithologists, *The Birds of the Seward Peninsula, Alaska* fills one of the many gaps in regional comprehensive references concerning arctic birds. Covering an area that truly provides a bridge linking Palearctic and Nearctic avifaunas, information provided in this publication will be of interest not only to devotees of northern ornithology but also students of biogeography, ecology, wildlife management and even devout North American birders. The author not only relies on her own extensive field studies spanning the past 23 years, but incorporates observations from a long list of biologists, associated field scientists, birders and local residents to provide a complete picture of the avian assemblage in this unique region.

The introductory chapters set the stage by orienting the reader to the often harsh climate and rugged terrain of the peninsula, with discussions of the physiographic features encountered, the overall climate of the region and the predominant vegetation. A chapter on avian habitats describes all of the habitats found in the region based on Dr. Kessel's own habitat classification scheme for Alaska published previously (Kessel, B. 1979. Avian habitat classification for Alaska. *Murrelet* 60:86-94). Black-and-white photographs of some of these habitats are indispensable in helping the reader visualize the habitats available to birds in the study area. A chapter on avian species abundance lists species of birds in order of abundance based on the author's many miles of terrain walked, driven or boated over a ten-year period.

Although many disclaimers appear in the preceding paragraphs, I cannot help but expect those not familiar with more standard avian census techniques to place too great an import on the data presented, particularly because habitats were not censused and data not presented in relation to the amount of habitats available on the peninsula. Nonetheless I found the tables of interest, and if used for the comparative purposes intended, they do provide some understanding of the general picture of avian abundances one would expect to encounter upon visiting a range of habitats on the Seward Peninsula. A chapter on distribution patterns provides an interesting overview of the zoogeographic affinities of the present species assemblage and helps explain why the Seward Peninsula is a particularly diverse region, given its northerly latitude. The final introductory chapter on seasonal