

about ice islands is deliberately detailed because of the confusion existing in the general literature regarding these important features. Thus, my criticisms are not directed toward the editor of this bibliography. According to Armstrong *et al.*, 1966, an ice island is "a form of tabular berg found in the Arctic Ocean with a thickness of 30 to 50 m" (in actual fact thicknesses of 25-60 m have been measured), usually with a maximum area of up to 100 km<sup>2</sup> and with "an undulating surface." These features may become grounded, in which case the term island is quite appropriate. On the other hand, the term iceberg is defined (Armstrong *et al.*, 1977) as a large mass of floating or stranded ice of greatly varying shape, usually more than 5 m above sea level, which has broken away from a glacier. (The word *usually* was added to include tabular bergs originating from low ice shelves.) However, many of the "low" Ellesmere Island ice shelves, parts of which have a freeboard of 5 m, are not composed of "glacier ice" nor are they attached to land glaciers, so the fragments that calve from them would never qualify for the term iceberg. What are now unequivocally referred to as icebergs in the Antarctic were once called ice islands, which, as we have seen, is a term now reserved exclusively for the Arctic Ocean species. Even there the term is in disfavour with current researchers and it may be a candidate for planned obsolescence.

Now, when one looks in the bibliography subject index under *ice islands thickness measurements* and finds (entry 998) that it refers to Antarctic tabular icebergs up to 280 m thick, then a correction is clearly in order. There are other similar cases to be found in the index-reference system concerning ice islands. Lastly, co-authors take up, and thus waste, space in the main "text." Since this is not purely author-structured it would seem more efficient and convenient to have a separate author index.

These difficulties contrast with some very entertaining entries, such as one (item 630) on iceberg psychodynamics, which is based on the hypothesis that icebergs have minds of their own (in order to "explain" seemingly erratic drift tracks). Another is a novel patent entry (1098) the possible brilliance but hopeless impracticability of which is shrouded in an indigestible matrix of legal prose. There are even five bibliographies to be found within this bibliography. Could there be bibliographies within those bibliographies?

Despite these criticisms and considering the full year of effort that has gone into producing this bibliography, the report is a very valuable and indeed, so far, the most complete source of references on icebergs that I know of, and it is well worth the list price of \$55.

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Gerald Holdsworth  
 National Hydrology Research Institute  
 Environment Canada  
 11 Innovation Blvd.  
 Saskatoon, Saskatchewan, Canada  
 S7N 3H5

THE PERMAFROST ENVIRONMENT. By STUART A. HARRIS. Totowa, New Jersey: Barnes and Noble, 1986. 275 p., 94 diagrams, 20 photos, index, bib. Hardbound. US\$31.50.

The objective of this book is to provide up-to-date information on the use of permafrost areas and the problems of their development at a level suitable for advanced undergraduates and professionals. This is a

laudable aim since there is a gap in the literature on this subject and no such review of this rapidly advancing field currently exists in monograph form. The author has worked in permafrost regions for many years, particularly in areas of high-altitude permafrost, and therefore appears well qualified to conduct this task. Unfortunately, this book falls short of its aspirations and is flawed by omissions of information, by factual errors and by poor presentation.

The book is divided into ten chapters. After an introduction, two lengthy sections deal with permafrost identification, nature and processes, and the distribution and stability of permafrost. The remaining seven chapters cover foundations, roads and railways, airfields, the oil and gas industry, mining, water supply and waste disposal, and agriculture and forestry. The bulk of the book does not concern the permafrost environment *per se* but rather its use. With the exception of the last chapter, all the rest could have been covered better by a title such as "Permafrost Engineering."

The best chapter is on the oil and gas industry and includes descriptions of the drilling methods used on land in permafrost areas and offshore in the sub-sea permafrost of the Beaufort Sea. It draws together literature on terrain disturbance, gas hydrates, sea ice, artificial islands, pipelines and tankers. It is disappointing, however, that the topic of gas pipelines is covered in less than two pages and that the Norman Wells to Zama oil pipeline, which traverses the discontinuous permafrost zone of Canada, is not mentioned.

In terms of content, the major shortcoming is that virtually all examples of engineering methods or problems are North American. The greater degree of development of permafrost regions in the Soviet Union is rarely acknowledged, and in the chapter on airfields, for example, there is a map showing their distribution in the U.S.S.R. but no further description in the text. It is recognized that it is not easy to obtain information on the Soviet Union, but the North American bias also results in little reference in any chapter to Greenland, Svalbard or the permafrost areas of China and Tibet, and no mention of northern Scandinavia.

A number of factual errors are present in the book. The most unfortunate of these is the statement that permafrost "... is the result of a negative heat balance at the surface of the earth ..." (p. 21). The heat balance at the earth's surface in a permafrost area actually can be in equilibrium, producing stable permafrost, can be positive, producing degrading permafrost, or can be negative, resulting in aggrading permafrost. The explanation given perpetuates a popular misconception among undergraduates and is inexcusable in a book targeted for this group.

The presentation of the book leaves much to be desired, and responsibility for this surely must rest with the publisher. The pages were produced from camera-ready typescript rather than typeset. Numerous commas have been inserted by hand and there are a significant number of typographical errors. There are too few photographs, considering the practical approach taken to the subject matter, and after reproduction some appear too dark to observe the details noted in the text. Diagrams are plentiful and generally fairly clear. However, the base map of North America used several times in the book is a very poor choice for a discussion of permafrost. Most islands in the Canadian arctic archipelago are omitted, with the result that the airfield at Resolute Bay on Cornwallis Island appears in the middle of sea (Fig. 6.1) and the Polaris mine on Little Cornwallis Island (Fig. 8.1) accomplishes the same feat. There are also errors present on some diagrams, such as the Alaskan and Yukon coastal plain appearing as sub-sea bottom permafrost (Fig. 1.1).

Despite flaws, selected pages of this book could be useful on a reading list for an undergraduate course on the development of the North. Given the price of the book, however, its purchase may not be the best use of limited library or personal resources.

Antoni G. Lewkowicz  
 Department of Geography  
 Erindale Campus, University of Toronto  
 Mississauga, Ontario, Canada  
 L5L 1C6

*Response from the author:*

Although the writer appreciates the constructive input in the above review, there would appear to be some points that might need clarification. The intended title of this book was *Utilization of the Permafrost Environment*, but this was later altered since it was thought that the subject matter was sufficiently well described both on the dust cover and in the table of contents. The book was written specifically for the *Croom Helm Natural Environment — Problems and Management Series*, and therefore the title was restricted to the format being used in that series. Permafrost studies are sufficiently diverse that undoubtedly they now warrant the status of an independent science rather than being a subject to be annexed by one of the conventional fields of sciences, social sciences or engineering.

The review takes exception to the statement that permafrost “. . . is the result of a negative heat balance at the surface of the earth. . . .” Actually, this is implied in the definition of permafrost (ground that remains below 0°C for more than two years), but if one considers the implications of the quotation, he will find that additional duration and persistence of the negative heat balance after the formation of permafrost is neither stated nor necessarily implied. The problem of disequilibrium conditions is discussed on pages 26-27, 31-33, and 56-57. Stability of permafrost is dealt with on pages 68-72, together with a brief summary of the possible effects of climatic changes such as the postulated warming due to changes in atmospheric carbon dioxide.

It should be noted that the book first appeared in December 1985 in the United Kingdom, so the manuscript in camera-ready form had to be delivered in early 1985 at a time when the Zama Lake-Norman Wells pipeline construction was hardly complete, let alone tested and described in accessible sources. Examples were deliberately chosen from English language literature that is reasonably accessible, since few of our students read Danish, Polish, Russian or Chinese. All the material is available in the library of the Arctic Institute of North America, and there are enough translations of key Russian and Chinese works that the most important foreign work is included.

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

**YUKON WILDLIFE: A SOCIAL HISTORY.** By ROBERT G. MCCANDLESS. Edmonton: The University of Alberta Press, 1985. 200 p. Map, photos, index, bib., appendix: transcripts of oral histories by John Joe, Frank Goulter, and Johnny Taku Jack. Softbound. Cdn\$14.95. Distributed in U.S. by University of Nebraska Press, Lincoln, Nebraska. US\$14.95.

Yukon Territory is an enclave of half a million square kilometres of mostly wilderness, where wildlife has been an essential part of the economy — traditionally as a livelihood for the inhabitants, and after 1900 as a source of revenue for the territorial government. By tracing changing attitudes toward wildlife as reflected in law and custom, McCandless has in effect outlined the Yukon's recent history. His central theme touches upon nearly every important aspect of life in that corner of Canada: the native trapping industry and the fur trade, the Gold Rush and subsequent mining enterprises, subsistence and market hunting for wild meat, fur farming, the evolution of territorial government, big game outfitting, shipping by steamboat and rail, the World War II intrusion of roads, aerodromes, telecommunications and the media and, finally, the post-war influx of permanent settlers from “outside” cultures.

This book is very welcome. Until recently, Canadians and Americans alike have avoided serious analysis of the *processes* that have transformed culture and economics in the northern and northwestern parts of the continent. These processes have been encouraged, when not actually imposed, by remote politicians, bureaucrats and urban

interest groups whose attitudes were formed under conditions quite different from those of the “frontier.” The main trend of such pressures, particularly since the 1940s, has been to bring law and custom into line with practices instituted elsewhere, ignoring the abundant wildlife, the thin and scattered population using it, and the generally stagnant economies of such isolated regions.

McCandless's treatment of the Yukon's unique situation is thoughtful and discerning. His study is based on an analysis of documents in the territorial and other archives and is supplemented by oral histories obtained from articulate Yukon old-timers (there should be much more of the like collected). It is informed by professional knowledge acquired during work for the territorial Wildlife Branch and the federal Environmental Protection Service. He hopes that the “example provided by the Yukon can help illuminate problems of wildlife management which may be encountered in other jurisdictions.” He is calling for a deeper sensitivity to regional conditions.

After a preliminary chapter on game law history (of which more later), McCandless first reviews game law affecting the Yukon, attending to the jurisdictional bases of its sometimes conflicting authority. The core of the book separately considers big game hunting and the fur industry, although he acknowledges that, of course, these two “themes” are inextricably related, especially as hunting and trapping involve the native population.

Game laws pertinent to the Yukon begin with The Unorganized Territories' Game Preservation Act of 1894 (more concerned with Canadian sovereignty than with preservation of wild animals) and the Yukon Act of 1900, Canada's response to the invasion of 30 000 gold seekers by establishing a quasi-provincial government with a two-member council and legislative powers over wildlife resources. Changes in the game regulations from 1900 to 1950 provide a “weather vane” of attitudes essentially cultural in origin. These attitudes ranged from taboos on shooting female big game to “cycles of wolf-hating,” from exemption of Indians from certain regulations to barring of Indians as independent contractors or “outfitters” in the big game hunting industry.

Because of the “cultural equilibrium” between Indians and non-Indians prior to the 1940s, the few thousand adults living in the Yukon were generally unaffected by game regulations. “Virtually the entire population . . . were wildlife users,” McCandless says; self-government and an isolated situation allowed them to resist irrelevant pressures. Because of their self-reliance, coupled with rather stable fur prices, Yukoners did not feel the Great Depression of the 1930s as severely as did other Canadians. Complicating factors in this period, however, included the necessity of cooperating with Ottawa to preserve the territory's feeble status as a political entity; meddling by myopic but influential trophy hunters who viewed the Indians as “wasters of game”; the determination of a government licensing agent in Whitehorse to reserve the the guiding business for white residents; and Alaska's requests for coordination of controls along the border.

The invasion in 1942 of thousands of soldiers and civilians for construction of the Alaska Highway, Northwest Staging Route aerodromes and related military projects disrupted forever the Yukoners' simple but fairly comfortable isolation. The intrusion resulted in the shift of the centre of decision making from Dawson City to Whitehorse and exposed the inhabitants to the full force of “metropolitan views” of game conservation and to Alberta-born theories of game management. A catalyst for change, McCandless shows, was the Yukon Fish and Game Association, “townspeople, most of them strangers to the Territory.” The medium for change was the indecisive territorial government, which, unlike British Columbia and Alaska, granted resident hunting licenses to military personnel.

One imported notion was trapline registration, incompatible with the life, culture, economics and conservation practices of Yukon Indian trappers. Another such borrowing was the wolf-poisoning program, originally a palliative for Alberta ranchers. Abolition of market hunting infringed on the livelihood of Yukoners. Meanwhile, outfitters acquired monopolies of hunting areas, buying and selling them as real estate although they had no legal tenure.