

dices (which deal with names, geography and ships) may be appreciated by certain readers. Occasional typographical mistakes, referencing errors, and grammatical inaccuracies are only very minor distractions from a book that is, on the whole, very nicely presented.

This book is mandatory reading for anyone concerned about the future of the Canadian Arctic. It is particularly recommended to those in government responsible for reviewing policy and taking decisions about the Northwest Passage. The vagaries of the world economy have given us a window of opportunity to make rational choices about this unique area. Let us hope that the opportunity is not lost.

Constance D. Hunt
Executive Director, Canadian Institute of Resources Law
and Professor of Law
The University of Calgary
Calgary, Alberta, Canada
T2N 1N4

MARINE BIRDS: THEIR FEEDING ECOLOGY AND COMMERCIAL FISHERIES RELATIONSHIPS. Edited by DAVID N. NETTLESHIP, GERALD A. SANGER and PAUL F. SPRINGER. Proceedings of the Pacific Seabird Group Symposium, Seattle, Washington, 6-8 January 1982. Ottawa: Minister of Supply and Services Canada, 1984. A special publication compiled by the Canadian Wildlife Service for the Pacific Seabird Group. 220 p. Softbound. No price indicated.

Marine bird studies associated with the environmental assessment of the outer continental shelf were initially concerned with censuses of distribution and abundance. Such research was conducted at a time when it appeared that of all the activities associated with man's increased interest in offshore waters, direct contact with spilled oil was the greatest threat to marine bird populations. In the past decade environmental assessment has moved to a phase where ascertaining the linkage of a seabird species to the marine system that supports it is of paramount importance. It is now recognized that impacts on the prey species of seabirds can and will have a greater influence than direct oiling of seabirds. This volume (with the exception of three papers on seabird mortality in fish nets) is a collection of papers examining the trophic linkages of a number of seabird species to the marine systems that support them.

The volume consists of three parts: feeding ecology of marine waterfowl (6 papers), feeding ecology of pelagic marine birds (7 papers) and seabird-commercial fisheries interactions (10 papers). The majority of the feeding ecology papers arose from environmental assessment studies related to oil and mineral development. With the exception of one paper on olfaction by tubenoses, all provide detailed information on diet, usually of a single waterfowl or marine bird species at a single locality. All of the feeding ecology studies reported on are from the Pacific Basin. Five of the waterfowl papers are from Alaska, the remaining one being from British Columbia. The pelagic marine bird papers are all from western North America, with three from California waters. With a few exceptions the papers in these two sections should be of most interest to marine ornithologists or others with interests in the species and areas covered.

The two feeding ecology sections as a unit represent a major contribution if only by bringing together 13 related papers in a single volume. There is a lack, however, of any synthesis or review papers in these two sections. Although it is clear that much of the information on feeding ecology gathered in the last decade is just reaching publication, it would seem that enough has been published to allow the compilation and integration of work to begin. Certain species or species groups have received detailed study over a wide geographic range.

The section on commercial fisheries interactions contains 3 papers on mortality of seabirds in fishing nets, 6 papers dealing with the conflicts arising from commercial fisheries exploiting the same fish stocks utilized by seabirds, and one paper on Capelin (*Mallotus villosus*). The latter is included in the volume as a companion piece to

a related paper on seabird-capelin interactions. Unlike the feeding ecology papers, there is a broad geographic spread, with the Pacific Basin being treated in only 3 of the papers. Six papers are concerned with Atlantic systems. A paper by Furness on modelling relationships among fisheries, seabirds and marine mammals serves to review the estimation of energy requirements of seabirds and marine mammals and how exploitation of fishery stocks may affect them.

The papers on commercial fisheries-seabird interactions should have a wider audience than the feeding ecology papers and will be of interest to anyone concerned with biological oceanography. All provide examples of the effects on birds of man exploiting fish populations. This group of papers is impressive for its broad geographic scope with six separate localities discussed (southern California, British Columbia, Peru, South Africa, northeast and northwest Atlantic). As a number of the papers show, the impact of seabirds on fish resources can be substantial. Furness estimates that in several ecosystems seabirds consume between 20 and 30 percent of the pelagic fish. While most of the effects described are negative, with real or potential declines in seabird populations, also presented is a paper that relates seabird increases to man's exploitation of a fish species that competes with seabirds for forage fish.

The papers on net mortality of seabirds should be of interest to conservationists as well as seabird and fishery biologists. Intensive in-shore fishing in Newfoundland in 1971 resulted in the death of 30 000 breeding birds, or 20 percent of the local breeding population. It is unfortunate that a paper on bird mortality in the Pacific high seas drift net fishery could not be included to round out this section. The problem of seabird mortality in fish nets is a chronic one and can be expected to increase with fishing intensity. The public and resource managers need to know of the magnitude of impact on seabird populations.

The publication suffers from the lack of an index. This would have provided a way for potential users of the volume to approach the work as a unit rather than simply a series of papers. There is also no attempt by the editors to present any discussion that occurred at the symposium that might provide the reader with an indication of the type of interactions a symposium is meant to stimulate. One has to assume that if meaningful discussions were part of these interactions the results of such discussions were included in the completed papers.

Data on the food of seabirds are not obtained easily, and the dedication of the volume to three seabird biologists who died in separate incidents while conducting research is evidence of the dangers involved in the collection of such data. This dedication should allow the reader unfamiliar with seabird studies to appreciate the effort involved in the collection of the data presented.

The production of the publication is of the usual high quality of the Canadian Wildlife Service. The Pacific Seabird Group, the CWS and the editors should be complimented for collaborating in producing this volume.

George J. Divoky
Institute of Arctic Biology
University of Alaska
Fairbanks, Alaska, U.S.A.
99701

THE BERING SEA FUR SEAL DISPUTE, 1885-1911. A MONOGRAPH ON THE MARITIME HISTORY OF ALASKA. By GERALD O. WILLIAMS. Eugene, Oregon: Alaska Maritime Publications, 1984. 100 p., maps, illus., notes, index. Softbound. US\$9.95.

Although the diplomatic history of the Bering Sea Fur Seal Dispute is well known to students of Canadian and American relations, there are other aspects to the lengthy affair that are of at least equal significance. The conflict originated because of the migratory habits of the fur seals that took them over specific routes from California to their breeding rookeries on the isolated Pribilof Islands. Once this in-

formation became known, sealers could intercept the seals en route, lie in wait for them off the Pribilof Islands, or break United States law to raid the breeding grounds. As the value of fur seal pelts increased, the number of pelagic sealers jumped dramatically from only six vessels in 1879 to a total of 122 by 1892. During their tenure in Alaska, the Russians had confined the seal harvest to bull seals. The pelagic sealers showed no concerns for conservation. Not only did they employ firearms that increased efficiency, but they slaughtered nursing mothers that had left their pups on the Pribilofs to range far out to sea in search of food. Rejection of American claims to sovereignty in the Bering Sea and lack of knowledge about seal habits set the scene for a tragedy that almost resulted in the extinction of the fur seals. Despite the obstacles, however, Britain and the United States negotiated one of the first agreements designed to preserve a species of wildlife.

In the present essay, Williams focusses upon United States efforts to protect its seal resources and revenues from pelagic sealers dedicated totally to profits and without any concerns about preservation. When United States laws tightened, Victoria, British Columbia, became the home port for over 100 sealing schooners employing more than 2000 men. In 1886 the Revenue Marine Service, forerunner of the United States Coast Guard, began to seize sealing vessels that broke American laws. When Canadian vessels were detained, the Dominion government turned to Britain for naval and diplomatic protections. After negotiating a temporary *modus vivendi* in 1891 in which both nations agreed to patrol the North Pacific and to try their own citizens, a Tribunal of Arbitration met in 1893 at Paris to seek a more permanent agreement.

The solution adopted provided graphic illustration of the dangers of political solutions to problems where the scientific evidence was not fully available. The assignment of an American fisheries research vessel with biologists, naturalists, and hunters to study the seals came too late to influence the negotiations. As a result, the Paris tribunal overturned American claims of exclusive jurisdiction in the Bering Sea to establish a 60-mile exclusion zone about the Pribilofs that was well within the feeding range of the female seals. The sealers simply formed a cordon about the islands to decimate the herds during their most vulnerable period. With the seals already in dramatic decline, the Paris negotiators seemed to have ensured their eventual extinction. In 1894 the sealers were able to work within the law to devastate the seal herds. If the legal situation was not bad enough, Canadian "seal pirates" evaded American patrols to raid the Pribilof rookeries. Enraged at the loss of revenues, some American legislators introduced draconian bills into Congress proposing the total destruction of the remaining herds so that the United States would obtain the final profits. The arrival of Japanese sealers, who were not bound by the Paris agreement, and the continued depredations of Canadian sealers who raided the rookeries, traded liquor to the native Aleuts, and used other unsavory methods presented graphic evidence of the need for controls.

The author has adopted a popular approach to the topic, and the essay is designed to identify areas for future scholarly research. Certainly, much more can be done to examine the sealers and the Indian hunters who made the annual trip to the Pribilofs. The volume is very well illustrated, but too much text has been crammed onto each page. This could well deter some of the general readers the author wishes to attract. However, the greatest weakness in the present essay is that it requires a thorough editing to remove minor mistakes. Williams has Callao, Peru, identified as the principal seaport of Chile, and there are a number of annoying grammatical errors that detract from what otherwise is a well-researched study. Despite these relatively minor drawbacks, the monograph is a useful introduction to the Bering Sea Fur Seal Dispute.

Christon I. Archer
Department of History
The University of Calgary
Calgary, Alberta, Canada
T2N 1N4

PERMAFROST: FOURTH INTERNATIONAL CONFERENCE, FINAL PROCEEDINGS. Washington, D.C.: National Academy Press, 1984. 413 p. Hardbound. US\$32.50.

This is the second and final volume dealing with the Proceedings of the Fourth International Conference on Permafrost held at Fairbanks 17-22 July 1983. The first volume (see review in *Arctic* 37:312-313) was produced in time to be sent out to conference participants by the end of 1983 and contained the bulk of the papers in English that were presented at the meetings plus English translations of some key Soviet papers. Left unpublished were the papers from the important panel sessions, the translations of the 6 invited Soviet papers and 25 contributed Soviet papers, abstracts of additional Soviet papers published in the Soviet volume (*Problems in Geocryology*, P.I. Melnikov, Editor-in-Chief, Moscow: Nauka, 1983, 280 p.), two American papers, and some additional abstracts. This second volume entitled "Final Proceedings" include these, plus the edited verbatim text of the remarks at the opening and closing sessions, reports on the field trips, the formal program, and lists of the committees, reviewers, and participants. It finishes with an author index and a list of the publications still available from the four international permafrost conferences held to date.

The international panel sessions were chosen to stimulate discussion on key topics in current permafrost research. The topics were deep foundations and embankments, frost heave and ice segregation, sub-sea permafrost, pipelines in northern regions, environmental protection of permafrost terrain and climatic change and geothermal regimes. The idea of having these panel sessions was excellent and it helped workers in other fields to obtain an idea of the state of research in each of these areas. Unfortunately, in one or two cases the statements prepared for verbal presentation are now published in written form without much change and without the illustrations shown simultaneously on the screen at Fairbanks, so that the panel reports vary somewhat in style and value. Nonetheless, the overall result is very good and deserves its place near the beginning of the book.

The Soviet contributions include both full papers and short abstracts from a special volume of papers published in the Soviet Union. The abstracts were translated by the National Research Council of Canada, while the invited papers were translated by William Barr, University of Saskatchewan. They were then revised by English-speaking readers, but no attempt was made to standardize the transliteration, terminology and quality of the translations. The full papers add an extra dimension to the Proceedings since there was little Soviet content in the earlier Proceedings volume and, in fact, the Soviet delegation in Fairbanks was disappointingly small. On the whole, there are few problems with the translations, which are well done, and those who do not read Russian are afforded a rare glimpse of the results of some of the current permafrost research in the USSR.

The opening and closing sessions contain some interesting historical information concerning the formation of the International Permafrost Association, but it is unfortunate that the informal photographs of personalities incorporated into the beginning of the book do not include captions with their names. The map of permafrost distribution in the northern hemisphere, used as a frontispiece, is a useful addition. Although it is not completely up to date, it provides the reader with an idea of the vastness of the permafrost environment.

The nature of the book, with its lack of a single focus, means that the reader must examine it carefully to find the information that he or she may be interested in, but it is a valuable addition to the permafrost literature. It is attractively produced by the camera-ready process on good quality paper and is well worth the \$32.50 for those who are interested in permafrost science or who wish to keep up with current permafrost research.

Stuart A. Harris
Department of Geography
University of Calgary
Calgary, Alberta, Canada
T2N 1N4