

Brower's *Fifty Years Below Zero*) are still of local interest but lack the scholarly perspective of an historian's years of research. Bockstoce's book gives us the historical perspective that the commercial bowhead fishery richly deserves. He also explores the flavor of personalities and life before the mast. Would this heroic bit of history be more widely celebrated if it had not been eclipsed by the simultaneous settling of the American West?

The book is generously illustrated with photographs, drawings, and advertisements of the time, as well as with eight maps charting particular events. Editing and printing are virtually flawless. It seems a handsome volume for the price. As a landlubber, I found the profuse nautical vocabulary occasionally difficult but apparently precise. The glossary, and four other appendixes, are useful and relevant.

Though Sylvester Stallone may not purchase the movie rights to this book, *Whales, Ice, and Men* is no dry chronology. Fortunes were won and lost, 150 ships were lost; there are true tales of scandal, murder, incompetence, and heroism. There is also scholarship and objectivity. Bockstoce has crafted a superb book.

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PIPELINES AND PERMAFROST: SCIENCE IN A COLD CLIMATE. By PETER J. WILLIAMS. Ottawa: Carleton University Press, 1986. viii + 129 p., index, bib. Softbound. Cdn \$9.95.

At the end of World War II, it was obvious that Canada must start to use its polar lands or lose sovereignty over them. Although mineral deposits were known to be present in the Shield, they were too far from markets to be economically worth exploiting except in a few special cases. On the other hand, Alexander Mackenzie had reported oil seepages near Norman Wells in 1789, and the first oil well had been drilled there in 1924. Subsequently, the oil produced was sent to Whitehorse along the ill-fated Canol pipeline for a brief period in 1943, but a burst in that pipeline showed the risks involved in such ventures.

Exploration in various parts of the northern sedimentary basins around the margin of the Canadian Shield soon established the presence of substantial oil and gas reserves, and even larger reserves were found in the Soviet Union and Alaska. This raised the problem of how to get the products to market, spawning a considerable number of proposals for pipelines in arctic North America, especially in the boom period before the collapse of world oil prices in 1981-82. The Canadian Government had learned from experience that development could be difficult unless carried out properly, and it was coming under more and more pressure from environmentalists and the native peoples to ensure that the proposals were geotechnically sound and would minimize the risk to the environment.

*Pipelines and Permafrost* describes the resultant hearings and discusses the successes and failures of the few developments that have been allowed to proceed from the viewpoint of one of the environmental consultants. It is an updated edition of the book first published in 1979 by the Longman Group of London. Like its predecessor, it is a readable account of the debates over the pipelines, including a relatively simple description of some of the technical problems that have to be overcome. The two major recent pipeline projects that have gone ahead in North America (the Norman Wells Pipeline and the Trans-Alaska Pipeline) are discussed, together with the debate over the Alaska Highway Gas Pipeline that ended when falling energy prices and escalating construction costs made the project uneconomic. However, if energy prices rise significantly, the debate may be renewed, so it is extremely important to have on record a concise, readable account of the limitations to our knowledge concerning the construction of pipelines in permafrost areas.

Chapter 7 is new and describes the recent work on the problems that limit construction, lamenting the lack of information being gleaned

from the rather considerable pipeline experience obtained in Russia. It also points out that if research is left to industry, the research may be abruptly terminated and the results never written up if they are not of immediate use to the company supplying the necessary funds. This emphasizes the importance of continued funding of government and university research on these problems, so that when the inevitable rise in energy prices once again raises questions of pipeline construction, we shall be better prepared to deal with them.

The selected references and comments at the back of each chapter have been updated and improved, so it will be easier for the interested reader to find additional material. The additional chapters successfully update the book so that it continues to fulfill its original purpose.

Geographers, political scientists and others interested in the technical problems of pipeline construction over permafrost soils will find this book fascinating. Those who are more concerned about the effects of pipelines on the biota will continue to find that this book largely ignores that area. It is a well-illustrated and provocative book, and this paperback edition is good value for the price. The revised edition differs sufficiently from the original that many owners of the first edition will want to buy the new one.

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THE NORDIC SEAS. Edited by BURTON G. HURDLE. New York: Springer-Verlag, 1986. 777 p., 26 maps, 262 illus., 19 colour plates, index and bib. with each chapter. Hardbound. US\$69.50.

This handsomely produced volume aims to be "a reasonably comprehensive multidisciplinary scientific description of the Nordic Seas." This volume coins the name Nordic Seas as a collective name for the Norwegian, Greenland, Iceland and western Barents seas; I hope this comes into common usage. With chapters covering all aspects of the physical environment of the Nordic Seas from the atmosphere above them, the ice and water within them and the rocks and sediments below them, it truly is multidisciplinary. The foreword and the afterword also emphasize the importance of the Nordic Seas both as the birthplace of modern physical oceanography and as an ocean basin in early adolescence.

The initial chapter, "Climatology," by S.G. Gathman, is disappointing in that it states that the marine climate database is insufficient to provide a quantitative description of the climatology of the Nordic Seas. What climatology appears is based almost entirely on data collected in and near the Norwegian Sea. The chapter concludes with a discussion of the meteorological data collected during two month-long summer cruises in the region during the early 1970s, whose principal point seems to be that the strong sea surface temperature gradients found in the region are responsible for a high incidence of marine fog.

Happily, much more information is available from the rest of the book. P.D. Wadhams's chapter, "The Ice Cover," is a wealth of information on sea ice and icebergs in the Nordic Seas covering the full range of data sources from the historical descriptions given by early navigators and whalers to modern aircraft and satellite observing systems. The following chapter by W.F. Weeks, "The Physical Properties of the Sea Ice Cover," discusses the smaller scale physical properties of sea ice in general and points out that only a few such detailed studies have been carried out on sea ice in the Nordic Seas. An addendum by O.M. Johannessen and co-authors, "Preliminary Results of the Marginal Ice Zone Experiment (MIZEX) Summer Operations," previews the scientific results of this major multi-institutional investigation of the physical processes operating at the boundaries between ice pack and open ocean.

Physical oceanography is covered in five chapters. A "Brief Overview of the Physical Oceanography," by O.M. Johannessen, briefly reviews the current systems and oceanic frontal zones of this complex

region of the world ocean. The complexity of the region is illustrated by several well chosen satellite images. The Nordic Seas is one of the few regions in the global ocean where deep and bottom waters are formed; this aspect forms the basis of J.H. Swift's chapter, "The Arctic Waters." B.G. Hurdle's chapter, "The Sound-Speed Structure," provides a different way of looking at the oceanographic structure of these basins. Sections illustrating the changes of sound-speed structure between summer and winter graphically illustrate the possibility of the acoustical monitoring of seasonal changes in the larger oceanographic structure of these basins.

H.G. Gade's chapter, "Features of Fjord and Ocean Interaction," discusses in a very general way the principal circulation features of a typical fjord and how they respond to changes in the oceanic waters outside. This chapter is so brief that a reader interested in the fjords of Norway, Svalbard and Greenland will certainly have to look elsewhere. Unfortunately, the reference list provided is equally brief. The final physical oceanographic chapter, E.W. Schwiderski's "Tides," provides a brief overview of the historical development of tidal theory, discusses the importance of knowledge about tides to the marine community and maps the amplitude and phase of the principal semi-diurnal (high waters twice per day) and diurnal (once per day) tidal constituents within the Nordic Seas.

R.K. Perry's chapter, "Bathymetry," is based on a chart of the region that he and his co-workers published in 1980. It is unfortunate that a copy of this chart was not included in a pocket at the rear of this volume rather than the reduced colour plate of this chart, which is virtually unreadable. The 12 line-drawing blowups of particular bathymetric features to accompany commentary about these features would be more useful if the figure captions contained information about the projection used.

The final two-thirds of the volume is occupied by two long chapters on the geology and geophysics of the entire region written by P.R. Vogt, "Seafloor Topography, Sediments, and Paleoenvironments" and "Geophysical and Geochemical Signatures and Plate Tectonics." A geophysical colleague whose interests are in the arctic rather than the Nordic basins, has told me that these chapters were a valuable and useful review of all of the relevant work and ideas concerning this dynamic and geophysically active region. While the chapters are long and difficult to read from start to end, a good index makes them an effective reference source. As a reader, I wished that an editor had persuaded the author that brevity was more important than his supplementary asides. I don't need to know that Caledonia was the Roman name for Scotland (p. 356), that the Heerland Seismic zone is so named because it is in Heerland (p. 443), or the names of collaborating institutions in seismic refraction experiments (one-third of p. 466), among many such asides.

There is also a long aside (p. 568-570) in a section on heat flux through the sea floor that discusses changes in the measured heat profiles in the sediments in terms of imputed changes in the temperature of the overlying waters. Such material should have been incorporated into the physical oceanographic chapters, where it could be placed in the context of the existing current meter records of temperature and velocity that exist for these overflows.

In a collection of chapters by different authors, there is always some unevenness in their approach and range of materials. This makes it a little difficult to identify the intended readership for this book. Some of the chapters, such as those on geology and geophysics, are comprehensive reviews of all relevant work that has been done in the area. Other chapters are more in the form of extended research papers presenting previously unpublished data. The volume as a whole is a valuable review of sea ice, physical oceanographical, geological and geophysical research in the Nordic Seas up to the early 1980s and should be useful to researchers in all these fields working both in the Nordic Seas and in similar adjacent regions. The book is well printed, with a number of colour and black-and-white prints. The indexing of the volume is very well done, with the key words chosen being those that come naturally to the reader. While I felt that some of the authors were trying to write for a broader audience, I think that

the volume is most successfully a reference book for the research community.

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**NASTAWGAN: THE CANADIAN NORTH BY CANOE & SNOW-SHOE — A COLLECTION OF HISTORICAL ESSAYS.** Edited by BRUCE W. HODGINS and MARGARET HOBBS. Toronto: Betelgeuse Books, 1985 (hardbound); 1987 (softbound). 231 p., index, illus. Price not indicated.

*Nastawgan* — the title is an Anishinabai word meaning "the way or the route one must take to get through the country" — is an excellent collection of essays about Canada's northern wilderness. As the title suggests, *Nastawgan* is a guidebook, but it is a guidebook of the spirit. It leads us over the height of land that separates modern urban society from its roots in the past, a past when man was more intimately bound to the land. And through the process of that spiritual journey, the reader better apprehends the intangible allure that wild lands and waters still hold for twentieth-century man, even in the apogee of his urban technology.

The title page announces *Nastawgan* is "A Collection of Historical Essays." Certainly the volume is rich with historical fact, but its concern is with asserting the continuity between "then" and "now," rather than with a historical analysis of another period. To be sure, many fine individual papers focus on historical events or periods in northern Canada: George Luste's "History, Travel and Canoeing in the Barrens," John Jennings's "The Mounted Police in the Barren Lands: the Pelletier Expedition of 1908," C.E.S. Franks's "David Thompson's Explorations of the Muskoka and Madawaska Rivers," and Craig Macdonald's "The Nastawgan: Traditional Routes of Travel in the Temagami District" are but four such essays. The primary concern of these essays, however, is not the past itself, but the continuity between past and present, an awareness of continuity that — the editors and contributors would maintain — comes to modern man, when, purged of the inessentials of twentieth-century technology, he enters into the northern wilderness. Other essays — notably William C. James's "The Quest Pattern and the Canoe Trip" and John Wadland's "Wilderness and Culture" — approach the atavistic cultural and psychological relationship between man and the natural environment more explicitly. They approach the universality of human experience in the natural world from a less historical but nevertheless equally effective perspective.

The political objective of the editors and contributors is no secret: this volume promotes the conservation of wilderness areas in the Canadian North. Published by Betelgeuse Books in cooperation with the Ontario Recreational Canoeing Association, the collection includes the following epigraph: "This volume is an acclamation of the northern wilderness. Let us strive for its survival." Yet this is an acclamation not only of the wilderness, but of man's interaction with the wilderness. The focus on human involvement perhaps accounts for why this is such a satisfying acclamation. I suppose it is ironic that the reason for protecting the virginal character and natural purity of northern regions is not for the sake of the wilderness itself, but for providing man with a place in which he can regain an essential sense of continuity with nature and with his universal cultural past.

But regardless of its role as a political nudge to preserve what is irreplaceable, the true success of this volume lies in its lucid articulation of what most of us can only sense when we step off into the remoteness of river and forest. One of the refreshing characteristics of the collection is that it voices those unconscious or half-conscious