Thirty-fourth Federal-Provincial Wildlife Conference

# TRANSACTIONS 1970

Yellowknife, Northwest Territories July 14-16 Transactions of the Thirty-fourth Federal-Provincial Wildlife Conference held in Yellowknife, Northwest Territories July 14-16 1970

Canadian Wildlife Service Department of Indian Affairs and Northern Development

Issued under the authority of the HONOURABLE JEAN CHRETIEN, P.C., M.P. Minister of Indian Affairs and Northern Development

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# Summary of the 34th Federal-Provincial Wildlife Conference

#### 1. Conference opening

J. S. Tener, chairman, opened the conference and asked the commissioner of the Northwest Territories to address the delegates.

Stuart M. Hodgson welcomed the conference to the Northwest Territories, saying that he hoped both would profit from the contact. He emphasized that although mineral and oil finds tend to overshadow other resources, he considered that the north's wildlife remains one of its most important riches.

# 2. Appointment of recommendations committee

The chairman appointed the following recommendations committee: B. F. Bossenmaier (chairman), D. G. Pike, C. H. D. Clarke and J. F. Cameron (secretary).

#### 3. Invitation for the 35th conference

C. H. D. Clarke invited the conference to meet in Ontario in 1971 – the dates to be established later.

# 4. Recommendations of the 33rd conference

F. H. Schultz reported on the action taken on the recommendations of last year's conference. There was no discussion.

#### 5. Activities of the Canadian Wildlife Service

Dr. Tener reported on progress and developments.

# 6. Canadian Wildlife Federation activities

R. C. Passmore reported on the success of the 1970 Wildlife Week and solicited comments on the 1971 and 1972 proposals.

The federation was congratulated on the high quality of the 1970 program.

Discussion on the proposal "Preserving Wetland Habitat" for 1971 brought out two major points: that the topic is not applicable to some regions of Canada, and that the time seems appropriate for emphasizing population and environmental concerns. It was decided to prepare a recommendation to support a population-environmental theme for 1971.

Mr. Passmore outlined educational ventures that the federation has encouraged in cooperation with the University of California, the Ontario College of Education and several other teacher-training agencies across Canada.

Mr. Passmore also invited the provincial representatives to consider setting up trial areas for point-system bag limits as recommended at the federation's annual meeting.

#### 7. Caribou administrative meeting

N. S. Novakowski reported that the committee had discussed the report by A. H. Macpherson and G. R. Parker on managing barrenground caribou populations in the Northwest Territories, Manitoba and Saskatchewan and also the recommendations of the caribou technical committee. The latter were far-reaching and the administrative committee members decided that they needed more time to discuss the amounts of resources they could obtain. The provinces are to become more involved in caribou research. A meeting will be held in Saskatoon later this year.

# 8. Polar bear administrative committee meeting\*

Dr. Macpherson reported that the committee discussed lengthy resolutions from the technical committee. The recommendations concerning zoning were accepted, but further study is needed of the quotas recommended. Other resolutions approved were: adoption of a common method of sealing polar bear pelts in all jurisdictions, a request to the Department of

\*As this meeting's discussions were misinterpreted by the press, the minutes of the meeting have been included in "Transactions". Transport to frame regulations to ban the hazing of bears by aircraft and motorized toboggans, and a review of legislation to prevent spills of oil and other toxic chemicals that could deteriorate polar bear habitat.

#### 9. Canadian Fur Council

C. R. Merkley of the Canada Department of Industry, Trade and Commerce reported that J. Dickson of the Dominion Bureau of Statistics had asked for an indication of the accuracy of fur statistics and that a recommendations subcommittee had been established. The council heard presentations by the Canadian Association for Humane Trapping, the Fur Fashion Council and the Steering Committee. The council agreed to meet again in the fall.

#### 10. Report on the Yellowknife breeding ground survey

Harvey Nelson, director of the Northern Prairie Wildlife Research Centre at Jamestown, North Dakota, outlined the work done since the beginning in 1951.

David Trauger illustrated his talk on the current work, notably on the lesser scaup, with slides.

#### 11. Canada Land Inventory

V. E. F. Solman reported on the progress of the publication of maps to date. He commented that the Inventory is receiving expressions of interest from several European countries.

Questions were raised about the extent to which governments are using the maps and whether land-use or zone planning might be based on the maps. Dr. Solman replied that the demands are putting great pressure on the cartographers and that maps showing capability in five sectors in order of priority are being produced in some provinces for use by planning agencies.

Two provinces confirmed that significant planning programs are now under way using the C.L.I. maps.

#### 12. Canadian Council of Resource Ministers

Christian de Laet reported on the developments in the council during the past year. He commented on the increased activity produced by seven working committees.

In 1973, the council will be sponsoring a major national conference on "Man, Land and Integrated Resource Use". Mr. de Laet requested the help of the wildlife agencies in the preparation for the conference.

A. B. Pelletier stressed that the wildlife sector will be very important in the conference.

## 13. Migratory bird problems

D. R. Halladay summarized a paper entitled "The management and conservation of raptorial birds in British Columbia" by W. G. Smith, who was unable to be present. Mr. Halladay stressed the importance of the recommendations of the paper.

#### Discussion

C. H. D. Clarke proposed that no further raptor collection permits be issued in Canada because there is now adequate evidence that the continued existence of all birds of prey is in jeopardy.

Stuart Smith suggested, in addition, that all falcons now in captivity should be turned over to qualified people for breeding purposes.

It was decided to rescind Recommendation 8 from the 33rd Conference and put forward a new recommendation.

R. D. Jakimchuk expressed concern that something constructive be done to reverse the conditions leading to the demise of raptors. The chairman replied that the Canadian Wildlife Service pesticide studies are attempting to do that but acknowledged the danger that, by the time sufficient data are available, it may be too late.

A. T. Studholme pointed out that the U.S. now has the authority to prohibit the importation of any rare and endangered species and that federal protection of all hawks and owls is now under review by the States.

J. B. Fitzgerald inquired about controls against illegal capture and exportation of raptors. Suggestions were made involving cooperation with U.S. authorities to detect forged state import permits; rare and endangered species legislation for the provinces; stiffer penalties in fines or seizure of birds; closer cooperation so that every agency knows what legislation and permits exist elsewhere; amendment of the Game Export Act to cover wildlife; and emergency legislation from the Canadian Wildlife Service.

The chairman summarized the discussion with instructions to the recommendations committee.

#### 14. Federal government involvement in oil pollution from ships

N. Sigsworth, superintendent of Marine Services of the Vancouver office of the Department of Transport summarized his paper. He concluded by remarking that now that public concern is raised, money is available. However, D.O.T. is concerned with only a small part of the problem — that involving ships. Who is to take hold of the whole problem?

#### Discussion

Dr. Smith expressed concern that shipping safety is not as closely regulated as air safety. A. Ballentyne commented on the anticipated problems of ship-to-shore and shore-to-ship oil transfers in the north, especially with the advent of the super-tankers. Mr. Sigsworth described the conditions that must be met by potential oil drillers.

Dr. Smith suggested that oil spill contingency plans be set up similar to forest-fire fighting arrangements where men, equipment and leadership become available as soon as required. Dr. Tener announced that the Department of Energy, Mines and Resources is setting up plans that should be ready soon.

It was decided to draft a recommendation to emphasize to E.M.R., D.O.T. and the provincial governments the concern of wildlife agencies with the hazards of oil spills.

F. Walden stressed that thorough understanding of the properties of the types of oil at various temperatures is necessary to realistic contingency planning.

Dr. Tener concluded that wildlife agencies should seek active participation on committees dealing with this problem as the biological problems caused are the most hazardous.

# 15. Toxic chemical research by the Canadian Wildlife Service

R. W. Fyfe presented a paper prepared by J. A. Keith who was unable to be present.

A brief discussion focussed on attempts to ban the use of the harmful chemicals – P.C.B.'s and the chlorinated hydrocarbons.

#### 16. U.S. Bureau of Sport Fisheries and Wildlife

N. E. Buell outlined the American efforts to legislate for a pleasant environment. He added that a national recreation survey of federal lands would be available soon, that bureau employees now require training in crowd handling, including riot control, and that recent re-organization proposals include an environmental protection administration and a national oceanic and atmospheric administration. An environmental early warning system has also been established to provide quick reaction to *any* environmental hazard. He concluded by inviting a re-examination of the bureau's contribution to the conference in view of its changed emphasis.

There was no discussion.

#### 17. Waterfowl status

R. H. Mackay reported that total numbers of ducks were up 16-31 per cent over last year, which was a very good year.

F. G. Cooch announced that modified surveying techniques for heavily settled areas had been developed and tried in southwestern Ontario and that a very significant number of birds had been discovered in terms of the populations normally attributed to eastern Canada. In addition, surveys in the Churchill Falls area of Labrador indicate a high black duck potential and that the flooding should not be as detrimental to nesting as was feared.

Wm. G. Leitch, Ducks Unlimited (Canada), commented on the effects of two consecutive good years on waterfowl populations on the prairies.

Generally optimistic reports were also made by British Columbia, Alberta, Northwest Territories, Yukon, Saskatchewan, Manitoba, Ontario, New Brunswick and Newfoundland.

Dr. Cooch reported briefly on the kill survey and the species composition survey reports and distributed copies to the delegates.

#### 18. National Waterfowl Advisory Committee

C. B. Forbes was appointed to attend the meeting.

#### 19. Provincial forum

Dr. Smith, as Chairman of this first Provincial Forum, commented on the respective roles of the federal and provincial governments in wildlife management. He pointed out that not all of the present arrangements are defined legally, e.g., taxation, and regulation and management of inland fisheries.

#### a) Financing of fish and wildlife habitat in Alberta

Dr. Smith said that provincial wildlife branches operate in the following areas: regulation of people, use of biologists in public relations, and charging fees for hunting privileges. In the U.S., most revenue comes from licensing and Pitman-Robinson and other cost sharing arrangements.

As part of its new Wildlife Act, Alberta has adopted a modified system of ear-marking funds through a trust account. Money for the Fish and Wildlife Habitat Fund will come primarily from the sale of habitat stamps and may be supplemented by donations and bequests. The fund will be used to create and maintain fish and wildlife habitat and for any other purpose included in the regulations. Cabinet will establish the fee which, it is anticipated, will provide about \$500,000 per year. The legislation is broad enough to permit inter-agency co-operation.

Dr. Smith went on to describe the new Alberta Wildlife Damage Fund, a licensing procedure to provide money to reimburse people suffering damage and to implement methods (mainly lure cropping) for minimizing crop depredations by waterfowl. Evaluation of the program is to be done on a research basis. Dr. Smith concluded with a strong pitch to the Canadian Wildlife Service for financial backing in the lure-crop program.

#### Discussion

The discussion focussed mainly on details of administration of the Act such as how the stamps will be sold, for how much, and to whom.

R. Webb inquired about the possibility of obtaining revenues from non-consumptive users. Dr. Smith acknowledged the problems in this area and said that it was hoped that bequests would come from these people.

F. Walden suggested that land prices might rise faster than income to the fund and that Alberta might be forced into buying up poorer land. Dr. Smith replied that other legislation and programs should minimize this hazard.

#### b) Interprovincial reciprocity for angling and hunting licenses

Dr. Clarke stated that Ontario has provision for honourary citizenship status for Canadians who wish to hunt and fish in Ontario. He made suggestions for reciprocal licensing arrangements and outlined some of the difficulties such as those involving boundary waters.

#### Discussion

It was generally agreed that angling licenses do not present a problem; in fact, some of the provinces and territories have some form of reciprocal licensing now. However, in the case of big game, especially trophy game, where the supply is limited, reciprocity is less feasible.

J. B. Fitzgerald expressed concern about regulations affecting the transporting of firearms. Sidearms entering Canada bound for Alaska are sealed, but not rifles; as a result, game is being shot from roadways. British Columbia and Alberta indicated their willingness to discuss the problem.

# c) Provincial waterfowl problems: (1) Migratory bird regulations and depredations

R. Webb introduced the subject by briefly describing the meeting earlier this year between the Canadian Wildlife Service and the western provinces at which an excellent understanding about depredation problems was reached, and also by describing the Manitoba trust fund for a lure cropping program.

C. B. Forbes told of the serious opposition to the Saskatchewan wetland development program and, consequently, to all wildlife management in the agricultural community following two years of serious depredation. He stressed that the depredation problem must be met head on.

Dr. Smith pointed out that the federal government has never discharged its financial responsibility for migratory birds in such areas as enforcement and public relations.

R. Webb suggested that a comprehensive review of the legal responsibilities be undertaken.

R. Halladay and F. Walden said that the

problem went beyond, to basic consideration of the use of land in the social-cultural context. Mr. Walden spoke of the application of urban zoning restrictions to the rural scene. It was generally agreed that the over-all land use consideration is most important and that all conservation agencies, public and private, should make their views known to the politicians.

R. Webb focussed attention on the Migratory Birds Regulations dealing with crop depredations. It was agreed that the present regulations are anachronistic and proposals were made for changing them, ranging from Dr. Smith's suggestion that the provisions be deleted from the regulations and delegated to the provinces, to adapting the Canada Department of Agriculture's L.I.F.T. program. A. G. Loughrey suggested and the delegates agreed that the provinces should give their views directly to the director of the Canadian Wildlife Service for co-ordination.

#### (2) Migratory bird populations and provincial regulations – How provincial committees are working

The four western provinces reported on the status of the provincial technical committees:

British Columbia has been operating since January and is establishing how it can better use available data and set up uniform surveys; Alberta is most pleased with its tri-partite committee responsible for all activities concerning waterfowl that has eliminated all duplication, decentralized decision-making, and permitted more efficient use of men and money, e.g., in the lure cropping program; Saskatchewan's committee is focussing on acquisition of wetlands; the Manitoba committee has not functioned since losing two key members.

With the exception of Newfoundland, which has an informal committee similar to that in Alberta and British Columbia, eastern Canada does not have provincial committees, but works through the eastern technical committee.

#### d) General topics:

(1) Commercial game farms This discussion extended to include all aspects of holding live "wild" animals in captivity. Much interest was expressed in the Ontario regulations and in the proposals newly developed in the United States.

(2) Humane trapping of fur-bearers D. H. Gimmer commented on the apparently increasing opposition to the use of game furs in garments, and the development of humane traps and the proposed campaign to present the facts and oppose the misinformation being circulated and thereby prevent economic hardship in the trapping industry. There was a brief discussion about the sharp drop in sales in early 1970 – and whether it was caused by public concern about inhumane trapping methods or the general economic slowdown.

#### e) Closed session

C. B. Forbes requested a closed session to discuss provincial involvement with the International Waterfowl Management Policy of the International Association of Game and Fish Commissioners.

20. Report — Recommendations committee by E. F. Bossenmaier Nine recommendations were presented and

unanimously adopted.

#### 21. Panel — Environmental hazards of northern resource development

The chairman, W. E. Stevens, introduced the co-chairman, J. E. Bryant and the panelists – S. DeLeonardis, R. C. Passmore, F. Quinn and H. J. Dirschl.

He commented that the subject matter fell into two areas, general ecology, and water resources. He suggested that discussion follow the presentations of the introductory remarks and presentation of the papers on ecology and water respectively.

#### a) General ecology

J. E. Bryant restricted his remarks to the eastern Arctic.

S. DeLeonardis illustrated the summary of his paper by reference to a topographical map of Alaska.

R. C. Passmore summarized his paper and made the following recommendations:

- that key wildlife areas should be identified and activities in these areas be regulated;
- that national parks, nature reserves and wilderness areas be set aside and that development of these be prohibited or greatly restricted, e.g., the Tuktoyaktuk peninsula for Pingo National Park before more damage is done to this unique area.

He concluded with a plea that rational longterm development replace short-term thinking.

#### Discussion

F. McCall pointed out that important legislation to control dangerous effects of development is already being formulated and will soon be law in the case of the Territorial Lands Act. He hoped that the Northern Inland Water Act and the Arctic water pollution act would also be passed soon. He also cited three research projects under way and the proposed conservation school at Haines.

S. DeLeonardis then described the limited incentive subsidies for oil development in Alaska.

P. A. Kwaterowsky criticized the splintered approach to development that does not consider the people of the north and their different cultural values. Dr. Smith pointed out that no cost-benefit analyses are being done to consider alternatives and to weigh the values of renewable resources as opposed to stock-pile resources. F. Walden added that "northern" development is really economic development by the south for the south.

b) Water resources

Dr. Stevens introduced the topic briefly.

F. Quinn summarized his paper stressing that not enough has been done to find out what the north wants. He described the two major schemes under consideration in Canada. The northern Ontario study of hydrological and engineering aspects of five basins began in 1965 and is currently under way through co-operation between the federal and Ontario governments. The Saskatchewan-Nelson basin study is also a federal-provincial undertaking that began in 1967 and should finish in 1972. It is no more than a study of physical feasibility.

He concluded by pointing out that the Northern Inland Waters Act will, for the first time, arrange for territorial in-put into councils involving water legislation.

H. J. Dirschl illustrated the presentation of his paper with slides.

#### Discussion

Discussion focussed on four major areas: (1) the purposes of various water studies; (2) comments on Mr. McCall's remarks; (3) the basic purpose of northern development; and (4) the significance of conservation concerns about the north.

(1) Purposes of various water studies In response to questions about the Northern Ontario and Saskatchewan-Nelson studies, Mr. Quinn agreed that they are somewhat premature in view of lack of articulation of social goals and suggested that much could be learned from two diversions completed in northern Ontario, at Long Lake in 1939 and on the Ogoki River in 1943. He also pointed out that the foreseen problems of the Bennett Dam were accentuated by drought conditions and by the dam being filled faster than the original authorized date.

Dr. Novakowski pointed out that as long as water diversion proposals are to serve economic or industrial ends, they should be resisted. However, we have a moral obligation to provide water for genuine need, if this can be demonstrated.

#### (2) Comments on Mr. McCall's remarks

R. D. Jakimchuk asked how a group as development-oriented as the Northern Economic Development Branch could carry out a truly objective and comprehensive conservation program as suggested by Mr. McCall. He also questioned the comparative financial resources of the proposed Canadian Wildlife Service Arctic ecology program with the economic development programs.

(3) Purpose of northern development A. Ballentyne queried the national posture regarding the north and suggested that many activities there may be self-cancelling. Mr. Passmore suggested that the rush to develop the north can be explained in terms of establishing and maintaining Canadian sovereignty. Otherwise, he continued, it is simply a case of an agency (Northern Economic Development Branch) being given a mandate to develop and doing its job blindly and too well.

Dr. Tener cautioned that the fact that we do not know the effects of northern development is reason enough to proceed slowly.

# (4) Significance of conservation concerns

The panel concluded with several people reiterating that no resources — wetlands, forests, oil stores, etc. — are inexhaustible and that in view of soaring world populations and the squandering of resources by affluent societies such as our own, we may run out of vital resources within the lifetimes of our children.

Dr. Stevens summed up the afternoon by remarking that a better understanding had been reached among the conference delegates and hoping that we can develop the urgently needed means to communicate the understanding.

# Report on recommendations of the 33rd Federal-Provincial Wildlife Conference

#### **Recommendation 1**

That the conference express its appreciation for the splendid hospitality rendered by the following:

The Alberta Fish and Game Association, the Edmonton Fish and Game Association and Ducks Unlimited (Canada) for the social hours and dinner wines; to the provincial secretary of the Alberta Government for the banquet, the staff of Elk Island National Park for bison and elk meat, and Alberta Fish and Wildlife Division for fish; to Mr. and Mrs. A. E. Oeming for the conducted tour and lunch at the Alberta Game Farm; to the Alberta Forest Service, Alberta Fish and Wildlife Division and University of Wisconsin for the flight to Elk Island National Park and the Rochester Research Station; to the City of Edmonton for the Klondike show at the dinner; and to the Department of Indian Affairs and Northern Development for the reception of delegates, provision of conference facilities and organization of the programs.

#### Action

Letters of appreciation were sent in each case.

#### **Recommendation 2**

That the conference express its appreciation to the United States Fish and Wildlife Service for making it possible to have its representatives, Messrs. Noble Buell, Alan Studholme and Walter Crissey at the 33rd Federal-Provincial Conference; to the Fish and Wildlife Branch of the Alberta Department of Lands and Forests for hosting the conference; and to the Royal Canadian Mounted Police for its growing support and co-operation at provincial and federal levels.

#### Action

Letters of appreciation were sent in each case.

#### **Recommendation 3**

That the conference express its appreciation

to Dr. David A. Munro for his contribution to the success of these conferences and to the development and quality of wildlife management in the provincial and territorial, federal and international arenas over many years of dedicated service.

#### Action

The views of the conference were communicated to Dr. Munro.

#### **Recommendation** 4

Whereas the Canada Fur Council, under its terms of reference, is concerned with promoting the use of Canadian wild furs and recommending appropriate research and development towards this end, and

Whereas competitive fur species produced throughout the world are being vigorously promoted through the expenditure of large sums of money, both in Canada and abroad, to the apparent detriment of Canadian wild furs, and

Whereas many Canadians, particularly in the northern regions continue to depend on wild fur for a significant portion of their livelihood,

It is recommended that the 33rd Federal-Provincial Wildlife Conference support the Canada Fur Council in its endeavour to mount a more aggressive promotion program for Canadian wild furs, both at home and abroad, and recommends that the council review its past activities and functions as a first step in considering a feasible approach to promotion, research and development aimed at expanding the use and market value of this important renewable resource.

#### Action

All members of the Canada Fur Council received the expression of support. In addition, the general director, agriculture, fisheries and food products branch of the Department of Industry, Trade and Commerce was informed of the views of the conference.

#### **Recommendation 5**

Since it is recognized that because of the lack of uniformity in dealing with polar bear pelts, undesirable avenues for escape of hides to commercial outlets exist, and since the polar bear technical committee recommended a uniform pelt marking system which would be mandatory for all bear hides which are bought or sold in Canada,

Therefore, it is recommended that under the leadership of the Canadian Wildlife Service a system for marking hides be developed for approval by each agency, to apply to all polar bear hides bought or sold in Canadian provinces or territories, or exported from them.

#### Action

The matter was referred to the Polar Bear Technical Committee. At its meeting in February, procedures were adopted for ratification at the administrative committee meeting. Later Dr. Novakowski reported on the final outcome of this recommendation.

#### **Recommendation 6**

That the Canadian Wildlife Federation continue to provide leadership and co-ordination for annual educational programs during National Wildlife Week, and that the themes to be covered by these programs be "Endangered Wildlife in Canada" in 1970 and "Preservation of Wetland Habitat" in 1971. It is further recommended that provincial and territorial resource departments participate fully in these programs and that they develop liaison with departments of education to encourage maximum use of the program in schools.

#### Action

A letter was sent to all delegates and observers on August 7, 1969 drawing their attention to this recommendation.

#### **Recommendation 7**

That provincial and territorial resource departments give consideration to establishing hunting regulations which will take advantage of the opportunities provided by revision of the firearms section of the Criminal Code to allow young persons to obtain training and experience in hunting under the supervision of licensed adults.

#### Action

A letter was sent to all delegates and observers on August 7, 1969 drawing their attention to this recommendation.

#### **Recommendation 8**

That the conference request the Canadian Wildlife Service to give further consideration to allowing the use of raptorial birds as a method for the taking of waterfowl through amendment to Section 16 of the Migratory Birds Regulations.

#### Action

At present, a national peregrine survey is being conducted to determine their status in Canada. Action to amend the Migratory Birds Regulations in consultation with the provincial governments in accordance with the recommendation was postponed until the results of the survey are available and have been studied. At the same time a legal interpretation is being sought relating to possible conflict with the section of the Criminal Code of Canada dealing with unnecessary cruelty to animals (Section 387 (1) C).

#### **Recommendation 9**

That the federal, provincial and territorial wildlife agencies formally encourage their professional staff to speak out in public on the social implications of their research on environmental degradation, specifically including the environmental consequences of present trends in the growth of human populations.

#### Action

A letter was sent to all delegates and observers on August 7, 1969 drawing their attention to this recommendation. The matter was also discussed at staff meetings of the Canadian Wildlife Service.

#### **Recommendation 10**

That the Canadian Wildlife Service encourage expansion in the activities of Canadian waterfowl technical committees by arranging and co-ordinating annual or semi-annual technical meetings with members of provincial technical staffs to discuss and formulate regional management plans required to improve and standardize data-gathering and interpretation for the purpose of better waterfowl management.

#### Action

Since last year, two major regional meetings have been held, one in the east and one in the west. In addition, numerous provincial waterfowl technical committee meetings have been held in Manitoba, Alberta and British Columbia. Improved computer services at the headquarters of the Canadian Wildlife Service have resulted in increased availability of waterfowl data to provincial biologists.

#### **Recommendation 11**

It is recommended that the role and responsibilities of each province and territory and the Canadian Wildlife Service, in respect to waterfowl management and research, should be clearly defined on the basis of appropriate negotiations between each province and the Canadian Wildlife Service, responding to the individual needs and capacities of each province and territory, and the recognized responsibility of the Canadian Wildlife Service in respect of an international resource.

#### Action

No substantive negotiations with respect to this recommendation between senior officials of the provinces and the Canadian Wildlife Service have taken place. As a first step the Canadian Wildlife Service has undertaken a major review of its role in the migratory birds field, including waterfowl management and research which has nearly been completed. At the same time the regional and provincial migratory bird technical committees have been asked to examine the roles and interests of each provincial and federal agency in the areas of waterfowl research and management. Following both those examinations, discussion with each province to define and set out areas for provincial co-operation and initiatives will take place.

# Report of the Canadian Wildlife Service by J. S. Tener

Once again it is a pleasure to give you an account of the highlights of the past year's activities of the Canadian Wildlife Service. In spite of many problems, or perhaps because of them, we believe we have made progress in a number of important areas of concern to us all.

Although most of you are probably aware of senior staff changes in the Service, I would like to draw them formally to the attention of this conference. Andrew H. Macpherson assumed his new duties as director of our western region based in Edmonton. Ward Stevens, the former director, decided to return to his first love, mammology research, and he is now supervisor of our western region mammal program. W. J. D. Stephen was recently appointed supervisor of our ornithological research. After several years, our complement of senior officers in the Edmonton office is filled and we look forward to vigorous results.

There was no change in our budget last year and this has necessitated making some difficult decisions about our priorities. It has been a good experience for us though, for it has permitted us to examine what we are doing more critically than if we had been preoccupied with the business of moving into new or expanded programs. Nevertheless, we were able to obtain some modest growth in some of our activities which I will mention briefly later.

I regret to have to report that the longawaited revision to the Migratory Birds Convention Act will not take place for another two to three years. Government policies with a bearing on the Act have yet to be determined and we are unable to make progress until that has taken place.

We are developing special legislation which will include a section dealing with rare and endangered species. It is our hope that the first draft of the legislation will be finished this winter and I expect that consultations will then take place with provincial governments.

Our Migratory Birds Program continues to

be the most important work of the service. I mentioned to you last year that we were examining our policies, objectives, and projects in that work. We have completed our review and plan to discuss the results with you in the autumn.

The days of gathering data with a notebook and intuitive feelings are long since gone as we must have a much sounder data base upon which to manipulate, protect, or otherwise manage the migratory birds of Canada. We are developing mathematical models to assist in the identification of important factors controlling waterfowl populations and to assist in more precise management. We are increasing the sophistication of our data-gathering methods and the analyses of the resulting data.

In the Migratory Bird Populations Section, the most significant change since the last conference has been in the field of data retrieval. After several years of developing, editing, and negotiating, the service is now receiving duplicate copies of North American banding and population survey data from the Migratory Birds Populations Station in Laurel, Maryland. It is expected that the transfer of tapes containing data will be completed by January 1971. After that date, all requests by Canadian banders for data retrieval will be handled by the Canadian Wildlife Service. Requests sent directly to Patuxent will be readdressed and sent to Ottawa.

A basic core of 36 programs is being developed and listed. That task is about 40 per cent complete and is on target.

In the past year, there has been a marked improvement in our ability to use the computerized results of major surveys and of the continental banding program.

Our Wetlands Easement Program is being continued but at a very low level of activity. We hope by the autumn to have completed our assessment of it and to recommend new initiatives which will more closely integrate the preservation of waterfowl habitat with agricultural land-use practices. Our land acquisition program is continuing, although at a reduced rate because of fiscal limitations.

Last year, we spent nearly \$500,000 for 2,400 acres, bringing our total acreage purchase to 40,500 acres at a cost of nearly \$3,000,000. In the current year, we hope to acquire nearly 4,000 acres. Most of our acquisitions have been in eastern Canada, although I am sure you are familiar with our purchases in Saskatchewan.

Dr. Solman will be reporting to you progress made by the Canada Land Inventory. As you know, we have 16 members of our staff seconded to the Department of Regional Economic Expansion because we view with great importance the work that is being done there.

I want to emphasize that we view all our activities in the migratory bird field as one package, and that in our judgement the interactions of all the factors having a bearing on waterfowl production and harvest and consequent ancillary problems such as crop depredation must be considered in a unified way.

Our mammalogy work is continuing. The past year has seen some major projects successfully completed or nearly so, such as the Keewatin caribou study, and the grizzly bear study in the Yukon Territory. Numerous other important studies on the Rocky Mountain bighorn, Dall sheep, fur bearers, forest mammals, and the polar bear are well advanced. We were recently able to provide two additional positions and more funds for the polar bear study. A number of our senior ecologists have been engaged in ecological studies of new and proposed national parks and in studies on the impact of exploration and development in the north on wildlife populations.

In this connection, you will be pleased to learn that we were able to obtain additional funds this past year to initiate northern ecological studies and we hope to expand that activity next year. Some of the most important work undertaken last year was in the field of toxic chemicals. I believe you are all aware that our project on mercury has established that that substance is an important contaminant of terrestrial and aquatic food chains in Canada. Our work led to a variety of restrictive actions on, for example, upland gamebird hunting in Alberta and commercial fishing in Lake St. Clair, and to a flurry of research and survey activity across the country to assess the extent of the mercury problem.

Last November, the Prime Minister announced restrictions amounting to a 90 per cent reduction in the amount of DDT used in Canada. The action was taken because of real hazard to wildlife populations and possible hazard to humans. The wildlife data came from our projects and our biologists were very active in the inter-departmental review of DDT uses that preceded the Prime Minister's announcement. We are continuing our studies as will be reported to you later. The department has now authorized an increase of seven in the number of staff biologists working on pesticides and ecologically related chemicals. We are presently classifying and recruiting for these new positions.

Our wildlife pathology unit continues to produce significant results. You are probably all aware that four of the 80 dead blue geese found near the shore of Round Lake in Manitoba were discovered to contain levels of organic mercury ranging from 10-20 p.p.m. These are toxic levels and undoubtedly caused the death of these birds. Disease control of bison in Wood Buffalo National Park continues. We are engaged in studying avian pathology as well as looking at the disease and parasite loads of many mammals. We are interested in enzootic diseases. They are difficult to recognize but they can play a significant role in mammal population status.

Our limnological activities are both research

and management oriented. Some excellent fundamental work is being carried out on alpine lakes in the western national parks with respect to their physical, chemical and biological features and to the ecology of planktonic organisms and prey relationships among copepods. Population dynamics and ecology of walleye and pike in the prairie parks are being studied as is the primary productivity of trout waters in Terra Nova National Park. The object of our limnological work is twofold: to obtain basic knowledge about the ecology of park waters and to recommend management of those waters and their biota for sport angling.

Although financial limitations have prevented us from constructing a second wildlife centre this year, the Wye Marsh Wildlife Centre near Midland, Ontario, is proving to be a popular and useful facility. It was officially opened on June 5. The centre is handling 1,000 school children per week and has had to turn away at least 1,500 because of inability to handle the increase.

Our information program is continuing to be productive. Two major films commissioned by the Service are expected to be completed this year. One is an hour-long documentary about the work of the Service and the second is a major feature film about wildlife in which the timber wolf plays the leading role. We are aiming for theatrical distribution of this film, probably next year.

Our Hinterland Who's Who series — both the television clips and the pamphlets — continues to be very popular. We will issue four new clips on the cougar, woodchuck, black duck, and peregrine falcon later this year. There will also be new titles in our pamphlet series.

New titles in our Report Series are A Study of Wapiti by Donald Flook and The Mammals of Jasper Park by J. Dewey Soper. A report on the bird strike research studies and one on the breeding biology of California and ring billed gulls are on press. We have a number of other major publications under way as well.

Oil spills are receiving increasing attention by this Service. As you may know, we were directly involved in the clean-up operations to contain the Athabasca River oil spill. The excellent co-operation received from federal agencies and the Alberta Department of Lands and Forests, and the outstanding work of the task force commander, Dr. W. J. D. Stephen, plus some lucky breaks with the dissemination of the oil, resulted in an effective operation.

It is a lesson to us all, however, that each agency must have a contingency plan ready to go whenever an oil spill occurs. The first few hours are the critical ones and every effort must be made at that time to limit biological damage. We must also learn what we can from the history of other oil spills, their biological impacts and the success or failure of clean-up operations. We view this problem as one that will be with us for a long time and one that can be most serious to our interests. We have, therefore, assigned a senior officer of this Service to act as our co-ordinator in dealing with the problem.

Oil spills are part of the general concern by Canadians for what is happening to their environment. Each of us in his professional and private capacity must be prepared to stand up and speak whenever possible about environmental degradation. I believe that wildlife biologists have a special role in this area because of the breadth of interest and knowledge we have in environmental matters.

This Service is very privileged and pleased with the outstanding co-operation we continue to receive from provincial governments, the United States Bureau of Sport Fisheries and Wildlife, Ducks Unlimited, and other agencies and individuals. Working professionally and collectively towards our common goals in the manner we have done in the past will help immeasurably in the future to overcome the many problems facing us.

#### National Wildlife Week, 1970

After last year's sober and somewhat introspective report on the 1969 National Wildlife Week program, it is indeed a pleasure to bring you the success story of the 1970 program based on the theme "Endangered Wildlife in Canada" which you recommended at the 33rd Federal-Provincial Wildlife Conference held last year in Edmonton.

The subject did meet the criteria we suggested to you last year: it did carry a simple, direct message capable of clear, forceful representation through posters and other materials, and the endangered species dealt with in the program do fall within the jurisdiction of the resource departments represented here.

As in 1969, materials produced for the 1970 National Wildlife Week program included posters, classroom lessons, sixteen-page booklets, sixty-second colour films for use in public service time by television stations throughout Canada, and the usual press kit containing suggested editorial material and announcements for use in public service time on radio. In addition, we produced a feature story for release to the press through the wire services. We were also fortunate in having a proclamation of National Wildlife Week issued, this year, by His Excellency The Governor General of Canada.

Nine provinces and the Yukon Territory gave excellent support to the 1970 program — it was only in Saskatchewan and the Northwest Territories that participation in the program was minimal or lacking. Quantities of materials distributed are listed in Table 1. Only 30,000 booklets were distributed on a complimentary basis by the Canadian Wildlife Federation, the remaining quantities, shown in brackets, were produced at the request of provincial governments or wildlife federations. As in 1969, the booklets and television films were produced with the aid of a grant received through the Canadian Wildlife Service. The interest shown in this program by both students and the general public was outstanding. Requests for additional copies of the booklet flooded our office and exceeded our supply by at least 10,000 copies. As you will recall, we solicited your comments regarding reprinting the booklet but, although there was some interest shown, the firm orders received were insufficient to permit reprinting at reasonable cost per unit.

The 1970 program received excellent coverage in the press, radio and on television. The TV films are still being used by many stations in Canada.

The Canadian Wildlife Federation is most appreciative of the very considerable effort which provincial resource departments and wildlife federations put into making this the most successful of the National Wildlife Week programs to date.

#### National Wildlife Week, 1971

Last year, at Edmonton, you accepted our suggestion of choosing National Wildlife Week themes two years in advance. We have already taken some steps toward preparation of materials for the 1971 program on the subject of "Preserving wetland habitat". We expect to be calling on some of you to help supply photographs, film footage and written material for use in the 1971 program. We plan to produce the same types of materials as in 1970, except that we have given some thought to reducing the number of pages in the booklet and applying our funds to production of a larger quantity of that item. We do hope we may look forward to the same excellent cooperation we received from most of you in 1970.

#### National Wildlife Week, 1972

In keeping with the above noted recommendation, we have given considerable thought to recommending a subject for the 1972 National Wildlife Week program. Our suggestion would be "Conservation education in

# NATIONAL WILDLIFE WEEK, 1970

# SUMMARY OF ORDERS FOR POSTERS, BOOKLETS, AND LESSONS

Province & Organization Receiving	Posters English French		Booklets English French		Lessons English French	
British Columbia Wildlife Federation Fish & Wildlife Br.	1,000 8,000		2,100		8,000	
Alberta Fish & Wildlife Br. Fish & Game Assoc.	1,250 750		1,700			
Saskatchewan Wildlife Federation	1,500		1,500		1,500	
Manitoba Wildlife Federation	10,200		1,500		10,200	
Ontario Dept. Lands & Forests O.F.A.H.	38,000	2,000	8,000 (3,000) (250)	(1,000)	38,000	2,000
Quebec Wildlife Federation Prot. School Brd.	5,000 500	35,000	1,000 (500)	6,500	5,000 500	35,000
New Brunswick Wildlife Federation	4,800	1,200	1,200	250	4,800	1,200
Nova Scotia Dept. Lands & Forests	2,500	x	1,100		2,500	
P.E.I. Fish & Wildlife Div.	1,145	35	500		1,145	35
Newfoundland Wildlife Div.	6,000		1,600		6,000	
Yukon Game Branch	100		50		1,000	
N.W.T. Indian Affairs	375		100		375	
C.W.F.	1,400	600	2,150	750	1,400	600
	82,520	38,835	22,500 (4,750)	7,500 (1,000)	80,420	38,835
	121,355		35,750		119,255	

Canadian schools", but we must acknowledge that we would be venturing into an area of responsibility which does not fall entirely within the jurisdiction of resource departments. However, we understand that most provincial departments responsible for natural resources are now working quite closely with departments of education and there seems to be reason to hope that, by 1972, inter-departmental relationships will warrant a joint approach to supplementing the current level of conservation education in the school systems of all provinces and territories.

But if, in your judgement, the subject "Conservation education in Canadian schools" would pose too many problems, we would like to suggest that the more general subject, "Conservation education", be dealt with in 1972, in which case emphasis on school systems would be reduced though not left out altogether.

We will look forward to receiving your suggestion regarding the subject to be dealt with in the 1972 National Wildlife Week program.

# Report from the administrative committee for polar bear research and management

Administrative Committee for Polar Bear Research and Management, 2nd Meeting, July 13, 1970, Yellowknife, N.W.T., 12 noon to 5:15 p.m.

#### Present:

Chairman, N. S. Novakowski, Canadian Wildlife Service, Ottawa Secretary, A. H. Macpherson, Canadian Wildlife Service, Edmonton

Members: E. Bossenmaier and R. Webb, Department of Mines & Natural Resources, Winnipeg, Man. C. H. D. Clarke, and F. Walden, Department of Lands & Forests, Toronto, Ont. D. G. Pike, Department of Mines, Agriculture and Resources, St. John's, Nfld. P. Kwaterowsky, Department of Industry and Development, Yellowknife, N.W.T. J. B. Fitzgerald, Government of the Yukon Territory, Whitehorse, Y.T. D. H. Gimmer, and A. Stevenson, Department of Indian Affairs & Northern Development, Ottawa, Ont. Sgt. T. C. Jenkins, Royal Canadian Mounted Police, Ottawa, Ont.

Agenda item No. 1 A report on the first meeting was published in the proceedings of the Federal-Provincial Wildlife Conference, 1969. Acceptance of the report was moved by E. Bossenmaier: Passed.

# Agenda item No. 2: IUCN Polar Group meeting

A report was presented by C. Jonkel, research scientist in charge of the Canadian Wildlife Service polar bear project. Dr. Jonkel presented the press release and added some detail. He noted that the Dutch were also working on polar bear physiology in Spitsbergen and that the IUCN would be setting up an Arctic ecology committee of which Dr. Macpherson would be a member. Internationally, more data were needed on denning areas; their locations and productivities were largely unknown.

Canada had delimited certain important denning areas within her territories and an additional \$4,000 had been ear-marked by the Canadian Wildlife Service for this work in 1970. The U.S.S.R. was doing continuing work on the important denning area of Wrangel Island. Dr. Vibe, at the Greenland office of the Danish government, had urged that more work be done on sea ice. Canada would respond by making this a major aspect of the work of a second polar bear biologist, Ian Sterling, who would be working in the western Arctic.

Sport hunting was an object of some concern to the group. Norway's more restrictive draft regulations had not been adopted and the use of set-guns had actually increased since the 1968 meeting. Heat-sensing devices for locating and counting bears were discussed. Canada agreed to translate a new Soviet book on polar bears. It would soon be edited and copied for our committees and others. It was agreed also to put out a newsletter, beginning in 1970.

The Soviet appeal, made through the IUCN, was submitted to the meeting and the possibility of an international convention was discussed. The administrative committee would advise the Canadian delegates concerning any such proposal. Mr. Kwaterowsky asked if managers should not be included in the IUCN polar bear group. Mr. Walden agreed; he thought that the important thing was getting the input, not who were the delegates. Dr. Jonkel noted that the IUCN had conceded that additional people might come to the polar bear group meetings to give papers, but membership would not be offered to them.

Mr. Bossenmaier noted that the crux of the question was whether or not the bears transgressed national boundaries. Dr. Macpherson replied that the group had conceded on the basis of Dr. Jonkel's work that Canada did have resident populations that would not be included in any international understanding. Dr. Jonkel added that an international understanding would concern first and foremost the high seas.

#### Agenda item No. 3:

The Soviet appeal and Canada's reply

Dr. Jonkel noted that if further concessions were required it would seem logical to close to polar bear hunting the northwestern-most islands (Area "G" in the zoning map). It might be desirable also to do further studies on the importance of polar bear hunting to the Eskimo culture. Mr. Kwaterowsky expressed his appreciation for the tone of the reply and the understanding it showed for the conditions of northern life.

# Agenda item No. 4: Discussion of technical committee recomendations

# Recommendation No. 1: concerning a tagging system

Two types of tags were circulated. Mr. Kwaterowsky pointed out that one of these was being used by the Northwest Territories. Dr. Jonkel stated that Quebec had agreed on the need for tags. The technical committee had perhaps given insufficient consideration to the method of reporting and the year. In Manitoba no hides could be sold; in Ontario an export permit was needed; Newfoundland had a \$1.00 export tax; the Yukon Territory had a \$5.00 export fee; and in the Northwest Territories a tag was already in use.

Problems might arise in extending a system to the other provinces. Mr. Kwaterowsky stated that in the Northwest Territories any untanned hide could be seized if it were not properly identified. Mr. Gimmer pointed out that Indians might be excepted from provincial regulation: that amendment might be required under Section 72 of the Indian Act, by Order-in-Council. Under Section 87, certain laws of general application are void in regard to Indians.

Mr. Walden commented on Ontario actions since the February technical committee meeting but asked the press to withhold their reporting on this matter. The press representatives agreed and asked for clarification in regard to Canada's "draft reply". This was given by the chairman, Dr. Novakowski.

Mr. Walden continued. Pleasure had been expressed by the Deputy Minister at the committee's concern and it was agreed to use existing legislation. No open season would be declared. A few polar bears were killed: it was important to receive the maximum return for their hides. Ontario did not want to prosecute occasional illegal buyers because they would also have to prosecute the Indian sellers.

The bands had been asked to limit their kills and they have agreed. The department will sell the pelts and return the funds to the bands. Mr. Webb was unsure how a tag system could help in regulating an illegal kill. Mr. Gimmer disagreed that the kill was entirely illegal: the Indians had residual rights even under Treaty 9 in Ontario. Mr. Webb expressed grave doubts that a workable system could be instituted in Manitoba; the Indians would have possession rights. Mr. Webb thought that Manitoba had the means of controlling traffic now. Mr. Sinclair (accompanying Mr. Fitzgerald from the Yukon Territory) felt that the U.S. should be approached at the IUCN meeting to extend the system under discussion here to their country. Mr. Kwaterowsky stated that no polar bear hides could be imported legally into the Northwest Territories and, therefore, that all hides in the territories had to have tags. The regulation concerned hunting on the high seas. This regulation should also be extended.

Mr. Walden remarked that we should inform the U.S.F. & W.S. of our requirements and untagged bear skins would then automatically become illegal in the U.S. under the Lacey Act (1905). Dr. Novakowski appointed a resolutions committee, consisting of Sgt. Jenkins and Mr. Walden. Mr. Webb noted the difficulties in tagging hides in present use. Mr. Walden stated that the principle was that hides be tagged; how this was to be achieved is up to each province or jurisdiction. The question was: did we subscribe to the idea of a tag?

Mr. Kwaterowsky noted that it was essential that tagging be universal in Canada but that the details were up to each jurisdiction. Mr. Walden stated that the Game Export Act required supporting provincial or territorial legislation. This is achieved in various ways depending on how the enabling legislation is worded. Dr. Jonkel added that the committee could agree on the principle and on the benefits envisaged. Mr. Webb asked if an export permit would solve the problem. Mr. Kwaterowsky thought not; another province could grant a permit after illegal export. The quota system is then breached.

Sgt. Jenkins said that skins had been seized in Quebec that had come from the territories; the R.C.M.P. had a good rapport with the taxidermists. Dr. Novakowski asked for acceptance in principle of recommendation number 1: Carried. Dr. Jonkel asked that the Canadian Wildlife Service data form be used in the tagging procedure.

# Recommendation No. 4: Participation of all jurisdictions in cooperative research programs.

Dr. Macpherson stressed that there was no commitment involved in agreement with the resolution. Mr. Bossenmaier pointed out the difficulty of allocating staff time. Manpower resources are now budgeted fully a year in advance and the regions and districts might refuse ad hoc requests. Dr. Novakowski asked for agreement on the recommendation: Carried.

#### Recommendation No. 7: On the undesirability of legalizing the hunting of polar bear cubs and females with cubs.

Dr. Jonkel said that Quebec had followed the principle but had found enforcement to be difficult. Mr. Pike stated that in Newfoundland the principle was implied. Other speakers noted that in Ontario and Manitoba the season was closed, properly speaking. In the Northwest Territories the choice of bears to be killed was largely left to people within the Eskimo communities and some cub hides had been tagged. The recommendation was carried.

# Recommendation No. 9: Support for the proposal to build an adequate garbage incinerator at Churchill.

Dr. Jonkel explained that in the last year the population of Churchill had greatly decreased and the alternative that the dump be moved further out of town might now be more acceptable. The Department of Public Works should be commended for their action in closing the dump at night and burning the refuse. Mr. Bossenmaier referred to a ministerial letter suggesting that the money was in this year's estimates for construction of the incinerator. Recommendation carried.

#### Recommendation No. 10: Protection of polar bears through land use permits.

Mr. Fitzgerald advised that he was wholeheartedly in agreement with the recommendation. Dr. Jonkel said that Manitoba was writing such regulations into work permits. Dr. Novakowski pointed out the problem of federal permits for territorial land use. W. E. Stevens (Canadian Wildlife Service, Edmonton) asked if large caliber rifles could be banned from itinerant exploration camps. Sgt. Jenkins described the DEW Line regulations which made it necessary for rifles to be sealed. Mr. Hall (Northwest Territories Game Management Service) said that the Northwest Territories found it impossible to assure the camp people that there was no danger. Mr. Fitzgerald agreed.

Mr. Webb noted that sealing rifles in this way abrogated the rights of individuals to shoot unprotected species. Sgt. Jenkins said that the R.C.M.P. prefer to see exploration parties equip themselves with rifles rather than with sidearms. Mr. Fitzgerald said that in the Yukon travellers must have fire-arms stowed unless they possessed hunting licenses. Side-arms are sealed at international borders.

Predators could not be shot legally. Three people who were mauled by grizzlies admitted that they would not have been helped by possession of a rifle. People in camps might not need rifles; however, prospectors like to have them. Mr. Walden noted that abrogation of hunting opportunity had to be avoided. Indiscriminate use had to be prevented. This was a law enforcement problem. He asked if the Canadian Wildlife Service could ask the Department of Transport to regulate the buzzing of polar bears by aircraft. Dr. Novakowski asked if the committee wished the Northern Economic Development Branch and the Department of Energy, Mines and Resources to be notified of the resolution: Agreed.

Mr. Fitzgerald asked that resident geologists

also be informed. Mr. Walden said that his resolutions committee would deal with the matter and the problem of buzzing. Recommendation carried.

#### Recommendation No. 2: Zones and quotas.

Mr. Kwaterowsky introduced Mr. Ballentyne, director of the Industry Branch of his government, and Mr. Legasse, assistant director. Mr. Kwaterowsky stated that the Quebec Eskimos were taking polar bears in Zone B and that they have been doing so for many years. Could the prohibition be reconsidered? Dr. Jonkel said that the prohibition was based on the assumption that the population was discrete and vanishing. We did not know if recruitment came from Baffin Bay and from Foxe Basin.

Quebec was asked to discourage expeditions for polar bear hunting and the federal government was asked to discourage Norwegian sealers. Mr. Kwaterowsky said surveys were necessary to convince the Burwell people. A quota of seven was proposed. Dr. Macpherson suggested the matter be referred back to the technical committee. Dr. Jonkel stated that the technical committee had agreed that there should be total protection until recruitment had been demonstrated. He felt that the chance should not be taken of proposing a quota. The range of bears in the area had greatly decreased.

Mr. Kwaterowsky felt that the prohibition would be countered one way or another and the committee should ease the position of the Burwell hunters. A quota should be established and gradually decreased if necessary. Sgt. Jenkins suggested circulation of R.C.M.P. annual game reports to the committee. Mr. Walden asked for an amendment to the resolution as follows: "subject to there being an open season".

Mr. Webb thought that the technical committee might have suffered from a lack of data. How was the quota for Zone A arrived at? Dr. Jonkel explained the information available to the technical committee. There were high populations which appeared to be excessive. The kill should approximate 70 to keep the population in balance. Less than 20 were being killed now and a higher figure was proposed (20 rather than 10) for Manitoba. Mr. Webb asked why the kill should not be higher. Dr. Novakowski suggested we vote on the parts of the resolution separately as follows:

Adopting the appended zoning plan: Carried.

Adopting approximate zone kill limits: Defeated.

Mr. Bossenmaier framed a resolution addressed to the technical committee that it review zones and kill limits, and report annually.

#### Agenda item No. 5

Mr. Kwaterowsky reported that he would have funds available to work on polar bears in the next budget. The quota system had stabilized the kill and it was felt possible to field some sports hunters this year. Mr. Walden asked that provincial directors keep the chairman of the administrative committee informed of developments continuously. Dr. Jonkel suggested that this committee should keep the technical committee acquainted with its needs. Mr. Kwaterowsky announced that since the Canadian Wildlife Service had obtained a second polar bear biologist position, he would put a member of his staff to work with Dr. Jonkel for familiarization with techniques.

#### Agenda item No. 6

Dr. Jonkel told the committee that Quebec Eskimos and Indians were hunting on islands in the Northwest Territories, in James Bay, Hudson's Bay and Ungava Bay. Dr. Novakowski asked if the committee wished to request information from the responsible governments: Agreed. Dr. Stevens asked if Greenlanders still hunted in Canada. Mr. Kwaterowsky said they did.

Sgt. Jenkins asked if there were sufficient liaison with Greenland to ascertain the numbers of Thule hunters using Canadian waters. Dr. Jonkel said that Dr. Vibe had advised that only ten bears or so were taken by Thule hunters, mostly off-shore. Dr. Jonkel raised a second point. He wanted to know if the technical committee should develop a contingency plan against an oil spill disaster. Mr. Kwaterowsky thought so. It was agreed that the resolutions committee would draft a request.

Mr. Walden proposed that a resolution of the Federal-Provincial Wildlife Conference could ask that sufficient legislative safeguards be established. Dr. Novakowski said there were such safeguards in contingency plans but agreed that we should recommend an intensive review of the safeguards and hazards to wildlife from northern developments.

Mr. Fitzgerald said that Herschel Island had been withdrawn from oil lease exploration but a resident of the Northwest Territories had proposed the establishment of an Eskimo village at Herschel Island and the proposal included polar bear sports hunts. He would not agree that this was feasible until information is forthcoming on the bear populations of the area. The meeting was adjourned at 1515 hours.

#### APPENDIX Report of the recommendations sub-committee

The following recommendations were submitted.

1) In order that the administrative committee may serve effectively in polar bear management, it is recommended that the technical committee define as precisely as possible its management objectives and the biological principles relating thereto, and that these be used as a basis for legislative and administrative action by the administrative committee. 2) It is recommended that as soon as legislative action respecting the sealing of polar bear pelts for the control of marketing has been enacted by any provincial or territorial government, the chief game officer of that jurisdiction should inform all other governments through their game departments within Canada, and also the chief of the United States Bureau of Sport Fisheries and Wildlife. And that the director of the Canadian Wildlife Service assume responsibility for informing all other federal departments of government which may be concerned, and also the commissioner of the R.C.M.P.

3) It is recommended that the director of the Canadian Wildlife Service approach the Department of Transport to initiate discussions which will achieve regulations prohibiting the disturbance or molesting of polar bears by means of aircraft.

4) It is recommended that provincial and territorial governments enact legislation, if not already existing, prohibiting the disturbance, molesting, herding or pursuing of polar bears by motorized toboggans.

5) It is recommended that the technical committee review the zone boundaries and kill limits for each zone annually, and convey their opinions to the administrative committee for the appropriate action or recommendation to the provincial or territorial game management agency concerned.

6) It is recommended that the technical committee be directed to draft a contingency plan for the protection of polar bears in their habitat in the event of an oil spill or some other critical debilitation of their environment.

7) It is recommended that the Federal-Provincial Wildlife Conference take under advisement the need for intensive review of the adequacy of all legislation relating to the prevention of oil spills or other factors which may cause critical deterioration of polar bear habitat or environments.

8) It is recommended that neither the press nor members of the public be permitted to attend meetings of the polar bear administrative committee without the chairman's express invitation.
9) It is recommended that each provincial or territorial game management agency accept responsibility for informing their neighbouring or adjacent game management agency officials respecting inter-jurisdictional hunting for polar bears whenever this takes place.

# Waterfowl research on the Yellowknife study area, 1961-70 by H. W. Murdy, D. L. Trauger, and H. K. Nelson

While flying aerial transects in the Northwest Territories for the co-operative breeding grounds program in the late 1940's, Robert H. Smith and Edward G. Wellein were impressed by two facts: (1) the western edge of the Precambrian Shield was an outstanding, albeit limited, breeding ground for ducks, (2) biological, environmental and ecological studies were needed to support the aerial surveys for this part of the subarctic.

Subjects which needed investigation included:

- (1) Dates of spring breakup.
- (2) Arrival dates for principal species.
- (3) Dates of nest initiation.

- (4) Incidence of nonbreeding (environmental, physiological and age-related).
- (5) Factors influencing nesting success (especially predation, weather and other environmental factors such as permafrost).
- (6) Incidence of renesting.
- (7) Hatching periods.
- (8) Brood sizes and mortality.
- (9) Duckling growth rates.
- (10) Fledging related to the fall freeze-up.
- (11) Changes in breeding population densities and species composition, especially for drought-displaced prairie species.
- (12) Water quality.
- (13) Basic breeding biology of northern

species.

- (14) Breeding ecology of lesser scaup.
- (15) Timing of aerial pair and brood surveys.
- (16) Air-ground corrections for aerial surveys.

#### Waterfowl production studies

During 1961-65, H. W. Murdy conducted for the bureau a waterfowl study entitled "Population dynamics and breeding biology of waterfowl on the Yellowknife study area, Northwest Territories" (Work Unit A-1.1).

The study area was located in the western edge of the Precambrian Shield between Yellowknife and Rae along the Yellowknife Highway, 1-7 miles north of Great Slave Lake. It was 30 miles long, ½-mile wide and encompassed approximately 15 square miles. The principal woody species are those of the northwestern transition section of the boreal forest.

Nearly all of the area gives a bushy appearance due to the willows and small white birches, aspens and coniferous reproduction which resulted from repeated and wide-spread fires in the late 1930's. Conspicuous granitic outcrops cover about one-fourth of the surface. Except for a few limited peat areas the soil is classified as subarctic, with permafrost continuous. Geographically, the area was the bed of glacial Lake McConnell which presumably enriched the Precambrian Edge that now extends from Great Bear Lake to Lake Athabasca.

The study area contains 232 scattered natural ponds, pools and small streams, which average 15.7 per square mile, plus ditches and borrow pits evacuated during highway construction in 1957-59. Most of the natural ponds are small; about half are less than one acre in size, and 90 per cent are less than 20 acres. The largest is only 92 acres. Directly adjacent to the study area there are a few larger ponds which are several hundred acres in size. Some of the study area ponds were altered through partial drainage and flooding resulting from highway construction. The majority of the water bodies are bog ponds and bog pools characterized by floating sedge-mats and deep mucky bottoms, and they are usually shallow enough to have extensive beds of yellow pond lilies. Some of the larger ponds have woodland or ericaceous shorelines which lack a sedge-mat but may have pond lilies. As indicated by surface water samples collected in July, the waters are described as "hard" with limited fertility. Median values were: specific conductivity - 125 mmhos; total alkalinity - 135 ppm; and pH - 7.4.

Initial reconnaissance and selection of the study area began in 1961. With the establishment of the Yellowknife study area in 1962, intensive breeding population and brood inventories were initiated and continued through 1965. The supporting studies which began in 1961 were continued throughout this study. These included: phenology records, a roadside chronology transect for monitoring activities of adult ducks, a roadside brood transect to follow development of the hatch, water level records, brood size records, and determination of the fate of all nests seen.

During 1964 and 1965 selected biological and physical characteristics and water quality were determined for each water body within the study area. Breeding pair and brood counts were made by walking-out or covering the water bodies by canoe. Pair counts were made in late May for dabbling ducks and canvasbacks. and in early June for other diving duck species. Dabbler drakes were assumed to represent breeding pairs, whereas only pairs actually observed were tallied as breeding pairs for diving species. A brood count was made in mid-July which measured the entire dabbling duck hatch plus the majority of the diving duck hatches. A second count was made in mid-August to measure the latest-hatched broods of diving species. Each year the project leader and an assistant were on the study area from mid-April until late August and in 1964 and

1965 Mr. Murdy remained until the freeze-up was well along, in late September.

Spring breakup began with the appearance of first open water in ditches and borrow pits as early as April 25 and as late as May 4. The study area was ice-free as early as May 15 and as late as June 6. The last frosts occurred between May 17 - June 7. Each year all of the water bodies contained water during the spring runoff; and only five per cent to 16 per cent went dry by late August.

The first ducks, pintails and mallards, appeared between April 23 and May 4 during the five-year period. Major influxes of puddle ducks occurred between April 30 - May 15. The first late-nesting diving ducks arrived between May 4 - 15; and their major influxes occurred about May 15 - 20. Breeding populations ranged from 45.9 to 55.2 pairs per square mile and averaged 51.3. Four species comprised nearly 90 per cent of the breeding population; lesser scaup (47 per cent), mallards (15 per cent), baldpate (14 per cent) and green-winged teal (11 per cent). Less abundant nesting species were the pintail, shoveler, blue-winged teal, ringneck, bufflehead, canvasback, surf scoter and white-winged scoter. Greater scaup nest on islands in the Great Slave Lake but were not found on the study area.

Nesting by dabbling ducks began May 4 - 13 and continued until the last nest was initiated June 14 - 29. This abbreviated laying period precluded much renesting. Late-nesting diving ducks started nesting the last days of May or first days of June. Last nests of these species were initiated during early July. There was no evidence of non-nesting among the dabbling ducks, and that observed among certain species of diving ducks was suspected to be age-related.

A limited sample of 89 nest histories indicated that all of the nest failures (51 per cent) were due to predation. Success was higher for cavity nesting species (67 per cent of three nests) and sedge-mat nesting species (53 per cent of 66 nests) than for ground-nesting species (20 per cent of 27 nests). Predation by ravens and foxes was believed to be responsible for 89 per cent of the unsuccessful nests.

Productivity was measured by brood/pair ratios expressed in terms of downy (Class 1) ducklings. The ratio for the 1962-63 composite population of all species was 27 per cent. Annual ratios ranged from 17 per cent to 34 per cent. Among dabbling ducks, ratios were lower for earliest-nesting pintails (19 per cent) and mallards (20 per cent), and higher for later-nesting baldpates (27 per cent) and greenwinged teal (55 per cent).

Among the diving ducks, two sedge-mat nesting species, ringneck and lesser scaup, exemplified productivity extremes of 66 per cent and 23 per cent respectively. Ringnecks nest earlier, nest as yearlings and are strong renesters; whereas lesser scaup nest later, many do not nest as yearlings and are not known to be strong renesters.

There was no evidence that broods attained flight more quickly than those at more southern latitudes. Latest dabbling duck broods hatched the second half of July and fledged about September 1 - 9. In contrast, the last diving duck broods hatched August 7 - 12 and fledged about September 24 - 30. First ice appeared September 20 to October 4. The first ponds became icebound as early as September 24 and as late as October 24. Freeze-up was completed by October 8 - 30. No broods of any species were observed to be flightless at freeze-up, but it is apparent that a few of the latest diving duck broods might perish during an occasional extreme year when the hatch is late and freeze-up is early.

Waterfowl production on the Yellowknife study area was chiefly limited directly by predation and indirectly by the brief ice-free period in relation to the nesting season. Habitat conditions, especially water levels, were relatively stable. In general, the low success of most dabbling ducks was attributed to their groundnesting habits and the generally late breakup which precluded much opportunity for renesting.

#### Breeding ecology of lesser scaup

Results from the initial five-year study indicated the desirability of conducting a more comprehensive investigation of the breeding ecology of lesser scaup. This second phase of the suggested study by Mr. Murdy was started by Dave Trauger in 1966 and is being completed by him this year. The primary objectives were to determine: (1) incidence of nesting by yearling females, (2) factors affecting nesting by yearling females, (3) the social role of extra males in trios, (4) the role of yearling males, (5) physiological norms for known-age birds and related reproductive organs, (6) physiological or morphological characteristics for differentiating sex and age classes, and (7) general population dynamics and distribution of lesser scaup breeding in the Yellowknife area.

A special study area of five square miles was established in 1966 including a segment of the original study area, between mile 20 and mile 30. All trapping, banding, color-marking and intensive observations of breeding behaviour and production were confined to this area. A total of 2,817 lesser scaup has been trapped and banded to date and 1,855 color-marked with nasal saddles during the first four years of the study.

The color-marking program proved to be highly successful in establishing a marked, known-age population of female scaup on the study, with about 100 marked females returning during 1970. Thus far, no marked yearling males have ever returned to the study area during succeeding years.

Mr. Trauger's slide presentation illustrated trapping, banding and marking techniques, and included information on distribution, mortality rates, nesting success, annual productivity, physiological development of known-age birds and contribution by yearling females.

In summary: (1) band recoveries through 1968 from 1.772 banded birds showed a 73.9 per cent mortality rate for juveniles and 41.7 per cent for adults, (2) 33 - 41 per cent of pairs present on the study area produced broods during 1967-69, (3) the breeding population on the study area has averaged about 30 pairs per square mile, (4) there is a strong tendency for adult females to return to the same pond and nesting area during succeeding years, with a lesser percentage of yearling females returning to the study area and their natal ponds, (5) less than five per cent of the marked yearling females attempted to nest and only three marked yearling females were observed with broods during the course of the study.

The principal results of the first phase of the study (1961-65) are being prepared by Mr. Murdy for his doctoral dissertation and will be published as soon as submitted to Utah State University. Completion has been delayed by Mr. Murdy's illness. The results from the lesser scaup study will be used by Mr. Trauger for his doctoral dissertation for Iowa State University and publication of four or more comprehensive papers is scheduled for 1971. Other publications resulting from research conducted in the Yellowknife area include:

Bartonek, J. C. and Murdy, H. W.

1970. Summer foods of lesser scaup in subarctic taiga. Arctic 23(1):35-44.

Murdy, H. W.

1966. When the prairies go dry. Naturalist 17(1):9-13.

Weller, M. W., Trauger, D. L. and

Krapu, G. L.

1969. Breeding birds of the West Mirage Islands, Great Slave Lake, N.W.T. Canadian Field-Naturalist 83(4):344-360.

# Progress, Wildlife Sector, Canada Land Inventory by V. E. F. Solman

Each year at the Federal-Provincial Wildlife Conference the co-ordinator of the wildlife sector, Canada Land Inventory, presents a brief report on progress in that sector. Dr. Tener has mentioned the 16 Canadian Wildlife Service positions seconded to the wildlife capability inventory. I wish to remind you of the similar numbers of provincial officials involved.

Last year at Edmonton, I gave you copies of the first published wildlife capability maps. There are now 35 published maps and we expect an additional 60 will be published before the end of the fiscal year.

An index to published capability maps was prepared in 1969 and revised in March 1970. I have copies of the March issue for you, on which I have added data up to July 9 for waterfowl and ungulate capability. A table giving details of the progress of waterfowl and ungulate capability mapping within the Canada Land Inventory area in each province is available. From it you can compare mapping progress in your province with your expectations and with progress in neighbouring provinces.

Capability inventory work in the waterfowl sector is complete in Nova Scotia, Prince Edward Island, New Brunswick and Alberta. It will be completed during the current fiscal year in Quebec, Ontario, Manitoba, Saskatchewan and British Columbia. Work in the ungulate sector is progressing well and will be completed in some provinces during 1971 and in others later.

A leaflet has been prepared outlining the scope and content of the inventory program and showing small sample capability maps. It will be of particular interest to planners and members of the public not already acquainted with the program. A large supply will soon be available for your use. Interest in the Canada Land Inventory program and capability mapping methods is increasing in Europe, the United States and in other parts of the world. Canadian planners at federal, provincial and municipal levels are making increasing use of wildlife capability information.

# Management and conservation of raptorial birds in British Columbia by W. G. Smith

# Legal status of raptors in British Columbia

All raptorial birds are protected in the province. Section 4 of the Wildlife Act states that: no person shall hunt, trap, wound or kill game (except under circumstances provided elsewhere in the Act or by regulations). Game includes "game birds", and game birds include birds of the orders Falconiformes and Strigiformes by Order-in-Council.

# Management of raptors in British Columbia

The capture, possession, transportation and importation of raptors is regulated by a permit system, under Sections 26 and 79 of the Wildlife Act. There is no provision for control of export of live birds. Provision for discretionary terms, purposes and fees associated with permits is contained in the above legislation. Provision for the taking of wildlife for scientific purposes is included in regulations, and permits to capture or take raptors may be issued for such purposes.

Most applications for permits to capture raptors are for falconry purposes — frequently with an expressed interest in conducting captive reproduction experiments. There are about 50 raptor permit holders in the province. Few serious scientific permits have been requested for reproduction experiments. Most permits for collection purposes have in the past two years excluded eagles, osprey, vultures, gyrfalcons, peregrine and prairie falcons, unless there has been specific scientific reason to include these birds. By agreement, permits to collect wildlife under the Museum Act now exclude these birds.

Applications are directed, in writing, to the director of the branch. Those for buteos, accipiters, owls, merlins, sparrow hawks and harriers are forwarded to regional offices for action at regional discretion. Applications for gyrfalcons, peregrine falcons, eagles, osprey and vultures are usually held at branch headquarters until some measure of the demand becomes evident. Following an assessment of the demand for birds, quotas may be established and permits issued containing such constraints as number of birds, place of capture, time of capture, etc.

Peale's falcon permits have for the past few years been issued only for the Queen Charlotte Islands (excluding Langara Island where research is currently being conducted) and for the northern management areas of the province in the case of anatum peregrines. No permits for prairie falcons have been issued in the past three or four years. Except in four instances, no permits were issued for the larger falcons in 1970.

Permittees have in the past been advised to leave at least one young bird in each aerie; we have however found in one proven instance, and in several reported and observed instances, that such a constraint is not usually observed; and it is virtually impossible to enforce when individual falconers are allowed to capture their own birds.

As a result of violations of this type the staff of the branch collected all (10) eyas birds from the Queen Charlotte Islands in 1969 — the major collecting area. Elsewhere in the province permittees have been permitted to capture their own eyas birds.

In the past some "proxy" collection was practised; this has however not been allowed for the past three years.

#### **Raptor inventory**

A province-wide inventory of the larger falcons was initiated in 1970. This work is still continuing, and results are not yet available for interpretation. For the fourth consecutive year the Queen Charlotte Islands' population of Peale's falcons has been inventoried, indicating a 23 per cent decline in occupied aerie sites this year as compared with the past three years. A decline of 50 per cent over the past eight years is indicated through records of occupancy reported by falconers before the branch's survey period.

The inventory program is being conducted under contract to J. Simonyi. Its purpose is to work out a method by which raptor populations can be annually inventoried, and population trends and circumstances can be adequately measured throughout the province. It is believed that such knowledge will eventually permit the development of a more precise management program.

#### **Illegal harvest**

The illegal take of the larger falcons is believed to be substantial. Annual legal harvests of Peale's falcons from the Queen Charlotte Islands have been in the order of 10 to 25 birds in recent years; the illegal harvest from the area in 1969 is believed to have been 10 to 14 birds. One aerie in the south coast region has had its eggs removed for three consecutive years, and for the past several years a substantial portion of Peale's falcon production has likely been removed illegally from the Scott, and other coastal islands.

The extent of the illegal harvest from interior aeries is not known; similarly the extent of illegal taking of passage birds is unknown. Comparative production counts this year indicate that about 14 Peale's falcons have been illegally removed from coastal aeries, other than the Queen Charlotte Islands.

Both resident and American falconers have been involved in illegal traffic in falcons. Three Americans were successfully apprehended in 1968. Two American falconers are believed to have taken birds from the Scott Islands this year — and to have done so undetected for several years. In some cases residents are believed to have assisted American falconers in obtaining birds illegally. It appears that the illegal capture of birds has sufficient rewards to encourage such activity on a well financed and coordinated basis.

Enforcement of regulations and conditions of permits for falconry have proven exceedingly difficult and very costly in proportion to the number of people involved in falconry and in illegal activities. The widely dispersed illegal actions, lack of co-ordinated regulations on the continent, lack of co-ordinated and planned enforcement, and in general the lack of information about the nature and extent of illegal activity have hampered enforcement.

The absence of a uniform and permanent method of marking birds legally held in captivity has been a serious impediment to enforcement. We are of the view that illegal taking of large falcons has grown to serious proportions, and that there is a need for more information, co-ordinated regulations and enforcement, and improved management on a continental scale.

#### **Pesticide work**

The harmful effects of pesticides are well documented for raptorial birds, and for other forms high on the food chain. Since 1966, 22 raptors have been analyzed for pesticides in the province, including nine adult falcons which were held captive or found dead in the wild; five unhatched Peale's falcon eggs; a fledgling gyrfalcon; and two nestling Peale's falcons. A substantial collection of birds is awaiting analysis.

Most tissues examined were found to have residues of chlorinated hydrocarbons. Total DDT concentrations were recorded at 37.11 ppm in fat tissue from a sparrow hawk collected in May 1966 near Crown Lake; 62.860 ppm in fat tissue from a Cooper's hawk collected in April 1968 near Vancouver; 34.12 ppm in egg tissue of a Peale's falcon taken from a nest in June 1968 in the Queen Charlotte Islands; 58.450 ppm in fat tissue from a Peale's falcon collected in February 1969 at Saanichton Spit near Victoria; and 49.610 ppm in fat tissue from a Peale's falcon collected in June 1969 in the Queen Charlotte Islands.

Larger falcons appear to be particularly susceptible to exposure and to accumulation of pesticides because of their tendency to take prev species which accumulate high concentrations. Indeed prey species themselves may be significantly affected by accumulations of pesticides as evidenced by: total DDT concentrations recorded at: 1.144 ppm in fat tissue from a pooled sample of 12 ancient murrelets collected in June 1968 from the Queen Charlotte Islands; 0.50 ppm in fat tissue from a pooled sample of five pigeon guillemots collected in September 1968 from the Haro Straits; 1.499 ppm in fat tissue from a pooled sample of two rhinoceros auklets collected in September 1968 from the Haro Straits; 0.943 ppm in liver tissue from a pooled sample of two marbled murrelets collected in June 1968 from the Queen Charlotte Islands; and 0.659 ppm in fat tissue from a pooled sample of eight common murres collected in September 1968 from the Haro Straits.

We concur with others who suggest that pesticides are presently one of the most important causes for the decline of raptor populations in North America. We believe that unless efforts are made to curb the use of pesticides many populations of raptors will be further extirpated, even from seemingly remote breeding areas. Peale's peregrines and probably anatum peregrines and prairie falcons in British Columbia are suffering from this phenomenon at the present time.

#### Recommendations

1. Continental inventory of raptorial bird populations

Annual or periodic inventory of populations is needed as a basis for harvesting populations, and to determine population characteristics and trends.

- 2. Central repository of information respecting raptorial birds, available to all wildlife management agencies on the continent The Canadian Wildlife Service and the United States Fish and Wildlife Service would seem to be appropriate agencies to perform this function and service, and to provide personnel for such work.
- 3. Expanded pesticide monitoring and research programs The sources of pesticides, their effects and consequences respecting raptorial birds need to be better understood as a basis for

a. Continental co-ordination of regulations,
a. Continental co-ordination of regulations,

enforcement and harvesting of raptorial birds An internationally acceptable definition of a

rare or endangered species is needed, and appropriate measures are needed to effect continental and regional control of such wildlife forms.

- 5. Captive reproductive studies The alarming decline of certain raptorial birds has uncertain implications respecting the preservation of some species in a wild state. Effort should be made to develop captive populations for reintroductions.
- 6. Declare: Eagles, osprey, peregrine falcons (Peale's and anatum) and prairie falcons as endangered species in Canada This action should be taken, at least until the ecological and population characteristics of these birds can be determined through a national inventory.
- 7. Greater public concern and understanding about the status and management of raptorial birds is needed Greater effort should be made through all information media by wildlife management agencies in Canada and elsewhere on the continent to achieve this purpose.

# Federal government involvement in oil pollution from ships by N. Sigsworth

So far as ships are concerned, I would suggest that the words "oil pollution" became famous — or even notorious — with the stranding of the tanker "Torrey Canyon" off the coast of Britain in March 1967. The incident brought to the notice of the public that which governments had recognized for many years; oil floating on the waters of the earth was at least unpleasant from an aesthetic standpoint.

The international conferences in 1954 and again in 1962 recognized that oil pollution resulted in the death and destruction of birds and other wildlife, and in probable adverse effects on fish and the marine organisms on which they feed. International agreements prohibiting the dumping of oil close to land were first signed in 1954, primarily to curb aesthetic pollution. The serious effect of oil pollution on the overall life cycle was to be voiced at a much later date.

In Canada the "Torrey Canyon" incident was given serious thought by some government departments, in particular the Steamship Inspection Service section of the Department of Transport whose function it is to administer the Oil Pollution Prevention Regulations. These regulations, made under the Canada Shipping Act, were introduced in 1956 and provide financial penalties for those persons who contravene the regulations. The maximum penalty of \$500 was raised to \$5,000 in 1968, and the upper limit is again under review.

In administering these regulations, the department has had some small measure of success in that the owners and operators of vessels using Canadian ports are aware of the record of successful action taken by the department in the courts.

To determine the needs for combatting a major incident in Canada, a working group of various government departments met in 1968. This group had as its chairman the chairman of the board of Steamship Inspection Service and a large number of government departments were involved.

The group met from time to time, with reminders from various ship losses, and in June 1969 a 'Proposed interim contingency plan to deal with a large scale discharge of oil from a ship into Canadian waters' was produced.

The plan was labelled 'Interim' to answer a need for action of an immediate nature but it was agreed that a more detailed and permanent plan was required. This is almost complete.

The interim plan consisted principally of assigning to various field offices the responsibility for being aware of what could happen due to the prevailing marine traffic in the regional districts, and to determine the regional resources available to combat the effect of such an unfortunate incident.

Because oil spills are a problem that affect a large number of people, both in the public service and private sectors of industry, it is advisable to involve those people in efforts to prevent or curb oil spills. The regions then are required to examine the resources available in the area, to explain the problem if it is not already realized, and to get the co-operation and active participation of other departments and of industry.

The region is required to have knowledge of: The procurement of dispersal agents, oil recovery material, ships, oil-containing facilities both afloat and ashore, protective clothing, tools, pumping facilities, power sources, mobile accommodation, communication systems, salvage expertise and salvage facilities and manpower.

In addition, if the pattern of marine traffic is established, the fore-knowledge of possible incidents would be invaluable at the time of the incident. The type of oil in a vessel and the quantity and disposition would be known, and the hazards of the route and possible action in the event of an incident could also be determined. Changes in the Canada Shipping Act in July 1969 now permit the Minister of Transport to direct that:

Any vessel polluting or likely to pollute Canadian waters, constituting or likely to constitute a danger to water fowl or marine life, damaging or likely to damage coastal property or interfering with the enjoyment thereof the vessel, its cargo or fuel be destroyed or removed.

These powers are quite wide but the exercising of these powers would depend upon the circumstances prevailing at the time of the incident and the opinions of the On Scene Commander (O.S.C.) and his advisers.

It was realized that with large physical and financial resources most things can be achieved, and, with such resources, teams could be trained for immediate action to control and retrieve oil spilled in the waters. The probability of needing such resources was deemed remote and consequently the plan was developed so that existing facilities and disciplines could be used.

A line of authority was established from control in Ottawa to an On Scene Commander (O.S.C.) in the various regions. There are four regions — Maritime, Laurentian, Central and Western — and while the regions have geographic definition, the O.S.C. of each region is to be prepared to co-operate and assist neighbouring regions. The O.S.C. would be a regional director, Marine Services, or equivalent or his nominee.

Dealing with a major oil spill is not a science and obtaining expertise in the art is costly and unwanted if the method of becoming expert must be through experience. Of course some experience has been acquired because of other unfortunate incidents around the world and this knowledge is freely exchanged.

In February this year the plan was overtaken by the stranding of the "Arrow" in Nova Scotia; Canada has gained considerable expertise in a short period of time and the education has been costly. It can be assumed that when the report of the incident in Nova Scotia is made available in the fall there will be more direction given to O.S.C.'s. Practices and technologies which were envisaged to deal with a spill will be expanded and changed — or possibly abandoned with new or different methods adopted.

The objective of an O.S.C. in dealing with an incident is to move immediately to analyse a situation to prevent oil from being discharged onto the water. At the outset this becomes a major decision on the method of dealing with the situation. It can only be decided on site. Weather is a controlling factor and all the plans available and all of the equipment marshalled may be nullified by storms.

Assuming that access is possible, the plan envisages (a) salvage of the oil with the vessel (b) salvage of the oil (c) control and recovery of leaking oil (d) clean up of oil that escaped prior to establishing control measures. The steps enumerated are in order of precedence except that they may progress jointly if sufficient resources are available.

One duty of the O.S.C. will be in the field of public relations and his efforts with news media and others will do much to allay unfounded fears that have been evident in past incidents.

In the western region, which includes the Arctic west of 95th west meridian, the O.S.C. is the regional director of Marine Services based in Vancouver. Due to the "Arrow" incident there has been established in Ottawa, under the Director of Marine Operations, one person whose full time duty is to refine the present interim plan. He will evaluate more recent knowledge and give advice and direction to O.S.C.'s which may up-date the current regional practice.

Again in the Western Region, a start has been made on an inventory of equipment thought necessary for a joint effort. Agencies and industry have been asked for information and advice to assist with the common problem. On June 17 we were fortunate to have Dr. P. D. McTaggart-Cowan address an assembly of those interested who will be participants in the plan. Dr. McTaggart-Cowan was given the responsibility of cleaning up the effects of the "Arrow" oil spill and removing the oil from the sunken vessel. His address was most informative and his findings contradict some of the technologies proposed in the interim plan. Obviously some changes are needed and will be made.

The meeting included representatives of oil companies, United States Coast Guard, Department of National Defence, Defence Research Establishment Pacific, Biological Research Station, Nanaimo, Department of Fisheries, Department of Public Works, Energy, Mines and Resources, harbours boards from the major ports in B.C., B.C. Wildlife Federation, and Department of Transport representatives including air, marine and communications sections.

The meeting had two objectives: firstly to listen to the speaker, but primarily to show to each section that others are interested, aware and concerned. A future meeting is planned to establish co-operation and an agreed procedure to attack a common problem.

The Department of Transport interim plan is concerned only with the pollution emanating from ships, since under the Canada Shipping Act this is the limit of the department's jurisdiction. The national plan being prepared is of course much broader in scope and will cover the total federal jurisdiction.

# Toxic chemical research by the Canadian Wildlife Service by J. A. Keith

At last year's conference I reported that we had a mercury project underway to look at wildlife hazards of both agricultural and industrial mercury. Since then our project has established that agricultural mercury used on seed grain is a significant contaminant of prairie seed-eating animals, and that the mercury is then transferred to their avian predators in sufficient concentrations to cause hatching failure. The project has also established that the Canadian chlor-alkali and pulp industries were releasing enough mercury into water systems to cause significant contamination of fish and probably hazardous concentrations of mercury in fish-eating birds.

Our mercury project includes a number of studies being done both by a university contractor and our own field staff. Our contractor has done penned studies to establish the effects of mercury-treated grain on seed-eating bird reproduction, using pheasants, and the effects of the transfer of mercury through seed-eating birds to avian predators, using redtailed hawks.

Results from these penned studies have been

used to interpret the biological significance of our surveys of mercury residue levels in wild populations. From the survey data interpreted this way we hypothesized that certain local populations of predators were likely to have reproduction chronically impaired by mercury. So this summer (1970) we are testing this hypothesis in New Brunswick with terns and cormorants, and in Saskatchewan with herring gulls.

Early results from our mercury project led to a lot of activity by other agencies in the past year. The Alberta surveys of mercury in pheasants and partridges precipitated closing the hunting season, and federal and provincial surveys of mercury in commercial fish have resulted in a large number of commercial fishing restrictions from coast to coast. This activity has also spread south into the United States where mercury contamination had not before been seriously considered.

The commercial fishing restrictions have been accompanied by encouragingly rapid restrictions on the release of mercury into industrial waste water, and so we can now expect that mercury levels in the exposed aquatic environments will begin to decline. Judging from the Swedish experience, however, significant reduction in these mercury levels may take a long time; so we must continue to look for hazardous mercury levels in aquatic wildlife populations for a number of years.

On the other hand, the closing of the pheasant and partridge season in Alberta last year did not lead to elimination of the seed-treatment source of mercury. Unlike the aquatic situation, the end of mercury seed treatment will be followed by a very rapid reduction in mercury contamination of terrestrial wildlife, probably reaching background levels within a year. This is because the mercury is directly applied to a wildlife food, and is not reaching wildlife by way of general contamination of the environment, as in the aquatic case. Some efforts have been made in the past year to reduce the mercury-treated grain spilled around farms, treatment plants, or along roads, but we cannot expect the mercury hazard to seed-eaters and their predators to be over until at least the most toxic alkyl mercury seed treatments are eliminated. The alkyl mercurials were not eliminated last year, and are still not being eliminated for this coming year because of the agricultural community's fascinating logic of maximizing grain yields at a time when the surplus on hand is so embarrassing that grain acreage is being reduced.

The choice, of course, is not all or nothing either continuing mercury contamination or no grain crop. Immediate banning of alkyl mercurials would leave other fungicides available, even if they are less handy or efficient, and the average increase in yield due to fungicide treatment seems to be only about 10 per cent or less. The Scandinavian countries solved their serious mercury contamination from seed treatment by simply banning alkyl mercurials.

Mercury is not the only wildlife problem from treating grain seeds. Persistent organochlorine insecticides are routinely used in many areas to combat wireworms, and of these, heptachlor and aldrin/dieldrin are of serious concern. High proportions of our prairie raptorial bird samples contain residues of these insecticides, and at least one set of prairie falcon nestlings was killed by heptachlor. It was seed-grain treatment by heptachlor and aldrin/dieldrin that caused such severe mortality among seed-eating birds in Britain between 1956 and 1961.

From seed-eaters these insecticide residues were transferred to birds of prey and helped caused widespread population declines. Since restrictions on aldrin/dieldrin seed treatments were introduced in the early 'sixties, populations of some of these birds of prey have begun to recover. Here in Canada the relatively high residues of heptachlor and aldrin/dieldrin in prairie raptors almost certainly originate in seed-grain treatments.

We are now faced, then, with a multiple contamination of western birds of prey. Our model population under study is the prairie falcon, and it is being stressed by residues or metabolites of DDT, aldrin/dieldrin, heptachlor, and mercury. The relative contribution of individual compounds is very hard to untangle, but at the least their effects are additive. The local declines within the prairie falcon population seem definitely related to toxic chemicals rather than such other factors as human disturbance, and correlate best with increased levels of DDT metabolites; but the other compounds are contributing to mortality of eggs or nestlings.

The DDT picture in Canada has changed sharply for the better during the past year. Wildlife data was very important in the review of all DDT uses during 1969, and the November announcement by the Prime Minister of a 90 per cent reduction in the amount of DDT used, starting in 1970, was based on both definite harm to wildlife and inconclusive evidence of hazard to people.

Our argument for such broad-scale reduction of DDT use was based on the inability to pinpoint individual uses that have caused the allpervasive DDT contamination. For example, we cannot identify a particular prairie use of DDT that causes the serious contamination of prairie falcons. We are then forced to conclude that the level of this chemical as a general constituent of the environment has reached the point where some avian predators can no longer survive.

Because use of DDT is now restricted in Canada does not mean our DDT problems are over. The DDT situation in the United States is still unclear, and while we expect reductions in use soon, we have no definite idea of their extent or timing. Of course, this is a crucial question for migrant birds and their predators, because it is through eggs that DDT does its population damage, and so DDT levels in spring migrants into Canada are not going to decline as fast as DDT levels in birds resident in Canada. In terms of general airborne contamination of DDT in the northern hemisphere, the Canadian restrictions and the recently announced restrictions in manufacture and use in Russia will hopefully result in declining residues in our general environment.

Whether these DDT reductions will come soon enough to save the collapsing continental peregrine falcon populations is an open question. This bird is being stressed by the same range of chemicals that are found in the prairie falcon, with the addition of a larger amount of PCB residues. These residues are from industrial compounds and show the same flair for widespread distribution and food-chain concentration that DDT does, and their possibly similar role in interfering with egg hatching is now under active research.

For the immediate future, we must pay close attention to wildlife contamination that we think comes from the DDT and mercury uses now being restricted. This may seem to be a waste of time, but in fact this period is precisely when we can best test our causal hypotheses.

Given wild populations subject to a variety of chemical and non-chemical stresses, we have gone out on a limb and said that just a few chemicals are much more important as stresses than anything else. If these chemicals are sharply reduced, and other factors stay roughly the same, a positive response by the wild populations is a convincing test of our original hypothesis.

Next in terms of research priority comes the PCB question. We are beginning to learn something of PCB distribution in wildlife populations, and if the rough quantification methods now used are any good, PCBs now occur in many places in concentrations similar to our traditional benefactor DDT. The key research question is biological significance. The evidence so far is conflicting; some research suggests that PCBs are as active enzyme inhibitors as DDT, and some results show a DDT-like effect of PCBs on eggshell thinning. Other research fails to show significant PCB effects on eggshell thinning or hatchability. But the possibility is definitely open that PCBs are as ecologically damaging as the DDT group.

If we look at the problem of trying to screen out dangerous chemicals before they are introduced into the environment, rather than try to gauge the damage already done, we come up with a very urgent need for research. If you ask how a certain toxic chemical behaves ecologically, we don't know how to answer. We don't know what would constitute a useful ecological test, and yet we urgently need to work out such tests if we are to regulate intelligently the entry of toxic chemicals into the environment.

This is a problem without an instant answer; it will take several years of hard ecological thinking to develop adequate screening tests, and we need the co-operation of every Canadian ecologist who cares to help. We are starting this with a staff position and some university contracts, but we invite any help or suggestions we can get.

# Report on conservation legislative matters by Nobel E. Buell

Legislative activity in Washington has been brisk during the last 12 months. A number of bills affecting fish and wildlife and their management have been enacted into law and many others are working through the various stages of the legislative mill as the 91st Congress heads toward the closing weeks of its second session.

A landmark bill signed into law since last year is the National Environmental Quality Act of 1969. The Act states, among other things, that Congress declares a National Environmental Policy that will "assure for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings." The Act is a broad charter and will have a profound impact on the operations of the Bureau of Sport Fisheries and Wildlife, and other conservation agencies – all agencies in fact.

For example, Section 102 of the Act includes the following directive.

The Congress has directed that:

(1) the policies, regulations, and public laws of the United States shall be interpreted and administered in accordance with the policies set forth in this Act, and

(2) all agencies of the federal government shall -

- (A) utilize a systematic, interdisciplinary approach;
- (B) consult with the Council on Environmental Quality to insure that presently unquan-

tified environmental amenities and values may be given appropriate consideration in decision-making along with economic and technical considerations;

- (C) include in every recommendation or report on proposals for legislation and other major federal actions significantly affecting the quality of the human environment, a detailed statement by the responsible official on
  - i) the environmental impact of the proposed action,
  - any adverse environmental effects which cannot be avoided should the proposal be implemented,
  - iii) alternatives to the proposed action,
  - iv) the relationship between local shortterm uses of man's environment and the maintenance and enhancement of long-term productivity, and
  - v) any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented.

I suggest that most of you have heard something at least about the Endangered Species Conservation Act of 1969 which became effective as Public Law 91-135 on June 3, 1970. The purpose of the Act is to afford protection to endangered fish and wildlife and governs importation, transportation and sale in the United States. In signing the bill into law President Nixon described it as "the most significant action this nation has ever taken in an international effort to preserve the world's wildlife."

In the Act's simplest and briefest terms, "fish and wildlife" means any finfish, wild mammal, wild bird, amphibian, reptile, mollusk or crustacean or any part, product, egg or offspring thereof, whether or not included in a manufactured product. "Endangered species" means any species or sub-species of fish and wildlife found in either the United States or other countries which is determined by the Secretary to be threatened with extinction.

All fish and wildlife imported into the United States, except fishery products imported for commercial purposes, must enter the United States through the following designated receiving stations: Miami and Tampa, Florida; New Orleans, Louisiana; New York, New York; Chicago, Illinois; Los Angeles and San Francisco, California. Provisions have been made in the regulations for emergency clearance at other ports where delays could impair the health or welfare of such fish and wildlife.

Perhaps of greater interest to you is that, except for species or sub-species which appear on the Endangered Species List, fish and wildlife originating in Canada may enter the United States through any of the 25 border ports listed in Appendix B of the regulations.

Regulations for implementation of the various provisions of the Act went into effect on June 4, 1970. The several ports of entry for endangered species become effective in 60 days.

Also of importance was authorization for funding and continuation of our pesticides research. This was a cliffhanger because the authorization contained in the original bill would have expired on June 30, 1970. The extension is for two years at the same funding level of \$3.5 million per year.

Moving into 1970 there is a lot of legislative action, but much of it is not yet final.

We have an extension of the Anadromous Fish Restoration Act. The new law continues the program for an additional five years. The old law authorized federal expenditures of \$25 million over a period of five years. The new law authorizes expenditures of \$32 million over the same period of time. This is a matching state/ federal program with the federal government putting up 75 per cent, except where two or more states are involved in co-operative projects. In these cases the funding ratio is 60-40. Legislative actions which are pending include the following:

**H.R. 12475** (Federal Aid Housekeeping Bill) – The purpose of this bill is to eliminate certain burdensome bookkeeping and reporting requirements. It also contains an excise tax on pistols and revolvers similar to that now levied on arms and ammunition. This provision could result in another \$5 million or so a year for wildlife restoration work.

The House Merchant Marine and Fisheries Committee has reported out H.R. 12475 and its chances for Congressional passage this session appear to be pretty good.

**H.R. 15770** (Water Bank Bill) — is "To provide for conserving surface waters; to preserve and improve habitat for migratory waterfowl and other wildlife resources; to reduce runoff, soil and wind erosion, and contribute to flood control, and for other purposes."

Hearings on H.R. 15770 and similar bills were held in March 1970 and this bill, too, has been reported out by the House Merchant Marine and Fisheries Committee.

The Department of the Interior supported the objectives for environmental protection but opposed enactment of legislation to establish a new waterfowl habitat program to be administered separately by another department. The existing authorities of the Department of the Interior for preservation of waterfowl habitat are adequate and in the opinion of the department they would be prejudiced by an overlapping and competing program.

**S. 3234** (Shooting birds, fish, and animals from aircraft) – This bill would amend the Fish and Wildlife Act of 1956 to provide a criminal penalty for such shooting on any land or water owned by the United States. House hearings were held in March and emotions of some outside witnesses were rather high because of the rather sensational TV program "The Wolf Man".

The position of the Department of the Interior is that while shooting any bird, fish, or animal from an aircraft under the guise of "sport" is a reprehensible practice, the problem could best be handled by the states through some sort of uniform state law. Such an approach would cover all lands, with certain exceptions, and would solve the myriad administrative problems of a "federal only" statute since state statutes could be binding on most federal lands.

Numerous proposals for designation of parcels of 26 national wildlife refuge land as wilderness under the Wilderness Act of 1965 – The bureau now has only one such area designated under the Act, on the Great Swamp National Wildlife Refuge in New Jersey. Hearings have been held in both the House and the Senate on many of the proposals.

**H.R. 1050** (Raising the price of the Migratory Bird Hunting Stamp to \$5) – Bills regarding this proposal have been introduced during the last two Congresses. The bureau and department positions have been favourable beacuse the bills would leave to the discretion of the Secretary of the Interior how much the increase from the present \$3 should be and for what purposes the increased revenue would be used. One recently proposed amendment to these proposals would give 50 per cent of any increase to the states for acquisition of habitat for migratory birds.

These proposals are still under study and as yet no Congressional hearings have been held.

H.R. 5510 (\$1 hunting permit for webless migratory birds) — This bill and similar proposals would require a federal hunting permit similar to the so-called "duck stamp" to hunt such migratory game birds as mourning doves, woodcocks, snipe, rails, etc. Funds would be placed in a special fund in the Treasury for expenditure by the Secretary without further appropriation. The proposal would authorize use of net receipts from the special fund by the Secretary for research, surveys and law enforcement, acquisition, development, and maintenance of lands and waters, and other management measures for migratory game birds other than waterfowl.

The proposal would also authorize the Secretary to grant funds (up to 50 per cent of net receipts) to state fish and game departments for research and surveys to be conducted, under contract, with the Secretary. No matching of funds would be required.

Beyond hearings, no significant Congressional action has been taken on this proposal.

In addition to the legislative actions and proposals which have received formal attention, the bureau has in the final stages for submission as administration legislative proposals the following:

Non-game Wildlife Bill — The purposes of this bill, now under review by the International Association of Fish, Game and Conservation Commissioners and other interested parties, is stated in the draft as providing for a federal aid program to foster state attention to programs which would benefit non-game wildlife and would authorize \$10 million annually for assisting the states in their work. The federal share of funds would not exceed 75 per cent of the funds that would be appropriated from the general treasury.

Federal aid to states for wetlands acquisition; Acquisition of lands for fish and wildlife-oriented recreation; Preservation of unique ecological communities; Amend Refuges and Hatcheries Act of 1962 to eliminate certain restrictions – These proposals have been cleared by the Department of the Interior for submission to the Bureau of the Budget as Administration proposals.

Intergovernmental Co-operation Act of 1968 – This Act is related to the other legislative actions I have discussed and is indicative of federal/non-federal relationships. The Act really did not become effective until the fall of 1969. It provides procedures by which the federal government, the states, and regional and local administrations could coordinate with each other's programs for community development.

Title IV of the Act sets out the policy of the United States for federal and federally assisted programs for the sound and orderly development of all areas, both urban and rural, as one of full co-operation at all levels of government. Included within the scope of the Act are projects related to the development and conservation of natural resources, including land, water, minerals, wildlife and others; adequate outdoor recreation and open space; protection of areas of unique natural beauty and historical and scientific interest; and projects of less concern.

The effect of the Act on our bureau, as outlined in regulations by the Bureau of the Budget, is generally two fold. One requirement is that the Bureau of Sport Fisheries and Wildlife is to supply information on grant-in-aid awards in each state to the State Central Information reception agency and to local and regional clearing houses.

A requirement for purely federal programs is that our bureau consult with governors, regional and metropolitan comprehensive planning agencies, and local elected officials at the earliest practicable stage — in refuge and other project planning on the relationship of our plans with the development programs of the state, region, or localities in which the refuge or other project is to be located. Project plans that are inconsistent with state, regional, and local development plans can be pursued only with clear justification. Most of our emphasis today will be on the western Arctic. Considering not only the location of our meeting but also the scale of "economic developments" in the west as compared to the east, that is perhaps understandable. In the eastern Arctic, however, there are also certain extremely urgent ecological problems which I would like briefly to sketch. My remarks will concern principally the Arctic and adjacent subarctic lands and seas east of the northward projection of the Saskatchewan-Manitoba border, and extending from James Bay northward.

The recent literature from both Alaska and northwestern Canada suggests that one point we have in common is a pretty thorough ignorance of arctic ecology. A recent account, (Chasan 1970) for example, pointed out that the Trans-Alaska Pipeline System (TAPS) would cross at least 124 major fish streams about which little if anything was known.

Crash programs will uncover the simpler facts, but the detailed ramifications and the extremely difficult-to-come-by understanding of what happens when existing systems are upset are unknown. Even less biological data are available from the more remote and maritime eastern Arctic than from either Alaska or our western Arctic.

The recent oil spill in Deception Bay, Quebec, served to remind people in the east how little we know even about the presence or absence of species at any given time of year. The effects of that spill at the moment are virtually unknowable. It could prove disastrous to the two to three millions murres believed still to inhabit the breeding colony at Digges Island off Cape Wolstenholme, or it could have no effect. Not only is wildlife and fisheries knowledge lacking but also such basic information as ocean currents and temperatures is very sketchy.

As recently as five years ago there was a widely held belief that polar bears were sufficiently mobile to constitute a single holarctic population. Current research indicates that movements are much more restricted and that, for example, the bears of southern Hudson Bay are probably a separate group from those of northern Hudson Bay. It is within the past 18 months that a major polar bear denning area — perhaps the most populous one in the world — was discovered in Manitoba. And that despite the fact that the Canadian Wildlife Service has had a polar bear research project underway in the Hudson Bay area for nearly 10 years.

The C.W.S. and the Quebec Wildlife Service have studied the northern range of the greater snow goose since the 1950's but we still do not know where more than 30 to 40 per cent of the population nests. We know virtually nothing of the ecological and ethological foundations for their selection of the known nesting sites, and are grossly ignorant of the details of their migration between Cap Tourmente and Bylot Island.

We have an outdated list of where muskoxen are found in Canada, but no recent useful knowledge of population numbers or condition. The muskoxen of Bathurst Island appear not to have produced even one calf for the past three years. Superficial examinations suggest that the range is adequate and the adults in good shape. But a whole island population of several hundred muskoxen does not cease reproduction without a reason.

Our ignorance of such matters is appalling. The reason could be something easily correctable, perhaps simply stopping all human activity on the island for a couple of weeks at a critical season, but we do not know and do not at the moment have either staff or funds to find out.

Our Danish colleagues have told us that the recent massive international net fishing effort for salmon off the western Greenland coast is killing hundreds of thousands of sea birds. The fishery, on this huge scale, is less than five years old. We believe on the basis of slight evidence that the birds being hardest hit are murres from the area of Lancaster Sound, where the largest colonies are on Prince Leopold Island and near Cape Hay on Bylot Island. But our last banding at Cape Hay was in 1957. Few banded birds still exist and the chances of their coming into our hands via the international fishing fleet are really not good.

We need far more detailed knowledge of our populations of all arctic animals. Not just of their numbers, distribution and movements, but of their whole life systems. One might well ask, for example, why worry about the death of a million murres on Prince Leopold Island? Most of our citizens have never even heard of a murre and most of you in this room have probably never heard of Prince Leopold Island.

I don't wish to dwell on the philosophy of man's stewardship of life on this little planet, but I would just say that there are sufficient examples of the horrors of upsetting ecological balances inadvertently to suggest we'd be damned fools indeed to do so intentionally or to allow major upsets to occur when it was possible to prevent them.

Environmental hazards from northern economic development are basically no different in the eastern Arctic from what they are in the west. A Hercules strip bulldozer in winter on Bathurst Island or Ellesmere Island in such a manner as to produce serious slumping and erosion in subsequent years is no different from the same or similar surface damage on Banks Island or the Tuk Peninsula. Garbage improperly disposed of at any northern settlement or camp has the potential for creating serious manbear conflicts such as occur at Churchill. Oil pollution, whether from shore installations or at sea, poses similar problems and demonstrates our abysmal ignorance of how to cope with it.

The Arctic is just emerging from the last ice age. In the east especially, sizable areas are still glaciated. The geological youth is at the crux of our burgeoning environmental hazards. Because the land is so new and so recently reoccupied by plants and animals, the ecological balance is more precarious than in more temperate areas. Damage takes longer to repair.

In the time span important to men in the north today, much environmental damage is simply not reparable. Faunal and floral diversity is low. Growth is slow. Decay is slow. Soil is thin and of poor quality. Mistakes made now by man will be there for succeeding generations to see and perhaps grieve about. Some of those mistakes can surely be avoided by cautious planning, by not taking precipitate action in the absence of ecological knowledge.

Our Alaskan neighbours have shown in the Kenai that development does not have to mean destruction, that in Cook Inlet inadequate precautions can lead to horrendous results, and in the case of TAPS that it is not only desirable but necessary (and quite possible) to require industry to wait while new knowledge is obtained.

Canada, by comparison with the other nations holding major Arctic land areas, has been very slow to recognize the need for extensive and intensive ecological research in Arctic areas. For the first 90 years of our national history, Canadians seemed almost to ignore the presence of the Arctic. Now that it appears able to produce wealth, there is still a reluctance to make the expenditures needed to obtain the knowledge for extracting that wealth wisely and to protect the ecosystems of the Arctic in the process.

We are faced with accelerating rates of exploration and development: a nickel mine in Keewatin, iron prospects on Baffin Island, seismic work on Axel Heiberg, drilling for oil in Hudson Bay and Melville Island. Two fuel barges went down in Byam Martin Channel in 1969. Five storage tanks ruptured in Deception Bay in 1970. A fuel bladder ruptured at Resolute. Techniques developed for oil drilling in southern latitudes are used in this totally different Arctic environment with little experimentation to test the effects or to develop new techniques. Hastily and cheaply built airstrips slump in the summer heat and erosion starts.

Man appears determined to extract wealth from the north, but if future generations are not going to suffer, he must improve his knowledge of the area and his ability to live with the environment rather than to fight it. The Eskimos learned that long ago. Stefansson also learned it. Modern industrial and economic man must re-learn it.

One positive step which has not yet been taken in the east but has at least been set in train in the west is the creation of national parks. In the east, Ontario has established a provincial park which includes the shore of Hudson Bay and some important polar bear denning ranges. Other denning areas in Manitoba and the N.W.T. need comparable, or better, protection if polar bear are going to continue to thrive. Protection of critical range for muskoxen and caribou — including the relatively rare Peary caribou of the Arctic islands - should also be given attention, perhaps by the establishment of National Wildlife Areas.

There are several important federal bird sanctuaries in the eastern Arctic but there should probably be more, and the effectiveness of their regulation could be increased. There is no way, however, that we could, for example, protect a colony of sea birds from pollution of their feeding area 50 or 100 miles away.

Similarly there is little to be done at the moment to defend Arctic animals from the insidious prevalence of DDT in Arctic waters and lands. Levels are not high enough to bother herbivores but species like the polar bear and peregrine falcon, standing at the top of long food chains, could well be seriously affected.

It is difficult to end a recital of ignorance on a positive note. The most positive I can be is to say that to prevent disaster in the Arctic, man must learn what makes it tick and then learn to march to its cadence.

# Industrialization of the north and its effects on wildlife resources by Salvatore DeLeonardis

Until the past few years, the area north of the Brooks Range, commonly called the North Slope, was considered by many as a frozen wasteland. A handful of hardy Eskimos lived in several widely scattered villages along the coast, having achieved some measure of harmony with their natural food supply — the caribou and especially the sea mammals.

The discovery of a major oil basin at Prudhoe Bay in June 1968 focussed worlwide attention on the North Slope. Overnight, the frozen wasteland of the north became a piece of valuable real estate subject to intensive human activity. As additional successful wells were announced, the realization struck that the North Slope contained major oil reserves measured in the billions of bushels. The economic and political implications of the new find indicated that the oil reserves probably would be exploited and the crude oil moved into world markets.

A number of alternative methods of moving the oil from the North Slope to market have been proposed. Some are being actively explored. One method involves the use of super tankers to ship the crude oil from Prudhoe Bay eastward through the Northwest Passage to the east coast and European markets. All of you must be familiar with the "Manhattan Project" and the considerable uproar raised in Canadian conservationist and political circles indicated in numerous newspaper articles.

A proposed 800-mile, 48-inch pipeline from Prudhoe Bay to Valdez bisecting Alaska north to south has created a counterpart uproar across the border.

This leads us to the question: What effect will industrial activities in the north have on the wildlife resources and on the habitat they occupy?

Let us first define the areas where industrial development is apt to occur; this will enable us to define better the potential effects on the wildlife resources.

Some 18 wells capable of producing oil and

three wells capable of producing gas have been developed on the North Slope. Exploration and drilling are expected to continue until the oil fields are brought into full production. A network of feeder pipelines will probably be built to collect the crude oil in a major storage area near Prudhoe Bay where port facilities will be located. The airstrip and road network will probably be expanded to all oil fields and well sites.

A transportation corridor will eventually be built linking the North Slope to the present existing ground transportation network some 400 miles to the south. The corridor will probably include a road, a pipeline, and possibly a northerly extension of the railroad. Associated developments along the corridor will include pipeline pumping stations and service facilities such as lodges and gas stations.

We thus have two major areas of development which may have a direct impact on wildlife resources. Let us examine the potential effects of each in turn.

#### **The North Slope**

The North Slope lies within a belt of continuous permafrost, perhaps the most significant ecological factor which must be considered in any development. The temperature of the permafrost in this region varies somewhat, but is generally several degrees below the freezing point.

As early as 1923, the oil potential of this area was recognized with the withdrawal of Naval Petroleum Reserve No. 4. In the late 1940's and early 1950's, an oil exploration and drilling program was conducted under navy contract.

Because of field operations conducted without knowledge of the potential effects of human activity on permafrost, we have an excellent outdoor laboratory demonstrating some of the worst possible consequences on the environment.

Permanent gullies, slumping slopes, sunken and undulating roads and trails offer dramatic testimony to improper usage of these northern lands. In some areas, trails cut by a single passage of a tracked vehicle are still visible after 20 or more years. Trash and discarded oil drums litter the landscape and will continue to do so because of the slow rates of decomposition in this arctic environment.

To the navy's credit, however, the Arctic Naval Research Center was established at Barrow to help work out some of the problems. Much of the knowledge we have today on far north plant and animal ecology and on engineering solutions to permafrost problems we owe to the work conducted at the center.

#### A. Wildlife Resources of the North Slope:

The wildlife resources of the slope are many and varied. Only those of greatest importance will be briefly mentioned.

- Caribou Two separate herds have been identified, the arctic and porcupine herds perhaps numbering as many as half a million animals. There is probably some intermixing of the herds on the North Slope. Major passes through the Brooks Range are used for north-south movement to reach seasonal ranges.
- 2. Grizzly bear Found widely scattered throughout the slope and mountainous areas.
- Wolves Found widely scattered throughout the slope and most generally in association with caribou.
- 4. Waterfowl The North Slope is one of the major waterfowl nesting areas in Alaska. Although densities per acre may not be high, total production is high because of the huge area involved. Of greatest importance is a narrow belt along the coastline, particularly for the Pacific Brant.
- 5. Fish North Slope streams are particularly noted for the Arctic char, an

anadromous species. Grayling and lake trout are potentially important for sport fishing.

#### **B.** Potential Problems:

- Physical take out of habitat represented by well pads, roads, and airfields; includes only a relatively small portion of the habitat. When contrasted to the entire area, the amount of habitat physically taken out of production is insignificant. While the actual physical take out of habitat may be relatively insignificant, human activity around the developments may influence a much larger surrounding area. This could be especially true with regards to waterfowl nesting, resulting in a much larger take out of nesting habitat than that physically occupied by improvements.
- Gravel supplies Gravel is a necessary commodity for proper industrial development. Improvements are built on gravel pads to prevent melting of the permafrost. Sources of gravel material are limited on the North Slope; perhaps the best source is stream bed gravel. If stream bed gravel is extracted improperly, degradation of downstream spawning beds could occur. Downstream migrating smolts could be trapped in poorly designed temporary stream-side pits.
- 3. Garbage and sanitation The proper disposal of sewage and garbage is no easy task in northern regions. It is important to avoid litter accumulation and contamination of surface waters because of the slow rates of decomposition. Garbage dumps attract bears, foxes, and other furbearers which must be removed or destroyed when they become pests. Developments, with their associated human population and activity scattered throughout the area, impose a severe

threat to the maintenance of a grizzly bear population.

- 4. Harassment and excessive take of wildlife – Harassment and excessive take, both legal and illegal, could have severe consequences for wildlife populations. Only strong enforcement activity by concerned agencies, plus a good educational program by the oil and exploration companies, will help in keeping this particular problem under control.
- 5. Interruption of caribou movements The effect of developments on the North Slope to caribou movements is unknown at this time. There is a possibility that the network of roads and connecting feeder pipelines, built on elevated gravel pads, may tend to restrict east-west movement along the slope. Should this occur, the two herds may be isolated from each other and a considerable area of the slope essentially made unavailable for forage production. At the present time, the roads apparently are not a barrier to movement.
- 6. Oil contamination Oil spills on the Arctic tundra could have disastrous long-term effects. Drainage through the soil profile is prevented by the permafrost. Spills would be contained on the surface to spread slowly over a large expanse. Clean-up would be difficult or impossible depending upon location and subsurface conditions, as either burning or scraping contaminated surface vegetation into piles would lead to thawing and perhaps massive erosion in the finer soils. Natural degradation of the oil is probably slow and could take many years. Given these circumstances, habitat contamination could be severe, extensive, and long lasting.

#### The transportation corridor

A tentative route for the proposed 48-inch pipeline from Prudhoe Bay to Valdez has been identified by TAPS (Trans-Alaska Pipeline System). An access road will have to be built along the route for construction purposes.

Once the proposed route leaves the Brooks Range heading towards Valdez, expanses of continuous and discontinuous permafrost will be traversed. The permafrost in this area differs from that found on the North Slope in that the temperature is close to the freezing point. Almost any surface disturbance, including compression of the surface vegetative mat, will start the process of melting.

As originally proposed by TAPS, all but approximately 40 miles of the pipeline were to be buried, no stretch of aboveground pipe being more than 12 miles in length. Government engineers and geologists, however, have challenged the TAPS proposal to bury the pipeline in silty permafrost soils. Their calculations indicate that a buried hot oil pipeline will thaw out ice lenses prevalent in these soils and thaw a sufficient ground area of the fine soils to cause massive movements of the saturated soils even on gentle slopes.

Their recommendation is that, in these areas, either the pipeline be elevated or re-routed to an area of coarser soils which are not as apt to flow. An above-ground pipeline on a gravel pad may not be practical, as 25 to 30 or more feet of gravel fill may be required to insulate the permafrost. There is some question whether any amount of fill will be sufficient to prevent permafrost melt.

The consensus among most biologists was that the TAPS proposal to bury all but 40 miles of the pipeline would offer little obstacle for cross movement by caribou. If more and longer segments of the line must be built above-ground or elevated, then additional review will have to be made to determine possible harmful effects on caribou movement. TAPS and interested government agencies will be designing a special study on the Seward Peninsula to determine the effects of an aboveground and/or elevated pipeline on reindeer movements. Hopefully, this will give us an indication of how caribou will react in the wild. The study may also give us some clues for proper design of the pipeline.

The Bureau of Land Management will be directly involved in the study, as it is the agency having management responsibility on the study area as well as most of the area through which the pipeline will traverse.

#### **BLM's role**

The Bureau of Land Management is the agency responsible for the management of public lands in Alaska as well as the "lower 48" states. Over 500 miles of the proposed 800-mile pipeline will be on public lands. It is BLM's responsibility to set the rules under which the pipeline and road rights-of-way will be constructed to offer the greatest protection to the environment.

To this end, a special BLM task force developed stipulations for construction of the pipeline and access road which will be made a part of any rights-of-way issued. These stipulations were prepared in co-operation with other federal and state resource agencies, as well as with private industry, and were reviewed by conservation groups.

Adherence to the stipulations should afford good protection to other resources insofar as our knowledge goes today.

There are methods of minimizing the effects of vehicle traffic on permafrost areas. This can be accomplished by confining cross country traffic to winter operations. The state is now working with the oil companies and their suppliers to test various smooth-tired or tracked vehicles which can be operated on the North Slope in the summertime with little or no effect on the tundra and permafrost.

In addition, through testing it was found that a minimum of five feet of gravel laid directly over tundra vegetation is sufficient to insulate the permafrost from melting on parts of the North Slope while other areas may require as much as 10 feet of fill.

These factors were considered in the preparation of the stipulations. We feel that an honest effort on the part of industry to follow the stipulations will result in minimum damage to the land and, consequently, the wildlife resources.

BLM has created a special division to monitor pipeline construction. This force includes engineers and soil scientists, as well as fisheries and wildlife biologists.

#### Summary and conclusion

The probability is that the oil reserves on the North Slope will be exploited in the near future. We are certain that the industrial complex developed will have some effect on the wildlife resources, but no one can accurately predict the degree and extent of the changes in behaviour or numbers. We do know we have valuable wildlife resources and that every effort will be made to protect these resources to the extent of our present knowledge. We also must recognize that political and economic pressures may dictate that the loss of some wildlife and wildlife habitat is not too high a price to pay for the oil.

# Environmental hazards of northern economic development by R. C. Passmore

Although economic development of the Canadian north began long ago — the Hudson Bay Company is this year celebrating its 300th anniversary — it is only recently that the accelerating pace of northern development has caught the attention of the Canadian public living south of the 60th parallel of latitude.

New mines, an oil strike, heated controversy over proposed national parks, the epic voyages of a giant supertanker, and questions of sovereignty, pollution control and ecological damage have suddenly caused the attention of not only Canada, but of the whole continent and much of Europe, to turn northward. But regardless of the shifting focus of attention in the north, economic development is the chief stimulus.

#### How much development, how recently?

Assuming that we are considering the whole of the 1.9 million square miles of land-mass (40 per cent of Canada's land surface) which is contained within the Yukon and Northwest Territories, we need go back only to the immediate postwar era to find a period in which northern economic development was virtually non-existent. Populations in both the Yukon and the N.W.T. were then more or less static at approximately one half their present levels. About the only southerners to visit the north were a small but growing body of government scientists and officials.

Construction and subsequent operation of the DEW line brought modern technology to the north with a sudden and lasting impact. Bulldozers, cat trains, airstrips, supply routes and communications changed the north in ways which are likely to be permanent, regardless of the military future of the DEW line.

Even though it never did have to report hostile aircraft or missiles, the northern-most radar chain did give early warning of some of the problems associated with technological man in northern environments. Permafrost and the problems of thermokarst plagued inexperienced developers. The relative permanence of even minor surface disturbances soon became apparent. Disposal of sewage and solid wastes presented difficult problems.

Unfortunately, only a few sensitive individuals looked upon these problems as anything more than trifling annoyances to be conquered by bigger and better technology. Those who foresaw the dangers to sensitive ecosystems and the scarring of wild landscapes were, indeed, voices in the wilderness.

One significant stimulus to northern economic development was publication in 1960 of a set of geologic maps which showed formations likely to bear petroleum and minerals. The result was a rapid acceleration of exploration for non-renewable resources. Exploration for minerals soon began to pay off. Prior to 1964, the average number of claims staked north of 60 totalled something below the figure of 6,000 per year. During the next five years there were five major staking rushes, reaching a peak of 52,000 claims staked in 1968 and representing a tremendous level of activity in exploration and development.

In the early 1960's the annual value of minerals produced in the north approximated \$30,000,000. By 1969 this figure had increased to \$153,000,000 and there were 11 major mines in production. Many other large mineral deposits have been discovered and are now undergoing evaluation and feasibility studies.

It is of interest to note that 64 per cent of the value of minerals produced in the north in 1969 came from foreign-controlled enterprises.

Petroleum exploration activity built up gradually through the early 1960's, reached a minor peak in 1965, then tapered off through declining interest in this unsuccessful search. In 1967, the federal government, in an effort to bolster the flagging search for petroleum, proposed creation of a consortium of Canadian enterprises which would pool their resources to continue the search for petroleum in the Canadian north. But interest in the project was so low that it required a major input of public funds to create Panarctic Oils Ltd. Despite the entry of Panarctic, by mid-1968 just before the major discovery at Prudhoe Bay, Alaska, petroleum exploration activity was at a low level with only 190 million acres remaining under exploration permit.

The discovery at Prudhoe Bay sparked an unprecedented acceleration in the search for oil in the Canadian north. An additional 250 million acres very quickly came under exploration permits which now cover 440 million acres and virtually blanket the whole of the potential oil bearing formations in the north. Where there had been \$32,000,000 expended on oil exploration in 1965, it is estimated that \$75,000,000 will be spent during the current year.

There had been a total of 58 seismic crew months expended in 1965: that figure exceeded 160 crew months in 1969. Eighteen exploratory wells were drilled in 1965, for a total footage of less than 120,000; 56 wells were drilled in 1969 for a total footage approaching 275,000. The Imperial Oil discovery at Atkinson Point, in January, 1970, virtually assures that the latter figure will be exceeded during the current year.

Again, it is of interest to note that, of the land held under petroleum exploration permit in northern Canada, 69 per cent is held by foreign-controlled enterprises.

#### The federal government: development fostered

Although some development-oriented residents of the territories might be inclined to argue otherwise, it is apparent that the government of Canada has for more than a decade put a great deal of effort into encouraging economic development in the north. It is always difficult to identify the starting point of a gradually accelerating trend, but this one may be related to a federal election in the late 1950's in which a "vision of the north" figured prominently. Certainly, it was followed by increases in government activities, both scientific and economic, in the north.

Publication of geologic maps in 1960 has been mentioned as one government activity which spurred exploration. Completion of the railway to Hay River and Pine Point in 1964 added impetus to the search by greatly improving transportation facilities. Direct economic aid to exploration activity came next in 1966, through the Northern Mineral Exploration Assistance Program which uses public funds to cover up to 40 per cent of the exploration costs incurred in the north by Canadian citizens or companies incorporated in Canada.

The objective of the program has been stated as "... to stimulate greater interest in the mineral resources of northern Canada and to intensify the pace of northern mineral exploration activity — by underwriting the higher cost of northern operations, thereby reducing the risk capital investment inherent in northern mineral exploration operations." A less direct form of financial incentive involves tax writeoffs for corporate profits diverted into exploration activities.

The government's determination to foster northern economic development was next exhibited in its investment of \$9,000,000 in Panarctic Oils Ltd. Government investment in this enterprise has been maintained at the 45 per cent level through subsequent major inputs of public capital.

The most recent incentive to northern economic development has been the announcement of a program to build and/or improve a number of all-season air strips at key locations throughout the north.

It is readily apparent that Canadians do want to see rapid economic development of the areas which lie "north of 60". They have shown their readiness to invest public funds — and to forego public revenues — toward this objective. The federal government has, at the very least, obliged the electorate in this respect. Perhaps it has done more. One gets the impression that this is one field in which government has assumed a leadership role.

# The federal government: conservation overlooked

But what of the government's attention to conservation of the continuing, renewable resources of northern Canada? What of the wildlife and the wilderness which have been the life support systems of native peoples and traditional economic resources of the past and which may be extremely important in the future, especially to the 20,000 or so native people for whom the north is home? Based on the legislation which now applies in the Yukon and the Northwest Territories, one must conclude that government interest in conservation has been incredibly — appallingly — low. Comparison of effort expended on development and on conservation is, to say the least, striking.

There are, of course, the game ordinances of the Yukon and the N.W.T., enacted and administered by the territorial councils. There are forest protection ordinances and timber regulations which, together, provide some control over road building and slash disposal in forested areas. There is virtually nothing which permits management of wildlife habitat or forests, or which protects water or air from pollution or scenic landscapes from desecration. In view of the sensitivity of the ecosystems of much of the north, and the extremely slow rate of recovery from disturbance, encouragement of economic development without protection of renewable natural resources seems shortsighted and negligent in the extreme.

Belatedly, and after much prompting from many segments of the Canadian public, conservation legislation is in the making. It is expected the legislation covering all aspects of use of inland waters and pollution of the marine environment will soon become law. The Territorial Lands Act is being revised to permit control of surface operations. It will apply, at first, only in the Northwest Territories, because other legislation will still have precedence in all phases of mineral exploration and development in the Yukon. One wonders why the Yukon legislation could not have been revised simultaneously with the Territorial Lands Act - was it bureaucratic bungling, or further evidence of a philosophy heavily prejudiced toward development at any cost?

The regulations which will make effective the forthcoming legislation have not yet been spelled out. Trained staffs are not available to administer them. How long will it be before conservation principles are applied effectively in the north? While we wait for the answer we can be certain that economic development will be pressed forward as energetically as possible. The scales do still seem to be heavily and unreasonably out of balance.

#### **Environment and development**

There is an obvious need to establish policies, legislation and administrative capability which will: ensure that northern environments will be preserved while they undergo exploration and possible development; ensure that traditional renewable resources are not wasted nor desecrated in a search for wealth that may, in many areas, turn out to be futile; preserve the options for future use of the land, particularly those options which native people may wish — or need — to exercise.

One of the optional uses of the land of the north is tourism. As the southern portion of the continent becomes more densely populated and its landscapes — even its so-called wilderness areas — more completely modified by the works of man, unspoiled open space will acquire a greatly enhanced value. Wilderness which also furnishes the unusual wildlife spectacles found in the north will be particularly attractive to southern urbanites, who spend their lives in crowded, unnatural surroundings. The wildlife which has been the traditional resource of the northern natives will then serve them in a different way, as an economic base rather than a subsistance resource.

Outfitting and guiding southerners who come north to hunt, fish, view wildlife or just to see the north are likely to become the lasting economic foundations of the native peoples of the north. The trend has already begun. Sportsmen come north to fish Arctic char and grayling or to hunt polar bear, and charter flights from Montreal now offer tours of the north. With proper promotion, and as natives get experience and training in this type of activity, the tourist potential of the north could increase very rapidly.

It is extremely important then, to both the northern natives and the southerners who may wish to visit their land, that the wildlife and the landscapes of the north retain their vigour and their wild beauty. Other forms of economic development must fit within these constraints, based on Canadian priorities, rather than overriding them callously in a frantic search for wealth in which foreign interests may set the pace and influence the priorities.

Maintenance of the integrity of northern landscapes and development of its non-renewable resources are not mutually exclusive. But, to be compatible, each activity must be carried forward in an atmosphere which recognizes the importance and the appropriateness of the other form of development.

There are already several mines operating in the north, each with its own little area of development and its transportation route. Many more of these foci of activity can be expected. If each is truly viable, in an economic sense, there is no reason why its impact cannot be confined to a very limited area. It need not spread pollution, nor any other form of blight, over an extensive area. Even the road or rail line which serves it can, with care, be fitted into the landscape in ways which minimize its visual and ecological impacts.

Natural gas has already been discovered in commercial quantities on the southern edge of the area north of 60. Oil may yet be found in quantities which warrant development of the collector lines and transportation systems required for the production phase. Construction of these will, of course, entail local ecological disturbance which, while it can be minimized, cannot be avoided altogether.

Except in key areas of wildlife habitat or in regions of extreme ecological sensitivity, these carefully designed developments, occuping a fraction of one per cent of the land area, should cause no concern for the future of renewable natural resources. But it is necessary to stress that this would be true only if these developments were carefully designed with full knowledge of their potential ecological effects.

The exploration phase of northern economic development covering extensive areas of land is more likely to be incompatible with preservation of the integrity of landscapes, if this phase employs techniques developed for use in the less sensitive ecosystems of more southerly latitudes. It is this phase of activities which is in great need of thorough review, redesign and legislative control. Imagination and inventiveness, modern technology and, most importantly, ecological awareness must be brought to bear on the problem of designing new exploration techniques more appropriate for use in sensitive northern ecosystems.

One outstanding example of this need is found in terrestrial seismic exploration for oil. The bulldozed seismic line of central Alberta is completely inappropriate to the more sensitive portions of the north. Even if it does not cause severe ecological disruption nor lasting effects on wildlife populations, the visual impact will remain for centuries, prejudicing the future use of the land for a very long time. These effects are particularly unfortunate when it turns out, as must often be the case, that the search for mineral wealth has been in vain. Every effort should be made to ensure that the exploration phase of northern economic development leaves the landscape virtually unmarked and its ecology undisturbed. And the technologies and scientific knowledge required may already be available.

New methods of transportation, including low ground-pressure terrestrial vehicles, helicopters and hovercraft; new, high-accuracy methods of radio navigation; and computer analysis of data produced by the exploratory phase offer almost unlimited opportunities to depart from the old, standard techniques.

Research and experimentation are needed, of course. In particular, there is need for greatly expanded ecological research on northern ecosystems, to help establish tolerances for disturbance, rates of recovery, etc. But, most of all, there is need for sincere goodwill and cooperation on the part of industry, government, conservation groups and the scientific community in working together toward solution of the many problems associated with northern economic development.

The pattern of northern economic development is already set: there can be no doubt that the non-renewable resources of the north are about to be developed. Despite the high-sounding expressions of concern for conservation, expressed by both government and industry, there is as yet little indication that either is prepared to show the restraint or consideration necessary to ensure that the development will really serve the long term interests of Canadians in general and northerners in particular. It is the subtle but extremely important difference between short term exploitation and long term development which now demands the attention of all those who care about the future of the north.

## Water and aquatic resources by Ward Stevens

This is the 34th federal-provincial wildlife conference, being held for the first time in the Northwest Territories. Although these territories are observing their 100th year, they still are new lands to be settled and developed according to the standards and traditions of more southerly areas.

Yet they are old lands, much of the area being of the oldest Precambrian rocks in Canada. And the people who have lived here, and have made their homes here over time, have their own ideas of the value of this vast landscape to them, to their culture and to their traditions stretching back many centuries, Conflicts already have emerged, and have not been resolved, and as settlement and development of a different culture are imposed on the old, more strains will develop.

Traditionally, at these federal-provincial conferences, we have talked about waterfowl management. Though we try to control waterfowl numbers through hunting regulations, it generally is accepted that adequate water is the key to waterfowl survival. We are losing waterfowl habitat in Canada through drainage for agriculture, through the construction of highways, through the spread of urban areas, through pollution, and through the artificial manipulation of normal water flows. Although the trend is not new, it appears to be accelerating as the development of agriculture and industry yearly increase their demands upon our natural resources of land and water.

Attempts at water management are not new in Canada. What started originally as simple water movement for agriculture later became impoundments for power, for industry and for transportation. These supported a burgeoning industrial complex, pledged to convert our forest and mineral resources into wanted dollars and unwanted wastes. The dollars were used to finance further exploitation, and the wastes were dumped into the rivers, the lakes and the oceans.

Such rapid transformation of natural conditions has been actively supported by governments because governments are industryoriented and need tax dollars. Governments are divided into departments like agriculture, mines, forestry and fisheries, and with their tax revenues they hire staffs of trained people whose purpose is to support their respective industries. Where conflicts occur in the exploitation of our natural resources, there sometimes has been room for compromise, but most often the conflicts do not appear until it is too late to do much about them, so the persons or agencies disadvantaged suffered by default.

But we live in a democratic country, and the opportunity for a free exchange of opinions is a right of our society, though is not often enough engaged in under present conditions. Increasingly, the exploitation of our natural resources affects more than one interested group, and so a continuous exchange of ideas is imperative.

Such exchange should rest not only with the bureaucrats of government, but should involve the public at large to as great an extent as possible. For that reason public hearings about important issues are and should be a part of the democratic process. The individual citizen still must have some voice in the development of his country, even though that voice seems to have been small and weak at times.

One of the issues that must be faced by the people of Canada, and especially by those living in northern areas, is the very important one of who is going to get the supplies of fresh water that form such an important part of their birthbright. Water represents a highway, a source of food, a source of power, and an object of beauty to the people who live in the territories or visit here — and the north has water in abundance. Other parts of the continent, either through mismanagement, population growth, or facts of nature, are not so fortunate.

Now continental schemes are developing to divert water from the Mackenzie River system to more southerly areas. Mr. Quinn may tell us something about the many proposals that have been advanced, and Mr. Dirschl will tell us something about the consequences of one of the minor developments, the Bennett Dam on the Peace River.

Admittedly, some of the continental schemes that have been proposed are unrealistic, but others are already being actively pursued. The Province of Alberta, noting that 85 per cent of its waters flow northward out of the province, already has instituted the PRIME program that will take waters from the Peace and Athabasca Rivers and send them southward into the agriculture and urban areas, and eastward into Saskatchewan.

At the same time, a federal-provincial study costing five million dollars is being undertaken in the Saskatchewan — Nelson basin, the intent of which is to apportion water resources of the prairie provinces, and to decide how to tap and utilize those water resources that flow toward the Arctic. And just for interest, we had last month the spectacle of the commissioners of the Western States Water Council and several senators being given their annual conducted tour of the well-watered areas of western and northern Canada.

The water resources of the Yukon and Northwest Territories are already under close and envious scrutiny and it appears that they will be subject to greater or lesser manipulation by the up-stream users. It is questionable to what extent the riparian rights of the down-stream users will be respected. The Supreme Court of Canada has limited authority to decide water questions, but water is largely a provincial matter, and there are no adequate inter-provincial agreements at this time. (Perhaps Mr. Quinn could enlarge upon that point.) It seems necessary, therefore, for the down-stream users of the northern-flowing streams to know what is in store for them, and either to seek firm agreements, or mitigation, if they are disadvantaged in any way.

What are some of the disadvantages of removing or regulating water flows in northward flowing rivers? Each such scheme will have to be viewed in the context of how much will be removed, and at what time of the year. Permanent removal of a specific volume of water can only serve to lower water flows in a lake and river system, unless adequate measures are taken to keep the flows at desirable levels.

Lowered levels will interfere with fishing, with transportation, and with wildlife production. Regulated rivers, on the other hand, store water during flood stages, and release water during the winter, thus interfering with winter transportation through massive amounts of overflow on the ice, or hastening the destruction of productive deltas by denying them water and fertile silt load yearly.

There are many more possibilities that must be investigated and measured. For instance, what effects will the removal of forecast amounts of heat and fresh water from the Mackenzie River have on the ice regimen and biological productivity of the Beaufort Sea? I assert that we must proceed on the premise that natural conditions cannot be improved by engineering works, and that any such works proposed must include funds or structures for the mitigation of damage.

Just because a thing can be done technologically is no reason it should be undertaken. It is time that engineers and economists accepted the fact that there are other interests involved, and that there are people like geographers, botanists, zoologists, and sociologists who know more than they have ever been given credit for about the consequences of constructing engineering works.

Within the Northwest Territories and the Yukon there have been a number of studies undertaken in the aid of power development that would have a profound effect upon the direction of flow, and flow rates of rivers that are wholly territorial. There have been a dozen structures proposed for the South Nahanni River system, an equal number on the Coppermine River, six on the Lockhart, and more on other rivers.

They are intended to serve as yet non-existent customers, and no account has been taken in their planning of other possible uses, nor of mitigation of damage that they will cause to sport fishing, to tourist values, to national parks, or to other uses. Such costs must be added to the equation in deciding whether other forms of power might not indeed be cheaper in the long run.

All of which brings me up to a point I would like to make: there should be some sort of forum to decide the pros and cons of water use where a number of different interests are going to be always involved. Water is a universal substance, necessary not only for life, but for a wide range of our activities. It must, therefore, be used, enjoyed or developed with all those wide uses in mind. There must be some agency with the authority to see that the views and interests of all potential users are balanced.

In closing I would like to quote from two sources — the first Russian, and the second Canadian. Academician Gerasimov, a geographer, says:

"A comprehensive account of all the economic gains and losses involved in a project must be forecast. In addition to the direct building investments, and revenue to be derived, the calculations must cover indirect investments and losses resulting from the disturbance of natural conditions, and the measures required to forestall unfavourable changes in nature."

In the same vein, W. A. Morris of the Inland Waters Branch says:

"The extent to which true conservation of the water in a river basin is achieved will always reflect the wisdom and foresight that have gone into the development of the master plan. A completely pragmatic approach can overlook values which, though they are difficult to assess, are nevertheless real. It can be seen, therefore, that the only satisfactory approach is to consider all these factors, assign dollar values to down-stream benefits increased or foregone then compare net benefits."

These are fine sentiments, and it is hoped that somehow they will be transformed into action. To the people of the Northwest Territories I say:

"Be aware of what is proposed for your great wealth in water and aquatic resources. You have everything to lose. There is little evidence that your rights and your needs are being adequately considered in any of the published development plans that I have seen."

# The north also thirsts by Frank Quinn

#### The international picture

The thirst of this continent's southern deserts and central plains has been working its way northward since the turn of the century. Along the way, many well-watered basins have fallen under its shadow; some have resisted more successfully than others. The outcome is uncertain.

Los Angeles sent out agents in 1906 to purchase water rights in Owens Valley, 200 miles to the northeast. It was only a matter of time before southern Californians, by the sheer weight of their numbers, would overwhelm their neighbours north of San Francisco Bay and bring the Sacramento's tributaries down to the desert. Irrigation districts on the Great Plains began to reach across the Rocky Mountains and other divides. Denver, Dallas and Salt Lake City soon followed suit.

Farther north, the South Saskatchewan

project and Qu'Appelle diversion served to reduce the area of Palliser's Triangle of aridity. Still, no inter-basin diversion anywhere in the west crossed a state, provincial or national border. And the Canadian north, "where God had not sufficiently divided the land from the waters," was far from the action as the decade of the 1960's dawned.

There followed a sequence of events in rapid succession which projected the vision of longdistance water movement to its zenith within five years. The longest argument ever heard before the U.S. Supreme Court terminated with a decision on Arizona v. California et al. in 1963 which returned the whole problem of southwest water allocation to the political arena. Adverse reaction to a federal plan led to a rash of alternative proposals that looked farther north for sources of still unappropriated water. Simultaneously, a drought diagonally across the country made life temporarily difficult along the shores of the falling Great Lakes and the Atlantic seaboard.

By this time it appeared that every consulting engineer and even some academics with the time to spare were making paper projections. Most of these concentrated on making the Columbia, Missouri or Mississippi tributary to the southwest, or James Bay tributary to the northeast; but some saw an opportunity to go all the way, solving in one massive campaign all the water problems of the west, the east indeed the whole continent.

In almost no time, it became fashionable to speak of co-ordinating governments nationally and internationally for the purpose of conveying millions of acre-feet of water over distances of thousands of miles and pumping lifts of hundreds of feet for costs which climbed into billions of dollars. The water rush to the north had begun. (Table 1)

Although they continued to capture headlines, the tide began to flow out on continental water promoters about 1968. The Columbia Basin states, aided by conservationists, were successful in turning back all bills in Congress which attempted to include studies of the feasibility of major inter-regional diversion; a moratorium of ten years was declared on such studies. The Texas Water Plan, which proposed to import 17 million acre-feet from east Texas and the lower Mississippi, was set back by the failure of a bond amendment. And Canadians officially and unofficially rejected the suggestion that their waters were "continental resources".

Federal and provincial governments in Canada appear to have been in consistent agreement on the following points:

(1) There is no identifiable market as yet for Canadian water in the United States. All diversion proposals are privately sponsored; none has the endorsement of the U.S. government which has made no offer to the government of Canada even to discuss the question.

- (2) Canada would be unwilling to negotiate any sale of water at present even if there were a market, because Canadian water supplies have not been adequately inventoried and Canadian water requirements into the future have not been assessed.
- (3) Federal and provincial governments must agree before any international negotiations could begin.
- (4) Canadian waters will never be sold under conditions which would jeopardize their permanent ownership and their repatriation if and when needed in Canada. Therefore they will not be sold as part of a total energy package.

Federal ministers' remarks in the House of Commons (September 2, 1964; June 28, 1966; April 3, 1967; October 10, 1968; February 24 and March 3, 1970) agree closely with those made by provincial officials over the same period of time. It is essential to understand the attitudes of both levels of government because, under the terms of the B.N.A. Act, jurisdiction over resources is divided and both levels of government have a veto power on water export from the country.

A conclusion which can be offered at this point is that no Canadian waters will figure in any plan developed in this decade to satisfy American thirst. The thrust of schemes like NAWAPA toward the Yukon and Mackenzie will remain no more than lines on a map. The first reason is that the challenge from the dry southwest has been beaten back at the first line of defense, i.e., by those well-watered basins within the United States, like the Columbia and the lower Mississippi, which are reluctant to share their wealth.

The U.S. Congress is currently engaged in environmental quality matters and will not even

Proposal (author)	Year proposed	Water source	Water destination	Vol. of div. in millions of ac. ft.	Estimated cost in billions of \$
Grand Canal Plan (Kierans)	1960	James Bay dyked, rivers ''recycled'' southward	Great Lakes region of both countries; possible further trans- fer southward	17 +	?
Great Lakes-Pacific Waterways Plan (Decker)	1963	Skeena, Nechako & Fraser of B.C., Peace, Athabaska, Saskatch- ewan of Prairie provs.	Great Plains and Great Lakes region of United States	115	?
North America Water & Power Alliance or NAWAPA (Parsons)	1964	Primarily the Pacific & Arctic drainage of Alaska, Yukon and B.C.; also tributaries of James Bay	Southern Prairie Provinces, Great Lakes, almost all of United States, northwest Mexico	110	100
Magnum Plan (Magnusson)	1965	Peace, Athabaska & N. Saskatchewan in Alberta	United States, via Souris River in North Dakota	25	?
Kuiper Plan (Kuiper)	1967	Peace, Athabaska & N. Saskatchewan in Alberta, Nelson & Churchill in Manitoba	Great Plains and other states south of Canadian Prairies	150	50
Central North American Water Project or CeNAWP (Tinney)	1967	Mackenzie, Peace, Athabaska, N. Sas- katchewan, Nelson & Churchill	Great Plains and southwest states via North Dakota	150	30-50
Western States Water Augmentation Concept (Smith)	1968	Primarily Liard & Mackenzie drainages	All seventeen Western states via Rocky Mountain Trench	40	90
NAWAPA-MUSHEC or Mexican-United States Hydro-electric Com- mission (Parsons)	1968	NAWAPA sources + lower Mississippi & Sierra Madre Oriental Rivers of S. Mexico	Virtually all of occupied North America	158 + 129 NAWAPA + MUSHEC	?
North American Waters, A Master Plan or NAWAMP (Tweed)	1968	Yukon & Mackenzie Rivers, drainage to Hudson Bay	Prairies, Great Lakes and all of United States	1,500	?

consider studying inter-regional diversion feasibility in the west before the official moratorium on that subject ends in 1978, at which time a reconnaissance survey of water supplies and requirements will have been completed state by state. In other words, the U.S.A. will be engaged in some basic homework determining its needs and alternative ways of satisfying them. (Colorado River Basin Project Act, P.L. 90-537, 82 Stat. 885, 1968)

The other reason international discussions cannot proceed in the near future, mentioned above, is that Canada must carry out its own water inventory and consider its own alternatives. In this respect, northerners may have more to fear from the demands or indifference of their southern neighbours inside this country than from those who live outside. It will be imperative for the north to participate in Canadian water planning in the 1970's.

The budgets of federal and provincial water agencies have increased significantly in the past five years, in part to accelerate the national hydrometric network and expand it northward, and to assess the possibilities of increasing water supplies in the southern regions of the country by storage and diversion.

A basic fact of our geography is that approximately 60 per cent of Canadian run-off is carried by rivers flowing northward, while 90 per cent of our population is concentrated within 150 miles of our southern borders. As local resources are developed to capacity in the southern interior of British Columbia, the prairies and the lower Great Lakes—St. Lawrence, interest has increased in dipping more deeply into the northern reservoir for water and power needs. A beginning has already been made in interbasin diversions, (Table 2) and more studies are underway.

Of most significance to joint federal-provincial investigation are the Saskatchewan-Nelson studies and the Northern Ontario studies. Both have been underway for some time; both are dominated by considerations of hydrology and engineering; neither is exemplary of the kind of comprehensive planning which the federal government is struggling to implement today. The determination of potential additional supply for the Saskatchewan-Nelson by storage and/or diversion from the north, supplemented by data on engineering projects costs, "will not . . . result in a comprehensive development plan on the basis of which projects could be selected for implementation." (1969 Annual Report, Saskatchewan-Nelson Basin Board).

Economic, social and environmental studies assessing the effects of any diversion on the area of origin as well as on the potential receiving area must obviously precede any such implementation. Perhaps most important, northern representation and participation must be active in any studies which investigate northern waters.

The means are at hand. Two legislative measures which Parliament has recently passed into law speak to the question of improving consultation among federal-provincial-territorial governments and affected interests. I refer to the Canada Water Act and the Northern Inland Waters Act. Contrary to popular belief. the Canada Water Act is not devoted entirely to cleaning up the Great Lakes and other pollution problems; it aims for co-operative arrangements with provincial and territorial agencies toward developing comprehensive water planning, planning which will evaluate all users and potential users of the resource and alternative means of achieving a satisfactory balance among them. Goals and priorities will be established as a first step by high-level consultative committees among the governments, not left to later determination when the results of physical investigations are in.

The Northern Inland Waters Act will complement the Canada Water Act by providing regional water authorities, the Yukon and Northwest Territories Water Boards. These boards will consist of the senior federal water

River diversions	Location	Average annual amount mill. ac. ft. (or sq. mi. dr. area)		Purpose (formerly) now	Year Estab.
<ul> <li>A. Affecting Canada</li> <li>1. Allagash to Penobscot</li> <li>2. L. Michigan to Illinois R.</li> <li>3. St. Mary R. to Milk R.</li> </ul>	Maine Illinois Montana	? 2.31 .18	(270)	(log driving) power (navigation) sewage dilution irrigation	1841 (1848) 1910 1917
<ul> <li>B. Existing in Canada <ol> <li>Nechako R. to Kemano R.</li> <li>L. St. Joseph to Winnipeg R.</li> <li>Long Lake to L. Superior</li> <li>Ogoki R. to L. Superior</li> <li>Megiscane R. to St. Maurice R.</li> <li>Indian R. to Humber R.</li> <li>Grey R. to Salmon R.</li> </ol> </li> <li>C. Under construction in Canada <ol> <li>Naskaupi &amp; Canairiktok to</li> </ol> </li> </ul>	B.C. Ontario Ontario Ontario Quebec Newfoundland Newfoundland	2.17 2.02 1.01 2.82 ? .15 .69	(263)	power power power power power power	1952 1957 1939 1943 1953 1967
Hamilton R. 2. Victoria & White Bear to Grey R.	Newfoundland	1.87	(4004)	power	1968—
<ul> <li>D. Under consideration in Canada <ol> <li>Porcupine to Peel to Rat R.</li> <li>Yukon to Taiya or Taku</li> <li>McGregor R. to Peace R.</li> <li>Churchill R. to Nelson R.</li> <li>Shuswap R. to Okanagan R.</li> <li>Alberta's PRIME study</li> <li>FedProv. SaskNelson study</li> <li>Northern Ontario study</li> </ol></li></ul>	Y.T., N.W.T. B.C., Alaska B.C. Manitoba B.C. Alberta Prairie Prov. Ontario	24.55		power power flood control & power supply, dilution, etc. supply, etc. supply, etc. supply, navigation, etc.	1969—

\* First-order divisions only are indicated, i.e., those which result in flow reaching the ocean by other than its natural channel. Second-order diversions, such as that from the South Saskatchewan to the Qu'Appelle, and lower orders, such as those effected by canal feeding right down to the individual user's different points of intake and outflow, are not shown. Note that most existing diversions serve power uses and required only minor construction activity to bring about, whereas future diversions will serve supply and other purposes to a greater extent and will probably require longer conveyance facilities and more sophisticated management.

officials in each territory and officials from the territorial governments. From now on, the territories are assured a stronger voice in any studies or proposals relating to the use of northern waters, whether such use is intended in the region or out of it.

There are lessons to be learned from Bennett Dam and Southern Indian Lake, lessons which might yet be applied in making studies such as that of the Saskatchewan-Nelson more comprehensive. Otherwise, the traditional judgments of the past will prevail: that the highest use of water is in reclaiming the drylands, that a river whose flow has been controlled by dams is always preferable to one which fluctuates freely. The 1970's are imposing extra demands on environmental planning for which past experience is inadequate. It will no longer be good enough to "win a few, lose a few". Governments cannot continue to guard their independence of action before the fact, then co-operate out of panic and pressure afterward.

Pressure on northward-flowing rivers will intensify. Fortunately, past experience provides some lessons (often of how not to go about it) and legislation exists for better consultative arrangements between jurisdictions. What balance do northerners want among conflicting demands? Those who would divert water southward to the prairies of the American drylands frequently speak of thirst in physiological terms of life and death, of economies that will decline without new water.

For what does the north thirst? What kind of development, what protection for its unique character of peoples and resources? The rest of the country knows too little not only about what problems large-scale diversions would bring the north but also about what opportunities northerners might develop without diversions.

#### The W.A.C. Bennett Dam and the ecology of the Peace-Athabasca Delta by Herman J. Dirschl

In July 1968, the Canadian Wildlife Service began a five-year study in the 2,000-square-mile Peace-Athabasca Delta to evaluate the immediate effects on the delta's ecology of the water regime changes caused by the W.A.C. Bennett Dam. This information will help predict the nature and extent of the long-term adjustments in landscape and wildlife use under the altered water regime.

More than half of the delta lies within Wood Buffalo National Park; the remainder consists of Indian reserves and Crown land in Alberta. Large numbers of bison inhabitat the delta, and its lakes and marshes are one of the most important areas for migratory waterfowl in Alberta. They are particularly unusual because they receive birds from each of the four major flyways in North America.

The delta is primarily important for moulting, and staging for the autumn migration. It is also a significant production area, particularly in years when the prairie pothole region is dry. Muskrat harvesting has been one of the main sources of income for approximately 1,300 Crees, Chipewyans, and Metis residing in and around Fort Chipewyan.

The productivity and uniqueness of the Peace-Athabasca Delta is the result of its hydrological regime. Before the dam was built the flow of the Peace River was extremely variable with spring flows of around 350,000 cubic feet per second (c.f.s.), followed by a gradual decline during summer and fall to winter flows of about 15,000 c.f.s. Several outlet channels connect Lake Claire, Mamawi Lake and Lake Athabasca with the Peace River.

During the spring flood, the water level in the Peace River exceeded that of the lakes; the flow in the channels reversed and large inflows from the Peace River caused the lakes to rise rapidly by six to eight feet, to 688 to 692 feet. Flooding of almost the entire area resulted in an influx of nutrients, deposition of silt, and removal of acid products of plant decomposition. Such yearly flooding, followed by lower water levels, is essential to maintain the ecology of the delta.

Since closure of the Bennett Dam in late 1967, flows in the Peace River have remained very low and outflow from the delta into the river has been continuous. As a result, water levels in Lake Athabasca and the contiguous lakes and marshes have continued to drop to a low of 675 feet, recorded in February 1970.

Because the ecological study began after the filling of the reservoir had already begun, it was necessary to employ methods that permitted rapid recording of vegetation and landform patterns, and monitoring of ongoing changes. To accomplish this, a number of representative study blocks and field transects were selected through examination of recent (1955) black and white airphotos.

These areas were then marked on the ground and photographed from an altitude of 1,500 feet with a Hasselblad 500 EL/70 mm camera. Three seasonal coverages were used, viz., shortly after the beginning of the 1969 growing season. On each occasion, black and white, normal colour and infrared colour coverage was used to record a maximum of information on film, and thus reduce as much as possible the necessary amount of ground study.

This type of coverage will be continued during the 1970 and 1971 growing seasons. With detailed ground study of vegetative cover, soil development, water table and lake level changes, it will then be possible to develop an ecological landscape classification for the entire delta that will recognize the dynamic relationships of the various vegetation/landform categories in relation to the water regime.

Subsequently, the entire delta will be mapped by means of this classification and a new airphoto coverage, at a scale of one inch — 1,000 feet, planned for July this year.

Comparative sampling of selected sites in 1968, 1969 and 1970 has indicated the nature of vegetative changes on mudflats exposed since spring 1968, instead of being re-immersed by subsequent spring floods, as would have occurred under natural conditions.

In July 1968, these mudflats contained a very thin cover of sedges and dead aquatic plant species, such as pond-weeds. One year later, seeds contained in the upper layer of silt had germinated, resulting in a luxuriant meadow of sedges. grasses, and various herbs. On the average, more than 20 species were present in each of the 22 sites sampled. It was also apparent that small willow seedlings were abundant in all of these stands.

Observations in the present growing season indicate that those willow seedlings are growing rapidly, and will probably visually dominate those areas by the end of the 1970 growing season.

It appears, therefore, that vast areas of the delta which were shallow marshes or wet meadows will rapidly develop into willow tickets because of the lowered water levels, and may eventually be invaded by various species of trees.

If this preliminary assessment is correct, a large portion of the sedges that form the staple food of the bison will disappear. Waterfowl capability will decline because nesting habitat will be lost, and muskrat populations will decrease sharply from loss of food sources and from winter kill caused by complete freezing of extremely shallow water bodies.

# Recommendations of the 34th Federal-Provincial Wildlife Conference

#### **Recommendation 1**

That the conference express its appreciation for the warm hospitality extended by the Government of the Northwest Territories and the people of Yellowknife to the delegates of the 34th Federal-Provincial Wildlife Conference.

#### **Recommendation 2**

That the conference commend the Canadian Wildlife Federation for its effective campaign on the theme of "Endangered Wildlife in Canada" for National Wildlife Week 1970, and recommend that its 1971 theme should be "Environment and Survival" and, in 1972, "Conservation and Education."

#### **Recommendation 3**

That the conference bring to the attention of the federal departments of Energy, Mines and Resources, and Transport, and to the appropriate provincial agencies, the importance it attaches to the rapid development of an effective contingency plan for handling inland oil spills.

#### **Recommendation** 4

That the conference express concern over the endangered state of all raptors in Canada and recommend:

- (a) that no further permits be issued to kill, capture or keep these birds other than for research to benefit the species;
- (b) that the provinces and territories enact endangered species legislation;
- (c) that the Game Export Act be amended to cover live animals.

#### **Recommendation 5**

That the conference recomment that the provinces and territories prohibit the use of mercury seed coatings.

#### **Recommendation 6**

That the conference recommend that the point system be tested on a Canadian waterfowl area in the fall of 1971 through a co-operative arrangement between the Canadian Wildlife Service and a provincial agency.

#### **Recommendation** 7

That the conference recommend that each conservation agency give its full support to the 1973 conference planned by the Council of Resource Ministers on the theme "Man, Land and Integrated Resource Use."

#### **Recommendation 8**

That the conference express appreciation for the leadership provided by the Canadian Wildlife Service in its research on environmental contamination by chemicals.

#### **Recommendation 9**

That the conference acknowledge that action taken on Recommendation No. 11 from the 1969 conference, and recommend that a continuing effort be made to define the responsibilities of each province and territory and the Canadian Wildlife Service for waterfowl management, research and other wildlife matters.

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