

with the basic issues in these complex and difficult negotiations. They don't confront the basic difference between the government position and the position articulated by both Dene and Inuit leaders. The government continues to insist on a policy of extinguishment of land rights while the Dene and Inuit, and every other First Nation, oppose the extinguishment policy.

The report places the onus on the Inuit for the effects on the environment of the tanker system which the Committee recommends. Meanwhile, an agreement was quietly being worked out with the Dene and Inuit leaders which is allowing a small-bore pipeline from Norman Wells as an experiment which may show the way further north. The Committee projects a price per barrel of oil from Norman Wells at \$75.60 by 1990, a figure which would require prices to triple over the next six years. It does not anticipate the direction that world energy markets have actually been taking.

The tanker recommendation assumes that technology now being developed for gas can readily be applied to oil. It also reflects the insensitivity which surfaces despite the consensus behind the report. When industry witnesses were advocating a tanker route down the west coast of Greenland, Senator Guay asked if Canada had not objected to similar proposals for Alaskan resources coming down our west coast. The answer was that it was "their ships and our coast". Apparently, when the tables are turned the other way — when the environmental hazard is to someone else's coast — the morality of "beggar thy neighbour" has a sort of imperial acceptability.

At the Northern Transportation Conference in Whitehorse on 5-7 October 1982, Marc Denhez, former legal counsel to the Inuit Tapirisat of Canada, presented a paper entitled "Some Inuit Concerns With Economic and Other Impacts of Transport Activities". In it he says: "Elsewhere in Canada, the infrastructure has either been provided or general subsidy formulas were adopted to compensate. A similar subsidy program should be introduced in the north, to bring northern costs in line with those of a developed system."

The Senate Committee does recommend that mega-projects be allowed to proceed following an "approval in principle" by the federal cabinet. This, their clearest recommendation, is intended to speed up an otherwise lengthy bureaucratic tangle of regulations and approvals. The report writers have done a reasonable job of clarifying a complicated procedure by attempting to explain why projects are held up and what the problems are with overlapping jurisdictions. It is less clear that either the Dene and Inuit or their Senate colleagues would favour allowing mega-projects to proceed by Order in Council without legislative action and a system for ensuring that prior conditions be met before each stage of development.

In June 1982, the Banking, Trade and Commerce Committee of the Senate (a body long headed by Canada's foremost expert on tax law and clearly dedicated to our present economic system) adopted a recommendation made by Dene Nation witnesses on the energy bills. They said that all recommendations affecting the local public interest in the north should be automatically referred to the appropriate policy committees of both Houses, as a political appeal process. Dene witnesses had based this recommendation on previous reports of another Senate Committee which routinely studies the form and structure of regulations and statutory instruments. It is clear that while the Senators interested in the transportation of gas and oil in the far north want to cut the bureaucratic red tape, both the Banking Committee and the Regulations Committee think it is time to revive some sense of due process and to introduce fair play into northern development. Unfortunately, the apparent tension between the "streamliners" and the "due processors" in the Senate has not yet surfaced into the direct confrontation which would provide a much-needed public debate. This is an area where the Senate has true expertise and there are Senators on both sides of the issue with both knowledge and passionate conviction. Instead, they have wandered into an area that requires economic forecasting, to which they have primarily added confusion. Some recommendations assume a continuing rise in world prices. The report anticipates a constant price of \$34.00 a barrel. But a later section of the report admits prices are falling.

The Committee has drawn up guidelines responsive to industry pressures, based on a deadline no-one believes anymore. They have coined the phrase "marching to the beat of the same drum" from the idea of coordinating government policy with company expectations. But by the time they were able to deliver a report in published form, the government was already changing its beat. And economic circumstance was giving a slight edge to the Inuit resistance against being pushed into the oil drum.

The Special Committee was originally created to oversee regulations on the Northern Gas Pipeline from Alaska (as was a parallel Commons Committee which restricted its work to reports of the Pipeline Agency, which never got off the ground). The Senate Committee has been transformed into a Standing (permanent) Committee on Energy. It is now beginning to do a study on future directions for the NEP. This is probably the most positive development to arise from the previous report of the Hastings Committee. It will allow a very able and dedicated group of Senators to now consider in public what we may

suspect they knew all along: the National Energy Program, seen in its most positive light, was obsolete by the time it was legislated.

They will also need to address the point that the Dene made to their sister Committee regarding the whole idea of Canada Lands. Canada Lands can be divided into two kinds: those that are underwater and those on which Dene or Inuit live. If the federal Parliament is going to maintain responsibility for northern development it will have to distinguish between submerged lands and populated lands before northerners are impressed by a system that keeps power in Ottawa.

They will have to consider that dynamic tension between the demand for due process (fair play) and streamlined regulatory procedures is nowhere greater than in the combined fields of energy and northern development. This tension, which has characterized parliamentary politics for the past century, is fast coming to a head because of high technology. It assures the need for continued Senate Committee studies. But it raises serious doubts about the usefulness of book-length reports which cannot be published for eight months after the evidence is heard. Perhaps the Committee should consult with the Dene and Inuit leaders on reaching a consensus.

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CONTRIBUTIONS TO THE SCIENCE OF ENVIRONMENTAL IMPACT ASSESSMENT: THREE PAPERS ON THE ARCTIC CISCO (*Coregonus autumnalis*) OF NORTHERN ALASKA. Edited by D.W. NORTON. Biological Papers of the University of Alaska, No. 21. Fairbanks: Institute of Arctic Biology, 1983. (University of Alaska, Fairbanks, Alaska 99701, U.S.A.) ISSN 0568-8604. 61 p. Softbound. US \$5.00.

This collection of three interrelated papers on the Arctic cisco, *Coregonus autumnalis*, as well as the introduction by the series editor, might well be taken as a stimulating challenge to those who have questioned the money spent and the validity of much biological work carried out in the name of environmental impact assessment. However, it is another gauntlet — probably rather casually dropped — that I would like to pick up, but only after an examination of the papers themselves.

The first paper is an assessment of the arctic cisco stock in the Colville River Delta as revealed by the results of a fishery there over a 15-year period, combined with considerable monitoring of the catch. The model developed, barring one glaring exception, gives a remarkably good fit to the data. The rather extraordinary and unusual feature is that very little information is available on the abundance of the spawning stock, its location, or frequency of spawning. (Apparent internal contradiction of statements on the percentage of spawners is resolved when it is realized that "sexually mature" means those fish physiologically capable of spawning rather than those in a pre-spawning or ripening state.) It is rather difficult to know exactly what these catch data represent beyond the bare fact that they reflect changes in abundance and regular fluctuations in size distribution. This is largely because of the great remoteness, apparently over 400 km distant in the Mackenzie delta, and lack of information on the spawning component of the stock from which these fish originate.

The second paper investigates the temperature/salinity preferences of the arctic cisco, and this is clearly done in standard conditions using accepted methods. The results confirm what is generally recognized about fishes and their temperature preferences, including the fact that arctic freshwater and anadromous fishes usually express temperature preferences well above those they are normally likely to experience.

The third paper is a valiant attempt to put the observations and results obtained in the previous two papers together into a coherent model, within the environmental context of the north coast of Alaska and the recently constructed causeway at Prudhoe Bay, over 3.4 km in length, but including a breach to allow the passage of migrating fishes. Like many models of this kind it appears to be rather crude initially but becomes more persuasive with experience. However, such a model, it seems, is only as good as the field data; this is clearly apparent when stocks are subjected to stochastic and quite dominating effects about which a computer model can have very little warning. Nevertheless the exercise is, I believe, a useful stimulant to thought; danger only arises if one puts too much confidence in the results.

This combination of field and laboratory work is undoubtedly the way to approach environmental problems, but it must be supplemented with a considerable amount of thought; if computer simulations can assist hard conceptual thinking then they certainly have a place in the process.

The one aspect missing, particularly from an "environmental" standpoint,

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.

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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.

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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)