

is the absence of a rather wider picture. Unfortunately, much of this general information, although readily available at the level of personal communication, is not published. The Mackenzie delta and River, the coastal waters of the Yukon and much of Alaska, and the coastal waters eastwards to Cape Dalhousie along the Tuktoyaktuk Peninsula form one enormous system. In late winter and spring freshwaters form along the coastal regions as a result of sea ice melting and river runoff. There seems to be a much better developed highway to the east rather than to the west for species not fully adapted to seawater, because of the direction of the freshwater plume of the Mackenzie River. Four species of *Coregonus* utilize this highway: broad whitefish, *C. nasus*; lake whitefish, *C. clupeaformis* (or *C. pidschian*); least cisco, *C. sardinella*; and arctic cisco. Of these, the one most adapted to "anadromy", or having the greatest tolerance to sea water, is the arctic cisco, *C. autumnalis*. This is apparently reflected in the greater westward migration of this species; only the arctic cisco appears to be readily capable of withstanding the higher salinities along the Yukon-Alaska coastline. Perhaps more extraordinary is the fact that none of these four species, the stocks of which all have their origin in the Mackenzie, appear to spawn in freshwaters adjacent to the coast, such as the Colville River, even though they may overwinter there. There seems to be a compelling uniformity about the process, the pattern in each species reinforcing the findings in the others.

The "gauntlet" mentioned earlier is that the ideal of the environmental scientist should be "...to predict quantitatively and with increasing accuracy the results of environmental perturbations." I believe that this may be a misleading and unattainable goal. My mind positively rebels at the prospect of quantifying the fish in the Mackenzie delta; silt load and water discharge, yes, but fish abundance and migration pattern, no. With luck we may be able to establish a general picture, and if luckier still, some measure of the variability likely to be encountered. For environmental science to function effectively we must develop pictures on the appropriate scale and be prepared to stand behind them, or in front of them, naked and largely numberless. Although we need to know in detail the best information we can get at the reductionist level (that is effectively the only way to go), it is necessary to integrate this at a higher level, using a mental "best fit" or "strong inference" technique. No numerical representation without conceptualization.

I can recommend this contribution to environmental science as a stimulating approach to an area of endeavour that is going to press more and more heavily, not only on the shoulders of biologists, but on those of everyone living. The ultimate question of how much we and the environment can take, or even better, should take, will be a judgment call.

We shall need all the perspicuity and perspicacity we can muster.

Lionel Johnson
Freshwater Institute
Fisheries and Oceans Canada
501 University Crescent
Winnipeg, Manitoba, Canada
R3T 2N6

WHITEHORSE HERITAGE BUILDINGS: A WALKING TOUR OF YUKON'S CAPITAL. Whitehorse: Yukon Historical and Museums Association, 1983. (P.O. Box 4357, Whitehorse, Yukon, Canada Y1A 3S8.) 62 p., over 60 historical and recent photos, fold-out tour map. Spiral bound. No price indicated.

Whitehorse, Yukon is a stopover point for me, between my home in Victoria and Atlin, B.C., where I am in charge of restoring the courthouse and other Gold Rush-era buildings. Often I have had several hours to wait for the mail truck to Atlin or the plane south. One way I pass the time is to explore and seek out remnants of the Whitehorse that has almost disappeared — early log structures covered over with stucco, one-room miners' cabins disguised by numerous vinyl-sided additions, and the odd lovingly restored home that housed the pioneers of Whitehorse and Yukon. After discovering some old hulk, I wonder who lived there, why it was built, and what is its future? These questions are well answered by the informative and attractive guidebook *Whitehorse Heritage Buildings - A Walking Tour of Yukon's Capital*, published by the Yukon Historical and Museums Association.

Over 35 buildings are well described with historical facts, anecdotes, recent history, and some speculation on the building's future. All buildings are illustrated by recent photographs, and some are further illustrated by excellent historical photos from the Yukon Archives collections. There are even a few buildings that have escaped my attention and are new to me.

The guidebook starts with a well-illustrated history of White Horse City, Closeleigh, the sternwheelers of the British Yukon Navigation Company, the American Army, the Alaska Highway, and of course, the Klondike Gold Rush. A brief section on architecture in Whitehorse describes the early pro-

gression from tent, to log, then to the "small scale and simple charm" of frame houses. Building styles and development patterns from the 1930s to the 1950s are also described, helping to explain why Whitehorse is so sprawling. This section's summary is particularly important to all who are connected to the north: "The history of architecture in Whitehorse is not one of discovery or of innovation. It is rather an illustration of what an isolated community can do when trying to maintain a life style comparable to the one they left behind."

The guidebook's format is an appropriate one for the invigorating weather I have occasionally experienced while touring the backstreets of Whitehorse. The book's tall 4 x 11-inch format, securely bound with spiral wire binding, can be opened in wind storms in excess of 40 kph; and its size ensures ease of retrieval from an inside coat pocket during blizzards. This guide is very easy to read and is good for browsing or careful study while walking about. The walking tour is well laid out with a fold-out map on sturdy cardboard.

Two minor criticisms are that the wire binding cuts a bit close to the text; and that a couple of the present-day photos are somewhat distorted by the misuse of a wide-angle lens.

Because this guide offers comment about the present problems and condition of heritage buildings, I am sure that its many contributors are planning a conservation program to preserve Whitehorse's past. The tour will do much towards increasing the citizen's and visitor's awareness — a most essential part of any conservation program. Because of the interest this book will generate, I expect to see more restoration with each stopover in Yukon's capital.

Richard Collier
614 Avalon Road
Victoria, B.C., Canada
V8V 1N7

PERMAFROST: FOURTH INTERNATIONAL CONFERENCE, PROCEEDINGS. Washington, D.C.: National Academy Press, 1983. (2101 Constitution Avenue, Washington, D.C. 20418). 1524 p. Hardbound. US\$65.00.

The science of permafrost is alive and well, as witnessed by the 276 papers published in the Proceedings of the Fourth International Conference on Permafrost, held at the University of Alaska, Fairbanks, 17-22 July 1983. An additional volume containing the general and plenary presentations and other contributed papers is still to come. Although most authors are from the United States, Canada, China, and the USSR, 22 countries are represented. Geographically, study areas encompassed the globe, including Antarctica, Europe, Siberia, China, Alaska, Hawaii, Columbia, Iran, Japan, and Spitsbergen — as well as Mars. The papers cover the spectrum of permafrost research, with the emphasis on local engineering and geotechnical design, surface and sub-surface hydrology, regional distribution, and geomorphology. Other topics include tundra botany and zoology, cryoturbation mechanisms, and remote sensing. The volume serves to indicate both areas of interest and new trends in permafrost research. The numerous contributions from the Peoples' Republic of China, especially in the areas of railway design and cryoturbation analysis, highlight the rapidly-growing interest in the 22% of China underlain by continuous and discontinuous permafrost. In the USSR, Alaska, and Yukon, where permafrost has long been a subject of concern, work has focused on engineering and environmental problems, as well as on surface and subsurface hydrology. Reflecting these interests are papers dealing with the performance of geotextiles in Alaska, the effects of oil spills and pipeline construction on tundra biota and ground ice, the formation of natural gas hydrates, the problems of borehole drilling in permafrost environments, and the evolution of the environment throughout the Quaternary.

Interest in geomorphological research remains an integral part of permafrost investigations. Several intriguing contributions concerning rock glaciers, palsas, pingos, and patterned ground are included. Thermokarst features are investigated from both geomorphological and engineering viewpoints.

Among the new approaches in permafrost research is the expanded use of remote sensing techniques. The papers presented here serve not only to outline the applications of remote sensing techniques through regional case studies, but also to elucidate the potential of the approach. Another interesting development is the application of terrestrial permafrost knowledge to the study of genesis of Martian landforms. The papers presented here indicate that this research is being vigorously and innovatively pursued.

The extremely broad scope of this volume is evident from the foregoing summary. The quality of the papers makes it essential to professionals involved in the study of permafrost. Non-specialists will probably forfeit ownership as long as the volume is available in libraries. The quality of production and of the figures is good, although the size of the volume (28 x 22 x 7 cm)