

**Thirty-fifth
Federal-Provincial
Wildlife Conference**

**TRANSACTIONS
1971**

**Toronto, Ontario
July 6 to 8**

**Transactions of the
Thirty-fifth Federal-Provincial Wildlife Conference
held in Toronto, Ontario
July 6-8
1971**

Canadian Wildlife Service
Department of the Environment

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Summary of the 35th Federal-Provincial Wildlife Conference

Conference opening

John Tener, conference chairman, welcomed the delegates and visitors and introduced Stuart Peters, executive director of Outdoor Recreation, Ontario, who spoke on behalf of Walter Macnee, deputy minister, to welcome the conference to Ontario. Dr. Peters commented on the scope of the agenda and enumerated some specific areas where Ontario could gain from conference discussions.

1. Recommendations of 34th conference

F. H. Schultz reported on actions taken on recommendations from last year's conference. There was no discussion.

2. Address by deputy minister of the Environment

As an engineer, R. F. Shaw professed ignorance about wildlife and many other resources, but stressed his belief that if the world is all right for fish and wildlife, it will be all right for humans.

He spoke of the events leading up to the formation of the Department of the Environment: the by-products of our high standard of living disposed of into our air, water and soil, and the gradually increasing volume of the voices pointing out the disastrous consequences of human intelligence not keeping up with human 'engineerity'.

He commented that as true generalists, wildlife people have a large role to play in helping the downward slope of environmental quality to turn upward. In pledging itself towards that end, the Parliament of Canada has established the Department of the Environment.

Environment Canada has been organized into four technical missions: fisheries service; lands, forests and wildlife service; water management service and atmospheric environment service.

Two non-special, co-ordinating services are the policy, planning and research service to survey all operations and co-ordinate internal

and external efforts, and the environmental protection service which will be the focal point for problem solving for the environment by setting up laws and liaising with industries and governments across Canada. It will also manage environmental actions and the disposal of dangerous materials.

Some progress has been made already. The department is already functioning: the Fisheries Act has been strengthened, the Water Act has been passed, and a clean air bill is being debated.

Some important features for the future include consultations with provinces to set up uniformity or rational unity of regulations to avoid pollution havens, advice for proposed pipeline works, the U.N. Conference for 1972, and the Law of the Sea Conference for 1973.

In conclusion, Mr. Shaw made two points: as far as the environment is concerned, there is no such thing as separateness—nationally or internationally; and he believes that "everyone is praying for our success".

3. Appointment of recommendations committee

Dr. Tener appointed the following to a recommendations committee: J. Hatter (chairman), G. Moisan, P. Kwaterowsky and J. Cameron (secretary).

4. Activities of the Canadian Wildlife Service

Dr. Tener reported to the conference.

5. Canadian Wildlife Federation activities

R. C. Passmore reported on the two activities of the federation that relate most closely to the federal and provincial agencies:

a) "National Wildlife Week 1971 on environment and survival" enjoyed unprecedented success due to the excellent co-operation of the

provincial resource agencies. The 1972 theme is to be "Conservation education" and Mr. Passmore proposed "Preservation of wetlands" for 1973.

b) Activities relating to encouraging emphasis on ecology in provincial and territorial educational systems have been so successful that the federation is now short of help to cope with demands. The federation has been concentrating on teacher training with one notable success at the University of Calgary which has now developed its own program, and with work progressing at Notre Dame University of Nelson, B.C. and at Acadia University.

6. Report of administrative committee for polar bear research and management

A. H. Macpherson commented on the high public interest in polar bears in Canada and reported on the recommendations proposed by the committee.

7. Report of administrative committee for caribou preservation

N. S. Novakowski reported on the deliberations of the committee. The report is circulated separately to members of the committee.

8. Report on progress of 1973 Man and Resources Conference of Canadian Council of Resource Ministers

H. Fletcher expressed Christian deLaet's regrets at not being able to attend and presented the report.

9. Report on activities of Ducks Unlimited

In connection with environmental concerns, D. S. Morrison quoted Pogo: "We have met the enemy and he is us." Mr. Morrison then reported on the environmental activities for ducks being undertaken by Ducks Unlimited (Canada).

10. Progress report on Canada Land Inventory

V. E. F. Solman reported to the conference.

11. The search for a solution to lead poisoning in waterfowl

D. G. Dennis, wildlife biologist with the Canadian Wildlife Service, reported on progress to date in preventing lead poisoning in waterfowl.

12. The pelican— Protection or extinction?

K. Vermeer, wildlife biologist with the Canadian Wildlife Service, presented his paper and followed it with a brief slide presentation during which he described how easily pelicans are disturbed by humans. He suggested the nature of protective measures that could be taken by the federal and provincial governments. He concluded by pointing out that pelicans form part of unique bird colonies as special as any in the world. He invited the delegates to take action immediately to prevent the extinction of this species.

Discussion

The brief discussion focused on dangers to the pelican and means of protecting this bird.

13. Interpretation in the Canadian Wildlife Service

R. Y. Edwards, staff specialist, Interpretation, with the Canadian Wildlife Service, summarized his paper. Discussion focused on the reason the only centre slated for the prairies is located in Saskatchewan, away from the areas of greatest population. Mr. Edwards explained the need for balance between a place to interpret a story and available population, and added that he thinks that people will come.

14. Waterfowl status reports

R. H. Mackay reported that surveys carried out in co-operation with the United States showed good to excellent habitat and a good hatch except in Manitoba, where total ducks are down 19 per cent from last year (40 per cent below long-term average) due to lack of moisture. In Saskatchewan and Alberta ducks are up 6.8 per cent and 33 per cent respectively.

H. J. Boyd reported that the unique surveys conducted in eastern Canada have not been fully analysed but it appears that duck populations will be at least as good as in 1970.

Four new survey programs are being developed:

1. to determine populations of breeding ducks in the early '70's for comparison at 5 to 10 year intervals;

2. to relate quantities of breeding birds to available habitat to determine potential for habitat management;

3. to relate distribution during hunting seasons to distribution in breeding season; and

4. to measure and account for the distribution and production of geese, especially in the Arctic.

W. G. Leitch, chief biologist, Ducks Unlimited (Canada), provided the results of the Ducks Unlimited waterfowl surveys in western Canada. These agreed in general with the results reported by the Canadian Wildlife Service and the provinces and the territories.

15. Reports from migratory bird technical committees

a) Harold Weaver reported that the Western Canada waterfowl technical group held a successful three-day meeting in Saskatoon in November. The senior provincial officials recommended that the group report only the highlights of its meeting to the Federal-Provincial Wildlife Conference. The first day was spent discussing current conditions, covering production surveys, banding, Canadian-American co-operative efforts, harvest surveys, crop depredations and chemical residues. The second day focused on geese man-

agement aspects, and the third on the goals of the group, problems and future activities.

He concluded by reporting on the status of the prairie provincial committees, followed by a brief report by Bill Morris on the B.C. committee.

b) Blair Dawson reported on the Eastern Canada migratory bird technical committee meeting in Charlottetown in May. Those present discussed topics that relate to almost every area of migratory bird management, including pesticides and wildlife, banding, hunter and harvest surveys, the roles of governmental and non-governmental agencies, enforcement, and changes in regulations.

16. National waterfowl advisory committee

John Bain was nominated to attend the meeting, with Gaston Moisan named as back-up if needed.

17. Invitation for the 36th conference

Merrill Prime invited the conference to meet in Halifax, Nova Scotia in 1972.

18. Provincial forum

Gene Bossenmaier as chairman commented on the closing of the forum to the press to facilitate more open discussion. He reviewed briefly other topics proposed but for which there would not be sufficient time for discussion: control of use of motorized toboggans and other all-terrain vehicles; the non-resident hunter; a co-ordinated approach to fur and game export requirements; fur royalties; the desire to establish common standards of game licensing and enforcement across Canada; the provincial role in waterfowl management and policy development; and trafficking in wildlife.

a) Consumptive use of wildlife—How does the future look?

Gordon Kerr opened the topic by proposing that it be limited to sport hunting, with some consideration of trapping. As sport hunters are a minority of the population, they are vulnerable to pressures against hunting that may be brought to bear by the majority who do not know the pleasure of hunting or understand how nature operates.

Wildlife managers should be communicating with the majority as well as the hunting minority. The former have mounted a vociferous campaign in the United States to ban all "slaughter" of wildlife, and Canada can undoubtedly expect the same pressures.

In addition, Canadian wildlife managers should review the following aspects:

Do provincial regulations foster real sport hunting?

Are present techniques of resource harvest adequate and humane?

Is the tradition of public ownership of wildlife on private land at the owner's expense outmoded for our time?

Discussion

Concern was expressed by several people about the amount of anti-hunting pressure already being exerted in Canada. Some factors outlined as contributing to opinion change were: rapidly increasing urbanization, hostility of landowners to trespassers, loss and change of habitat, the hunters' lack of awareness of changing attitudes, the bad image of the hunter, and concern with the moral aspects of "blood sports".

It was generally agreed that the game manager is in the middle and very vulnerable. He needs to re-examine his methods and to engage in public relations work to inform people of his three major responsibilities:

1. to help maintain environmental equilibrium,
2. to preserve species threatened by extinction,

3. to execute his responsibility towards all users of wildlife.

In connection with the above points, the importance of hunter education and re-education was strongly emphasized. In conclusion, Gene Bossenmaier challenged all present to prepare and exchange papers suggesting steps that might be taken.

b) Trends and implications of wildlife agency re-organizations

Frank Walden began by stating that Ontario has adopted a basic planning philosophy to cope with the rapid changes taking place in society. The re-organization in the Department of Lands and Forests is consistent with that approach, especially concerning the need to provide more outdoor recreation for the increasing urban concentrations. It also relied heavily on the field staff's first-hand knowledge of problems.

Historically, Ontario's regional organizations have been strongly oriented to forest management. In addition, there had been a tendency toward centralization.

New objectives were articulated: that resources should be more economically managed and that the cultural values of outdoor recreation and aesthetic appreciation are an inherent right.

Coincident with re-organization has been the introduction of PPBS—a Planning, Programming and Budgeting System that will incorporate an annual planning of sub-objectives into budgeting for wildlife activities and a subsequent performance appraisal.

The new organization of the department identifies four separate parts which are subdivided into 15 branches, of which Wildlife is one. Each branch has three layers: head office, regional offices and district offices.

The assignment of responsibility to each layer is based on the principle that most of the cutting should be done at the cutting edge—that is, by the district offices. The regional offices

and head office set priorities, audit and provide special expertise and co-ordination.

Mr. Walden concluded by cautioning that no re-organization will produce miracles and with a reminder of the political environment that we all live in.

Discussion

Gene Bossenmaier said that Manitoba had also adopted PPBS and decentralized when re-organization took place. In addition, they integrated head office along the functional lines of research, operations, planning, and development and extension branches. The re-organization is working—not at peak efficiency yet; that may take five years to achieve.

General discussion focused on the advantages of decentralization and on the question of how best to organize to stimulate the upward flow of ideas and suggestions.

c) Associations of wildlife officials in North America—Their adequacy for Canada

Since scientific and technical needs are being met, Jim Hatter restricted his remarks to associations intended to meet administrative needs—particularly the various associations of game, fish and conservation commissioners.

He pointed out that much can be learned by attending meetings of the associations but that there are significant differences that reduce the relevance of much of the concrete work of the association's meetings such as: no counterparts in Canada to the commissions and the organizations that they deal with; the fact that our federal government does not have basic rights on unclaimed land in the 10 provinces; and different areas of controversy.

Dr. Hatter suggested that Canadian needs should be recognized and can probably be met through expansion of the provincial forum to a whole day for next year and possibly to two days in the foreseeable future.

Discussion

It was generally agreed that an expanded provincial forum would go a long way towards meeting needs not previously met. There was discussion about dividing the forum into an eastern and western meeting but the majority seemed to prefer to keep the meetings integrated. Other details of format including selection of a chairman, types of subjects and possible associated technical meetings were also discussed.

19. Report of activities of U.S. Fish and Wildlife Service

Before reporting on events and activities in the bureau, Joe Linduska briefly described President Nixon's proposed organization of the Department of Natural Resources and senior personnel changes. Spenser Smith is now deputy director and Noble Buell has been succeeded by Vic Schmidt.

Dr. Linduska also reported that one adverse effect of the American anti-pollution movement has been the equation of any killing of wildlife with environmental degradation. Three surveys to evaluate this trend are now being carried out and Canada will be informed of the results. Meanwhile, restraining orders and court injunctions are being used to hamper game management programs of population control.

Other current issues are a treaty between the United States and Japan dealing with migratory birds; the subjection of archery equipment to the 11 per cent tax on hunting weapons; and the increased cost of duck stamps from three to five dollars.

20. Panel—Land-use planning in Canada

The co-chairmen, Vic Solman and Nolan Perret, introduced the topic and the speakers, Jim Maxwell, Art Benson and Paul Dean, who presented their papers. Mr. Benson illustrated his presentation with overlay transparencies and slides.

Discussion

Bob Dorney, rapporteur for the panel, was introduced.

Open discussion revolved around three main points: a) the qualifications of wildlifers for participation in planning, b) means of dealing with economics-oriented people about wildlife values, and c) the necessity of population planning; followed by the rapporteur's report.

a) Training for planning

Jim Hatter asked if the training received by wildlife biologists is adequate for them to participate in land-use planning.

Art Benson replied with a qualified yes and suggested that training emphasis for biologists should also include other disciplines. One aspect that should be emphasized is the need to become involved with municipal and other governmental planning agencies.

b) Selling wildlife values to planners

Gene Bossenmaier asked how to deal with planners who look at wildlife in economic terms. The panelists had several suggestions, including refusing to play the game by the economists' rules, creating an informed public to put political and social pressure on planners to include wildlife and recreational values, and better articulation of society's objectives. Bob Dorney suggested that if stuck with having to use economics, habitat has useful economic parameters.

c) Population planning

Al Loughrey inquired about the role of population planning in land-use planning. Art Benson replied that population planning cannot be done at this time and that it is necessary to focus on what can be done and on getting more public participation from a more informed public. Bob Dorney added that population location is as important a factor as its size in planning.

Rapporteur's report

The entire text of Professor Dorney's remarks is included with the papers from the panel.

21. Report of recommendations committee

Jim Hatter, chairman of the committee presented 10 recommendations. All were adopted.

Report of 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.

Action

A letter of appreciation was sent to Commissioner Hodgson.

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".

Action

A letter expressing the wishes of the conference was sent to the executive director of the federation.

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.

Action

A letter was sent from the minister of Indian Affairs and Northern Development to the minister of Energy, Mines and Resources subsequent to circulation of the "Interim federal contingency plan for combating oil and toxic chemical spills" asking for confirmation that the plan covered inland spills.

The minister of Fisheries and Forestry (subsequent to taking on the responsibility for water matters) replied that the plan covered only areas

under federal jurisdiction but that the development of a national contingency plan will be a priority assignment for a suitable task force to be set up following the review of the "Arrow" report.

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.

Action

Letters from the minister of Indian Affairs and Northern Development were sent to all the provincial resource ministers and the territorial commissioners urging immediate action to implement sections (a) and (b). The Canadian Wildlife Service is working on section (c) and is proposing new legislation for 1972-73.

Recommendation 5

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

Action

After an inter-departmental review in the fall, the Canada Department of Agriculture on December 1, 1970, issued a trade memorandum on the "Revised status of seed treatment products containing mercury" under the authority of the Pest Control Products Act.

This memorandum announced that registration of mercurial products intended for use on cereal seed would be discontinued effective immediately except for stocks already committed to retail outlets and said that these latter would probably be ineligible for registration in 1972.

If products are labeled "Do not use on the seed of wheat, oats, barley or rye", they may be registered for 1971 for use on non-cereals such as sugar beets, turnips, oilseed crops and vegetables. These requirements do not apply to cereal seed that has been already treated but it is envisaged that the use of mercury seed dressings on cereal seed will be curtailed by 1973.

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.

Action

The Canadian Wildlife Service was unable to find any province willing to participate. It was decided that in view of the extension of the experimental point system in the United States, it would be in the best interests of waterfowl management in Canada to maintain a surveillance of that experiment.

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".

Action

A letter was sent to all provincial game directors and to the territorial commissioners conveying the recommendation.

Recommendation 8

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

Action

The expression of appreciation was passed on to J. A. Keith, head of the toxic chemicals unit and his staff.

Recommendation 9

That the conference acknowledge the 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.

Action

Legislation is being considered by the federal government for enactment by the Parliament of Canada which will deal with Canadian wildlife. It is expected that the details of the proposed Act will be the subject of discussions between the minister of the Environment of the federal government and the ministers of the appropriate provincial departments next autumn.

Such legislation, if passed by the Parliament of Canada, will provide the opportunity of clearly defining the respective responsibilities of the federal, provincial and territorial governments for research and management on waterfowl and for other wildlife.

Report of the Canadian Wildlife Service

J. S. Tener

Since our last conference in Yellowknife, major events have occurred which have had a profound influence on the Canadian Wildlife Service. As you all know, the service was transferred to the Department of Fisheries and Forestry last November from the Department of Indian Affairs and Northern Development where it had resided since its inception in 1918.

Over the years the service had built very close and effective working relationships with agencies of Indian Affairs and its predecessor departments and we were all naturally sorry to see the formal separation from the department.

However, the relationships will continue, for it has been agreed that the service will carry on its advisory role in providing policy and management recommendations on wildlife and ecological problems in the national parks and on wildlife problems in the Yukon and Northwest Territories to the deputy minister of Indian Affairs and Northern Development and to his senior staff.

The creation of the Department of the Environment, of which we are now a part, has already proved to be extremely beneficial to the service. The grouping of renewable resource agencies under the umbrella of environmental concern and action provides a framework for more effective participation of the service in assessing resource development problems as they relate to wildlife, and for participation in developing and maintaining environmental quality standards throughout Canada.

The concept of the department is exciting; the problems are varied, immense, and complex, but the prospect of accepting the many challenges before us to achieve substantial progress in good resource management practices are stimulating and will, I am confident, be rewarding.

We have made one senior appointment since last year. Donald Flook, who was previously based in Edmonton working in the western national parks, has been appointed supervisor of mammal research for the eastern region and Dr. Flook will be assuming his duties next month.

There was a modest increase in our budget and staff in the current fiscal year. This has enabled us to strengthen to a limited extent our resources which have been spread very thinly because of new and demanding pressures on us to provide wildlife and ecological information relating to major resource development projects.

I am not able to report any progress in amendments to the Migratory Birds Convention Act as government policies having a bearing on the Act have yet to be determined. The minister announced on March 5 that he was proposing the creation of a Canada Wildlife Act and has indicated that the matter will be discussed with provincial ministers and territorial government officers before legislation is introduced to the House of Commons.

There have been a number of significant developments in our migratory birds program. It is believed that these developments will have a considerable impact on migratory bird research and management over the next decade.

The first of these developments was a complete revision of the Migratory Birds Regulations. This tedious but important task was started in December 1970 when provincial agencies were requested to offer comment on desired changes. Subsequently, in a series of meetings with the Royal Canadian Mounted Police, all Canadian Wildlife Service enforcement personnel and the Department of Justice, a complete revision was made by late May 1971. The number of sections to the regulations was reduced from 51 to 35 and, in those which remained, further reduction in verbiage was accomplished.

In so doing, many time-honoured and familiar friends have disappeared. We anticipate that there will be a period of considerable debate as the hunting public and the enforcement personnel become accustomed to the new rules. These changes could not have been accomplished without the very considerable assistance received from the provincial agencies and the Royal Canadian Mounted Police over the past few years.

Some adjustments will probably have to be made after the 1971 hunting season. Hopefully they will be minor and hopefully by 1972 we will be able largely to stabilize the textual portion of the regulations for a five-year period.

The second major development has been the receipt of duplicate tapes of banding records from Patuxent and the subsequent development and testing of data retrieval programs which we believe will satisfy about 95 per cent of the requests for data retrieval. The edited recovery file will be available in mid-August 1971 and we should be in a position to start filling the backlog of data requests by early September. A catalogue of the material available and instructions as to how to order the material have been sent out.

The final event has been in the area of non-consumptive use of migratory birds. The Canadian Wildlife Service is in a modest way subsidizing the various provincial nest record schemes, undertaking to store—as an adjunct to the banding office—a copy of all such records and transmit them to magnetic tape for easier data retrieval. A similar boost is being given to the breeding bird census. The first results of both the nest record and breeding bird census schemes have been reported in progress notes.

We are convinced that the systems approach to understanding migratory bird populations is essential. A first step is the upgrading of the knowledge of our officers engaged in migratory bird research and population analyses and, to this end, we have sent a number of our staff to the University of British Columbia for a two-week training session on systems modelling. The results have been highly satisfactory and we anticipate a substantial growth in our analytical ability to assess what is happening to waterfowl populations, and to predict trends or significant changes.

The operation and improvement of the surveys of the annual harvest of waterfowl are continuing and we expect that with the development of

an integrated waterfowl program for the service, with a strong input from biometricians, our interpretations of mortality of waterfowl will be much more accurate.

The economic value of waterfowl and indeed of all wildlife continues to be an elusive factor which we as managers must identify and quantify. To this end we have initiated a two-year, multi-disciplinary study with the University of Saskatoon for the purposes of assessing socio-economic values of the migratory bird resource in the prairie provinces.

We are convinced that many land-use problems will not be resolved in favour of wildlife and their habitats until governments are in the position to understand public social values about wildlife, and until a satisfactory economic price can be placed on the resource. It is true that there is growing public concern about the preservation of wild animals but this legitimate concern is most often expressed through individual appeals to ministers or to government agency heads to take action.

The strong public interest in the use of leg-hold traps or the harvest of young harp seals in the St. Lawrence is an example of a non-economic, social concern on the part of the public. We can expect such concerns to become more articulate and more powerful in the future. Nevertheless, specific decisions about the kind of use permitted in a given piece of land which has competing demands for it are still based more often than not on dollar returns. This is particularly true where very large industrial operations are involved such as those of the oil industry and those involving production of power or diversion of waters.

Our land purchases are continuing. In the 1970-71 fiscal year, we spent \$853,000 in the purchase of 4,800 acres. The bulk of the money spent, and the acreage obtained, was for land in Quebec, Ontario, and Saskatchewan.

Our mammal research in the national parks and in the two territories continues. The research

on the barren-ground caribou populations which the service has carried on since 1948 has largely terminated as there is now sufficient information available for the provinces concerned and the Northwest Territories to manage that resource on a co-operative basis. There are a number of problems still to be solved but these are more management-oriented and it is expected that the agencies with responsibilities for the resource will be undertaking that work.

Our polar bear study has been expanded in the Northwest Territories and now includes studies of western arctic populations as well as those of the high arctic.

Oil and gas exploration activities in the Arctic have necessitated work by service officers to provide advice to the Department of Indian Affairs and Northern Development. The arctic map series which delineates wildlife populations and their habitats has been published and distributed and it has received wide acceptance.

The Mackenzie Valley pipeline study has been initiated and we have obtained new resources to assess the impact of the proposed line on migratory bird populations in particular, but also on other wildlife species and their habitats. The Peace-Athabasca Delta study is proceeding well.

The proposed James Bay power development in Quebec will have an impact on migratory bird populations as well as other organisms and we must take steps to assess the significance of that impact.

I regret to say that anthrax has broken out again in the bison population north of Wood Buffalo National Park. The animals are under the jurisdiction of the Northwest Territories government but our pathologists have been providing professional advice and assistance in handling the outbreak. Its seriousness has yet to be determined fully but there is no doubt that it will set back again rational utilization of the species by Indians and sport hunters.

Our other pathology work is continuing in the

Yukon and Northwest Territories, in the national parks, and in migratory birds throughout Canada. This has yielded valuable information furthering our knowledge of parasites and disease conditions occurring in species such as caribou and reindeer, Dall Sheep, elk, or fur bearers and rodents. A major study of parasitic helminths in gannets is being completed. Our pathologists continue to work in close collaboration with other personnel of the service, of the national parks and of the territorial government—and often with personnel of other federal and provincial agencies, in matters relating to diseases in wildlife.

The limnology unit is concerned with the ecology of national park waters and the management of sport fishing activities in the national parks of Canada. Basic research is being carried out on primary production in Terra Nova National Park waters and on aquatic resources in Kejimikujik National Park. The Terra Nova Park program is nearly completed.

In the prairie national parks, an assessment of a large-scale restocking program with walleye fry is being pursued. The analysis of the angler harvest survey in Prince Albert National Park will be terminated soon. Routine surveys are being carried out in the mountain parks to follow up growth and survival of restocking with hatchery-raised trout. Research on the distribution and ecology of planktonic organisms, particularly copepods, and the physical-chemical characteristics of alpine and mountain waters is being continued.

The Wye Marsh Interpretation Centre, which you will be visiting tomorrow, is proving most successful. Public acceptance has been gratifying. Two other interpretation centres have been designed and construction will start this year. One is located at Cap Tourmente, which is positioned to assist a better public knowledge of the greater snow goose population, and the other is located at Percé on the Gaspé coast.

The purpose of the latter is to interpret the rich avifauna at Bonaventure Island, an extremely

valuable asset which the province of Quebec has recently announced it is purchasing. We are very pleased with that development for it will secure one of the most spectacular bird colonies in North America.

Our information program is continuing successfully. Three reports have been published since my last review and six additional titles will be going to press later in 1971. Three occasional papers have been published and it is hoped that before the end of the fiscal year two more monographs will be out.

We have published 21 new titles in the *Hinterland Who's Who* series bringing our total now to 33; we have at least six new manuscripts in hand. *Canadian Wildlife Service '71*, an 84-page review of CWS activities subsequent to our Canadian Wildlife Service '66 publication, will be off the press in about a month's time. *Pesticides and Wildlife*, a collection of popular talks on that subject, is being distributed to schools and other agencies and the general public. I believe you will be interested to know that a pamphlet on careers in wildlife management is being prepared.

Two major films of the service were scheduled for September television; the first titled *Atonement*, on the CBC network, September 12 at 10:00 p.m.; the second, *Death of a Legend*, dealing with the timber wolf, at the same hour on September 19.

An innovation we developed last winter was the creation of radio tapes featuring songs and calls of birds wintering in southern Canada, such as the chickadee and nut hatch. The listeners were offered literature on these species and on feeding birds. Public response has been good.

There are many other subjects I could mention in my review but time does not permit it. Before closing, a comment or two on this conference format would be appropriate.

The character of the Federal-Provincial Wildlife Conference is changing, from the days when it was largely devoted to migratory bird problems,

to a broader forum—for an exchange of federal-provincial views on a number of subjects in the wildlife field generally, for the exchange of views in the provincial forum, and to a forum where the quality of presentations and discussions has improved substantially over the last 20 years.

We have welcomed a number of new heads of provincial agencies this year, more I believe than any other time in the past. The problems facing all of us as managers of wildlife and their habitats are growing rapidly and are becoming increasingly complex.

As a group of responsible public servants dedicated professionally and personally to the science and art of good wildlife management in Canada, we must accept these new challenges and collectively develop co-operative mechanisms which will serve the public good and those animals under our trust.

Report of the administrative committee for polar bear research and management

A. H. Macpherson

The third meeting of the administrative committee for polar bear research and management was held here under the chairmanship of N. S. Novakowski of the Canadian Wildlife Service.

The purpose of the committee is to bring together the heads of game branches with responsibilities for managing polar bears in Canada, and of other agencies interested in the species. No fewer than six provinces and territories in Canada include arctic and sub-arctic coastlines inhabited by polar bears.

It may be a surprise to some of you to know that there are wild polar bears within 600 miles of Toronto. The polar bear is among the most impressive species of Canadian wildlife and hence attracts a great deal of interest from the Canadian public as a whole and also from abroad.

The committee had a lengthy agenda to deal with, including reviews of the status of research programs carried out by the Canadian wildlife Service and co-operating provincial and territorial wildlife agencies, notably those of Manitoba and the Northwest Territories.

Progress has been made on a broad range of studies, of movement, behaviour, food habits and numbers, and on the development of an integrated national system of pelt-tagging designed to improve management and control of the annual kill.

The polar bear interacts broadly with human interests, as a resource for subsistence hunters, a trophy for small numbers of sportsmen, as a rare and spectacular species for naturalists to add to their record books, and for the general public as typifying the wild and pristine state of much of the northern rim of most of the major continents.

Because a large portion of the polar bears of the world reside in Canada, the bulk of the research and management of this species is a Canadian responsibility. As a consequence, the resolutions of the committee range broadly in

their subject matter from problems of garbage disposal to questions of public attitudes, from purely local concerns to Canada's international relationships.

They were prepared by a sub-committee chaired by Paul Kwatorowsky, director of game management for the Northwest Territories, and read as follows:

Resolution 1

It is recommended that, whereas the Yukon Territory and Ontario have followed the lead of the Northwest Territories in requiring a tag for polar bear pelts, and whereas Newfoundland is now making untagged polar bear pelts illegal, that as soon as legislative action respecting the sealing of polar bear pelts for the control of marketing has been enacted by the remaining provincial governments, the chief game officer of that jurisdiction should inform all other governments within Canada through their game departments, and also the chief of the United States Bureau of Sport Fisheries and Wildlife.

And that each remaining province or territory make it an offence under its appropriate legislation to export or possess an untagged, untanned polar bear hide. 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 Royal Canadian Mounted Police.

Resolution 2

It is recommended that the Canadian Wildlife Service in co-operation with the provinces and territories embark upon a public relations program to inform the general public adequately in respect to the principles of game management and research objectives and goals, thereby eliminating to the largest possible extent the existing misconceptions and often unfounded concern for the survival of the various species.

Resolution 3

It is recommended that the administrative committee assume responsibility for writing to the federal Department of Public Works urging them to immediately relocate the garbage disposal site at Churchill to a more remote area such as Bird Cove, and there to continue the present practices of burning and burying, stressing that the cost of such action will be largely offset by savings experienced when the hauling of gravel from Bird Cove to cover the garbage is no longer necessary.

Resolution 4

It is recommended that because considerable confusion remains in recognizing the differences between family groups requiring maternal care, family groups bonded by unknown social relationships, and random groups of bears, and that under these circumstances considerable problems can be foreseen in the enforcement regulations prohibiting the killing of cubs or females with cubs, that jurisdictions also consider the establishment of summer closed seasons and establish protective measures for denning areas.

Resolution 5

It is recommended that, whereas polar bear management in Zone B includes several jurisdictions, and whereas rational polar bear management in this zone must be based on multi-jurisdictional research and planning, polar bear research in Zone B must be given top priority as a joint effort by Quebec, Newfoundland, Northwest Territories and the Canadian Wildlife Service.

Resolution 6

It is recommended that the Department of External Affairs through I.U.C.N. solicit the co-operation of all nations to consider a treaty controlling the hunting of polar bear on the high seas, such that any pelts taken on the high seas

be subject to tagging and reporting regulations similar to those applicable to polar bear pelts taken in any jurisdiction in Canada.

Resolution 7

It is recommended that the federal government, through the Department of External Affairs, forward letters to the major fishing and sealing nations that operate in Zone B, requesting them to refrain from taking polar bears until either the necessary data justifying such hunting is obtained or an international treaty is signed.

Resolution 8

It is recommended that prior to the next administrative committee meeting, each jurisdiction, other than the Northwest Territories, review and summarize existing laws or treaties in so far as they pertain to the kill of polar bears by natives, with a view to eventually exercising a more meaningful and regionally standardized control over the polar bear harvest.

Resolution 9

It is recommended that any jurisdiction in Canada contemplating the licensing of sport hunting of polar bear enact adequate legislation to ensure that the highest possible standards of sportsmanship are maintained, thereby minimizing public criticism of such programs.

Resolution 10

It is recommended that the administrative committee urge appropriate agencies to increase their research on the impact of exploration and drilling techniques on the ecology of the area in advance of actual operations, and that the Canadian Wildlife Service conduct further research and assemble additional data on ocean currents and ice movements and conduct research on how oiling affects a polar bear and also investigate methods of removing oil from polar bear fur.

Man and resources, 1973—Canadian Council of Resource Ministers

Henry Fletcher

What is the council?

The Canadian Council of Resource Ministers is an inter-governmental co-ordinating agency established jointly by the federal and the 10 provincial governments to further the orderly development of Canada's renewable resources. It functions primarily as a forum for continuous consultations between governments, facilitating the exchange of ideas and mutual understanding. The council also initiates studies, projects, seminars and conferences, as decided by the ministers.

What is 'Man and Resources'?

The council has decided that it will be timely to arrange a national conference in 1973, focusing on the problems of integrated resource management, and taking into account social and economic—as well as technical—factors relating to the environment.

The principal objective is: "to provide a national forum on the formulation and recommendation of guidelines to achieve and sustain an optimum balance of social, ecological and economic benefits derived from the natural resource base". Thus the intention is to promote a broadly based discussion which will bring together many different disciplines and viewpoints.

Background: Forces of change

We live in an age of unprecedentedly rapid change. All around us we can see evidence of social changes, changes caused by increased affluence and leisure, by continuously developing technology, and by the communications explosion which immerses us in "instant information". The speed of these changes is constantly accelerating; projecting the future is increasingly important.

Along with technological changes, there are also new perceptions emerging—a greater awareness of threats to the environment whether from population or pollution; concern for the quality of life which cannot be satisfied by material

affluence alone; a questioning of existing institutions; and moves towards participatory democracy.

These changes in society and in people's values mean that we must re-examine the ways in which we make decisions about man's relationship with his environment. The old patterns will not be adequate for the future.

The conference process

How will another conference help? "Man and Resources" is not just a one-week conference, but a continuous process extending through and beyond 1973. The keynote of this process is public participation at all stages, including formulation of the issues which will make up the conference agenda.

The participation of many sectors of the public is vitally important in terms of determining perceptions, attitudes, values and priorities. This is not simply a matter of increasing public awareness of the issues, and of raising the information base; it provides a positive means of dialogue between governments and people to secure improved policy-making.

The involvement of a wide range of interest groups—business, community organizations, educators, conservationists and many others—will ensure that no sectional interest is dominant, and most importantly will help in defining the system of values which is to underlie policy decisions.

The conference program

The program will be divided into five stages. First, the preparatory consultative phase in which governments and the council secretariat will contact a wide variety of organizations, to solicit views and encourage discussion. This phase will have as its highlight a national workshop in the fall of 1972, which will define the conference agenda. Secondly, there will be a study phase in which various issues requiring treatment in depth will

be examined by expert task forces. Third, in parallel with the first two, there will be a wide-ranging public discussion, both in the mass media and through the internal programs of organizations. Fourth, the conference itself will be a major national event. Finally, a continuing follow-up process will stem from the conclusions of the conference. In all of these stages there is room for participation by governments, by organizations, and by the public at large.

What will the conference talk about?

We don't know yet. The whole basis of the program is that the issues and agenda will be defined in a dynamic way out of the discussions. Some examples of topics to be discussed may be:

- Pressures of population on natural resources.
- The "true" economics of pollution abatement.
- Ground rules for development of the Canadian Arctic.

The effects of urbanization and technological change.

Human institutions for environmental management.

But the relative importance to be given to these and other questions will emerge from the discussion process. The final agenda will not be shaped until we can see which are the truly important issues in the view of the participants.

How will this concern me?

Whether you belong to a government or a non-governmental body, you can help the "Man and Resources" program in at least three ways:-

By actively taking part in the program in all its phases.

By helping to publicize the program in all media at your disposal.

By identifying the key issues you would like to have discussed.

We shall be more than glad of your assistance.

Report on the activities of Ducks Unlimited (Canada)

D. S. Morrison

1971 will again be a year of significant growth in Ducks Unlimited. To give you an idea of this growth pattern, and talking only in terms of budgets, in 1961 \$615,742 was spent in Canada. In 1971 we are budgeting for \$2,500,000 to produce 101 projects.

In British Columbia our emphasis again will be on the Leach Lake project of the Creston Valley Wildlife Management Area. Our work this year will complete the north and south dykes and bring the project under control to coincide with the effects of the Libby Dam.

We are intensifying our reconnaissance work in the Chilcotin which has similar habitat and problems as the prairies, and many projects should be forthcoming from this area in the future.

This year we have provided the provincial offices with a fund allocation to improve the waterfowl production potential on older Ducks Unlimited projects using such tested techniques as level ditches, nesting islands, etc. This program is operating under the auspices of our biologists.

In British Columbia these funds will be utilized to test a marshland ditching machine. This amphibious machine is designed to dig a channel six feet wide by three feet deep through aquatic vegetation. The machine is manufactured in California and if it proves successful will be another valuable tool for marsh management purposes.

We are very enthused about the direction our B.C. program is taking, under the auspices of our new manager, Bernie Forbes.

Our Alberta program continues to be the brightest star in our organization. Here the conflict between agriculture and waterfowl is less intense and in most areas our programs are compatible with the needs of the ranching community. In addition, the Alberta Water Resources Branch is extremely far-sighted and undertakes many water conservation projects.

We are participating with the Water

Resources Department, which is now part of the Department of the Environment, in a number of areas. Our participation is based only on the extent that the project will benefit waterfowl. For example, we have co-operated with them on the Three Hills project in central Alberta, where our participation is only one-third of a \$300,000 total cost.

By far the most interesting project being built in Alberta this year is the complex on Ribstone Creek. This creek channel is very meandering and subject to flooding during the summer; this flooding was detrimental to hay production. The local farmers asked the Water Resources Division to straighten out the channel by means of a ditch. Perhaps in past years this area would have been lost to waterfowl, but not so today.

The government approached Ducks Unlimited and asked that we put in check dams throughout the length of the ditch to hold the water in the spring and release it in the early summer—to benefit waterfowl and also improve hay production. In 1970 seven of these check dams were installed; 10 are planned for 1971; and in total we expect to have 40 or 50.

We are also co-operating with the CWS and the Alberta government by helping in gathering data on the Athabasca Delta, and our Manitoba provincial biologist has been transferred to Edmonton to undertake this work. Our report is to be in the Task Force's office by September 30, 1971.

Our Saskatchewan program will increase substantially in 1971 over the previous year, however, in terms of the job that needs to be done for waterfowl habitat in the "wheat province", we are still not operating at the level we would like to see. Our major program in the province will centre in the Beaver River area in the northwest.

In addition we will continue to work on the Wetland Reservation program. This is a very interesting program and one where we attempt to have the lessees or the owners of land set aside

waterfowl habitat as a water conservation area. In 1970 a pilot program was undertaken. One hundred lessees were interviewed and 39 signed agreements, encompassing four complete marshes and 2,500 acres of prime habitat.

In Manitoba our major emphasis will once again be in the Mawdesley—Tom Lamb Wildlife Area northwest of The Pas. In 1970 we installed a 38,000 gallon per minute pumping installation, which is designed to lower the water levels on 16,000 acres. This is our first large scale try at manipulation of water levels by other than gravity means, and we are very interested in the outcome.

We expect to lower the 16,000 acres in a six-month period. By the end of 1972 we will have invested \$750,000 in this project. We are unable to bring the full area under control as a large portion of it is affected by higher than anticipated water levels on Moose Lake, just north of the project.

In 1968 we began to pay increased attention to the Interlake Region and this area is producing excellent results for us. Many of our projects are designed to keep wind tides and carp out of the Lake Winnipeg and Lake Manitoba marshes. We are also investigating the Marshy Point area, the home of the famous Murphy goose flock, as a possible development site.

A highlight of our total program for this year will be the inauguration of our Maritimes operation. This office is located on Church Street in Amherst and is staffed by Donald Black, project engineer from the Maritimes Marsh Reclamation Agency. Later this year an appointment of provincial manager will also be made, and possibly a biologist. We are very happy to be in the Maritimes on a full-time basis.

This year you will also begin to notice a distinct change in the public relations policy and programs of Ducks Unlimited. We have added an agriculturalist to our staff, who has a background in writing for farm publications, and we

will begin to aim our public relations activities at the Canadian landowner.

It remains a curiosity to me that we have never done this before, when this group is so important to our programs. We feel that we have neglected the Canadian landowner and that we have not fully told him of the benefits that our water control program can bring to him. In general, I believe many conservation organizations have not included the landowner in their programs and plans, and this is part of the reason for the alienation that the landowner feels towards conservation agencies.

We are also producing a film which will depict what Ducks Unlimited (Canada) does for the Canadian landowner and the environment of our country.

Gentlemen, thank you for all your help in the past. We will again require the co-operation of each and every one of you to carry out our programs. The responsibility for the waterfowl resource rests with you. The field of game management is becoming extremely more complex with loss of habitat being only one factor. Newly recognized factors such as pollution and anti-hunting feelings are forces to contend with.

Hopefully we at Ducks Unlimited are helping you with the waterfowl habitat situation. As long as we have this co-operative approach we are fulfilling our responsibility to the resource and to the citizens of our country by obtaining the maximum benefits possible.

Progress, Wildlife Sector, Canada Land Inventory

V. E. F. Solman

At federal-provincial wildlife conferences in the mid 60's, there was discussion about the possibility of conducting a wildlife capability inventory of the settled area of Canada, approximately a million square miles. We are now approaching the termination of that inventory.

Two years ago, at the Edmonton conference, I showed you the first examples of published wildlife capability maps. The number of published coloured maps has now reached 66. The mapping program is now complete for some of the wildlife sectors in a number of provinces. I have a summary of progress which is for examination at your leisure. In it you will note that the waterfowl inventory is more than 90 per cent complete, the ungulate inventory almost 70 per cent, and the sportfish inventory, which started later and involves only six provinces, more than 40 per cent complete.

At the present rate of progress mapping will be complete in the wildlife sectors by the end of the present fiscal year. The production of the published coloured maps at a scale of 1:250,000 takes much time after the maps are prepared. We hope that most of the maps at that scale will be printed and available for distribution before the end of 1973.

The published maps are available through Information Canada, at 35 cents a copy and are selling well; that suggests growing public interest in wildlife capability information. To provide a broad overview, we plan also to publish maps in all sectors at a scale of 1:1,000,000. Some maps have already been prepared and publication will begin soon.

Land capability maps are produced to serve many purposes in addition to informing the public. A major objective is to provide data for planning to make more efficient use of Canadian lands. As Canada Land Inventory data become available, they are being used more and more by planners.

So you may understand more about the use of that kind of information in the planning

process, we have arranged for a seminar on that subject and you may participate in a discussion of the way in which wildlife and wildlife capability data can fulfill some of their most important functions.

As Mr. Shaw mentioned earlier, the Department of the Environment includes a Lands, Forests and Wildlife Service. The Canada Land Inventory is a part of the Lands Branch of that service. That change strengthens the long association between the C.L.I. and the Canadian Wildlife Service.

The search for a solution to lead poisoning in waterfowl

D. G. Dennis

Lead poisoning of waterfowl has been recognized for more than a century. Next to the direct kill by hunting it is probably one of the most important unnatural causes of waterfowl mortality.

Annual waterfowl losses due to lead poisoning have been estimated to be between two and three per cent of the population. Therefore more than one million ducks, plus lesser numbers of geese and swans, are wasted annually.

Each year several thousand tons of lead pellets are deposited by hunters in waterfowl habitat. Lead shot accumulates on favoured hunting areas and marshes where it is available to feeding waterfowl. Birds pick up the pellets while feeding and, if an adequate number are retained in the gizzard, death eventually occurs.

The frequency and the magnitude of lead poisoning is influenced by several factors—the number of birds using an area, the kind and amount of food available, the amount of lead shot present, and the availability of shot within the habitat.

During the early 1960's, waterfowl numbers declined well below the peak levels of the 1950's and thus unnatural drains on the resource, such as lead poisoning, assumed greater importance. Research to eliminate lead poisoning was initiated in 1966 by the Flyway councils, federal and state game agencies, the ammunition industry and Canadian wildlife agencies.

Lead has long been recognized as the ideal substance for shot in sporting ammunition. Other elements or compounds (with the exception of precious metals such as gold) do not offer physical or ballistic characteristics similar to those of lead. Therefore the initial research involved attempts to develop non-toxic lead compounds as well as various coatings that could withstand the grinding action of waterfowl gizzards.

The results were unsatisfactory in that non-toxic lead compounds seemed difficult if not impossible to develop, and the toughest man-made coatings such as "Teflon" plastic could not withstand the repeated grinding action of the gizzard.

The search then turned to substitute metals such as copper, nickel and iron. Iron was eventually selected for further study because of its low toxicity and apparent low cost of production. Waterfowl shooting tests were conducted at the Patuxent Wildlife Research Center in Maryland using specially manufactured iron shot at ranges designed to simulate field conditions. Results of the tests showed that iron killed ducks as effectively as lead at normal hunting ranges. However, development of economical manufacturing techniques for the iron shot still poses a problem.

The shot used in the Patuxent shooting tests were produced one at a time by forming dies with soft iron wire as the raw feeder material. An additional problem that as yet has not been solved is shotgun barrel damage. Even though the shot tested were annealed and were made from the softest iron available, choke expansion occurred.

The Canadian Wildlife Service co-operated with the United States authorities in the initial search for a solution to the lead poisoning problem. In addition a separate but complementary program was initiated in Canada in 1968. The agencies currently involved in the present Canadian program are the Canadian Wildlife Service, the National Research Council of Canada, the Canadian Armaments Research and Development Establishment of the Department of National Defence, the Steel Company of Canada, International Nickel Company of Canada, Canadian Industries Limited, Cominco Limited, the Ontario Waterfowl Research Foundation and the Ontario Veterinary College.

The first project done under the Canadian program consisted of testing various coatings and lubricants on iron and nickel pellets in an attempt to reduce the problem of barrel wear. It soon became evident that the real problem with the harder shot substitutes was not barrel wear but choke deformation.

The initial tests with soft iron shot conducted by the National Research Council showed a 20 per cent increase in the diameter of the choke portion

of the barrel after firing 100 rounds. Tests on the shells containing the soft iron used in the killing tests in the United States indicated 10 per cent choke expansion after 40 rounds had been fired.

A current program of the National Research Council involves testing the effects of pellets of various hardness on gun barrels. Pellets ranging in hardness from standard lead shot to soft iron will be test-fired in shotguns so that life expectancy tables for shotgun barrels based on pellet hardness can be prepared. Further research into alternative pellet materials will be based on those results.

The Canadian Armaments Research and Development Establishment (CARDE) has co-operated in the program by testing ballistic characteristics of all shot shells used in the barrel testing studies. They have developed a shot shell ballistic testing range where commercial ammunition has been fired to provide central data for comparison with the various experimental shells. CARDE has the facilities to measure pellet energy and in addition is able to develop and test new concepts and propellants in shot shells.

In making the shot for the wear tests, the National Research Council is employing an agglomeration process. Iron and lead dust are combined in varying amounts to produce the range of hardnesses required. Because of the difficulty in developing a process to produce iron shot as soft as lead, or at least soft enough not to damage a gun barrel, it is possible that agglomerated pellets of iron and lead may be a reasonable alternative to lead shot. In an aquatic environment the iron would be oxidized leaving only small particles of lead.

Rather than wait for the results of the barrel-testing phase, a research program involving the effects of particulate lead on the environment and on waterfowl was initiated by our service in 1970.

The Ontario Waterfowl Research Foundation, an incorporated non-profit organization in Ontario, was asked to submit a research proposal on the effects of particulate lead on waterfowl and the

environment.

The program initially submitted was divided into three phases: 1. the ingestion of particulate lead by waterfowl; 2. the solubility of particulate lead in marsh waters and 3. the assimilation of lead by the marsh biota and its implications to waterfowl and waterfowl food species. The program is being directed by Lars Karstad of the Ontario Veterinary College and phase one has now been completed by a graduate student, James Irwin.

The initial findings indicate that wild mallards can be exposed to an equivalent of 10 times the average maximum concentration of lead shot in North American marshes in the form of particulate lead without showing signs of lead poisoning. (Average maximum concentration is one pellet per square foot).

Birds exposed to 50 times the average pellet concentration have shown no outward signs of lead poisoning; however, blood tests show significant lead absorption by some birds. The initial results indicate that the particulate lead shot merits further consideration.

A most interesting by-product of phase one of the particulate lead study was the discovery that birds exposed to 100 pellets per square foot, in the form of lead dust, showed virtually no clinical signs of lead poisoning after two months if fed commercial duck pellets. Birds fed whole corn at the same lead concentration succumbed to lead poisoning within an average of 22.5 days.

It has been a well-documented fact that waterfowl on a corn diet are exceptionally vulnerable to lead poisoning. Most workers thought that the more intense poisoning was caused by the gizzard grinding up the lead pellets more quickly when the birds were fed whole grain. Clearly this is not the case and it appears that some nutritional deficiency of corn may be involved.

Selenium, an element with many metallic characteristics, was present in the commercial duck pellets at about 40 times the concentration in whole corn. Dr. Karstad observed that some of the internal lesions that occur in lead-poisoned

ducks closely resemble those that occur when selenium and/or vitamin E is deficient. He plans to conduct further research on the relationship of selenium and other dietary factors to lead poisoning.

If selenium turns out to be the key, then another potential solution to the problem exists. Lead and selenium could be combined in the appropriate quantities to produce pellets that, if ingested by waterfowl, would offset any dietary deficiencies and lead poisoning would be largely avoided. Excess levels of selenium may be toxic however, so it would be necessary to regulate carefully the

amount added to the shot.

In summary, recent work has been directed along three main avenues in an attempt to obtain a solution to the lead poisoning problem. All three have some minor or major disadvantages that are not present with the current lead shot.

I believe that it should be emphasized that in the interests of ensuring that the waterfowl resource will not be further harmed by lead poisoning, we may have to accept a substitute shot type that is not quite as acceptable as lead shot from the sportsman's and/or the industrial viewpoint.

The pelican—protection or extinction?

K. Vermeer

Twenty-six nesting colonies of white pelicans, ranging from a few to more than 2,000 nests, are known in Canada: 24 in the prairie provinces, one in British Columbia and one in Ontario. The location of 25 colonies on lake islands and one on a river island apparently provides a nesting habitat relatively free from such predators as coyotes and foxes.

These predators occasionally remain on the larger nesting islands after the lake ice thaws in spring. During 1970 a family of foxes remained on a Primrose Lake island, in Saskatchewan, which contains Canada's largest pelican breeding colony. Failure to raise young there was almost total, partly or wholly because of disturbance by the foxes (Blokpoel, 1971).

Mammalian or avian predation on pelican eggs and young is a natural calamity which has undoubtedly occurred on many occasions in the past. Much more serious is man's threat to their existence. In the two last decades at least 10 colonies have disappeared from Canada, because of direct human interference or because of habitat changes made by man. As recently as 1970, fishermen disturbed a large nesting colony at Suggi Lake, Saskatchewan, causing the pelicans to desert it.

Although pelicans are migratory birds, wintering in the southern United States, they are not protected by the federal Migratory Birds Convention Act of 1916. Their exclusion from the Act may have been due to the erroneous belief that they consume large quantities of economically valuable fish. In most cases pelicans feed primarily upon fish of little or no commercial value. The Migratory Birds Convention Act has not been changed to protect the pelicans chiefly because it was assumed if this was done the Act's original intent would be overlooked.

White pelicans are supposedly protected by provincial statutes, but provincial stewardship has not prevented many colonies from disappearing because of human interference. The following incidents support this view.

Carson (1966) found a white pelican colony at Suggi Lake completely destroyed by fishermen in 1964. He then reported his findings to an official of the Saskatchewan Department of Natural Resources. Carson reported (1966:97):

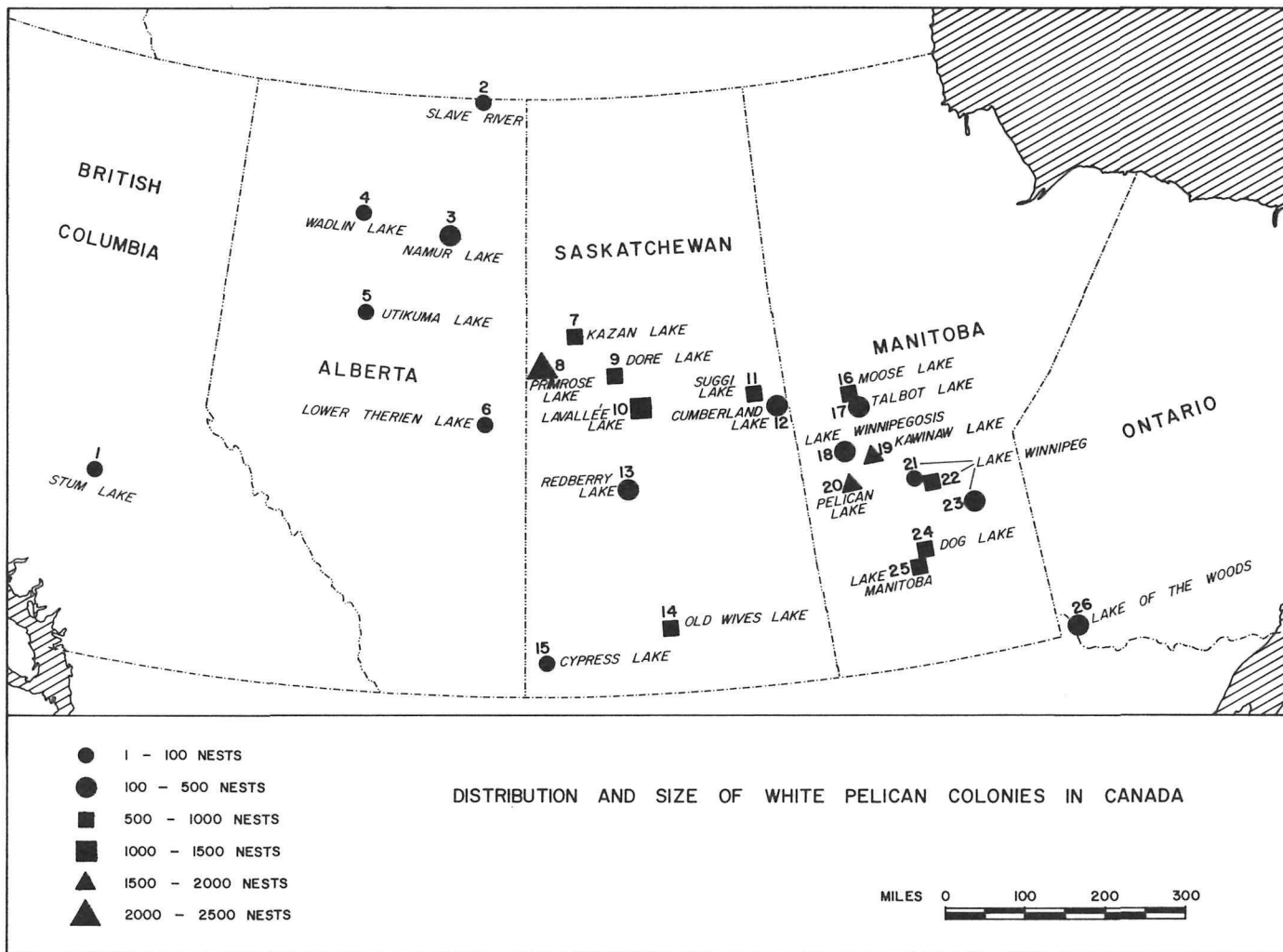
"Upon my return to headquarters at Regina, a Department of Natural Resources official, who was directly in charge of the northern area at that time, was contacted in the hope that official action would be taken for the following year in order to prevent a re-occurrence of disturbance of the colonial birds on the island. In his reply to me, this official condemned the pelicans as a serious menace to the fishing industry and further stated that no sanction would be given to the birds."

In Manitoba the white pelican colony at Pipestone Rocks in Lake Winnipeg is now endangered because a company filed a mining claim on the island.

In Alberta, Soper (1957) sought protection for a pelican colony in Newell Reservoir. This was not given and the nesting population dwindled from 157 nests in 1951 to 27 nests in 1966 and none in 1967. Alberta now has only one pelican colony of more than 100 breeding pairs at Namur Lake where its existence is endangered by the possible establishment of a fishing lodge.

Protection of the white pelican is considered unnecessary because the species has no monetary value. Such an attitude would lead one to question the value of many other migratory birds. White pelicans attract tourists to various parts of the country, but more important they are indicators of contaminants in our environment. DDE concentrations of two to six parts per million in white pelican eggs are closely correlated with a decrease in eggshell thickness of those eggs. Thin eggshells can lead to breakage and hence to egg mortality.

One white pelican colony is protected in Prince Albert National Park. Two colonies are within federal migratory bird sanctuaries, but even here, control of activities may be negligible. For



example, in Alberta the federal government does not own most of the land on which sanctuaries are established. Consequently, some of them have become resort areas, golf clubs, city parks and even garbage dumps.

Moreover, many federal sanctuaries turned over to the provinces were never cancelled by federal Order in Council and are, therefore, orphans in that neither government is interested in them. In the United States the National Wildlife Refuge system provides good protection to most white pelican colonies.

Many islands on which white pelicans have located their colonies belong to the provincial government and special protection for these would require little money. If the pelican colonies are not protected immediately, so that fishermen and boaters are compelled to leave the

birds undisturbed during their nesting period, man will soon be unable to enjoy the sight of white pelicans soaring majestically against blue prairie skies.

Blokpoel, H.

1971. *Fox predation on a bird island.*
Blue Jay 29(1):32-34.

Carson, R. D.

1966. *Destruction of colonial birds on an island on Suggie Lake.*
Blue Jay 24(2):96-97.

Soper, J. D.

1952. *Protection of wildfowl breeding grounds in the Lake Newell Locality, Eastern Irrigation District, Alberta.*
Canadian Wildlife Service 26 p.

The CWS Interpretation Program

R. Y. Edwards

Introduction

Your life and mine are filled with contradictions and paradoxes that are routine and accepted without question. Labels cause the most trouble. The “freeway” through my town is the slowest way to the office in the morning; the “quality of our lives” is revealed to statisticians by how much water we waste, especially via our toilets; and the apple known as “Delicious” is the most tasteless apple on the market.

A problem that I live with daily is that my business of involving people with their living, fascinating world is saddled with the dull and colourless name “Interpretation”. But none better has appeared, for “naturalist program” is as vague a term, and “outdoor education” is education, not interpretation.

We seem to be stuck with a stuffy word. Perhaps the solution is to “unstuff” the word by simply having our program give it a new image.

What is interpretation?

Interpretation gets its name from being a method to “interpret” to people the language and knowledge of science and technology. But it is also a lot of other things, depending on how closely you look at it. Its parts are simple enough, but the sum of its parts is complex, because there are a lot of those parts.

As a general description, think of interpretation as a communication system that can use any appropriate method of communication, but it is communication that has two essential characteristics. First, interpretation communicates about real things that must be right there adding to the message “in person”; second, interpretation aims at introduction, at inspiration, at motivating its audience to seek more information.

To put the matter more candidly, it seeks “to turn people on” so they become involved. It stops short of depths approaching education. Interpretation concentrates on opening doors into minds, and it lets things tell their own stories, com-

municating first-hand information by just being right there.

Interpretation aims at giving people new understandings, new insights, new enthusiasms, new interests. Not everyone gets the message of course, but it is successful often enough that working at interpretation can be an unusually rewarding occupation.

A good interpreter is a sort of pied piper, leading people easily into new and fascinating worlds that their senses never really penetrated before. He needs three basic attributes: knowledge, enthusiasm, and a bit of the common touch.

The two requirements of interpretation that distinguish it from information and education are also its strengths. On-site communication—talking about a Douglas fir with a fir right there—is first-hand experience. Most communication these days is second-hand experience, whether via schools, radio, books, newspapers, television or conversation.

The advantages of interpretation are that in our man-made worlds of fakery and unreal things, people are hungry for first-hand experience; and that in seeking only to open the doors in people’s minds, leaving other sources to fill up the spaces inside, interpretation concentrates on making converts, not experts.

What good is interpretation?

This sort of question about anything usually leaves me groping for words. How do you cope with such complete lack of understanding? Here I asked the question of myself because I wanted to see how convincing I could be.

Interpretation has been a service mainly associated with parks—national parks, state and provincial parks, and municipal parks. The term “park interpretation” is in many minds a generic term for this approach to communication with the public. Most people who have experienced interpretation have done so in parks.

The method evolved, matured, and became

popular in the United States National Park system beginning about 1920, and in the past 20 years has spread abundantly throughout other park systems in North America. More recently it has taken root in Great Britain, Australia, and New Zealand.

Without doubt the remarkable strength and popular appeal of large parks today in the United States and Canada is the result, in part, of the years of pleasure and inspiration that park interpretation has given to millions of people using parks. The method of interpretation that evolved through 50 years of trial and error is completely effective at involving people with the land.

Oddly enough, park people have been the only land managers to carry their story to the public via widespread interpretation programs, yet the methods evolved in parks are available to other resource managers for equally effective communication. With North America swarming the highways every summer, seeking hungrily for new experiences, one wonders that the opportunities have been ignored by people in forest management, mining, water shed management, agriculture, fish management, water storage and hydro projects, and other fields that are suitable.

Many resource fields talk at the public, but they use the traditional media, joining the second-hand information methods dominated by soap, deodorants and how to be suddenly shapelier—where the din is so loud that it is nearly impossible to be heard. The usual communication media are very costly, highly competitive, and in the resource field not very effective. Cornflakes fit into a video tube, but a managed forest doesn't. How can so small a window show the space and mass vitality that is the very essence of understanding a marsh, or a lake, or a forest?

Resource managers outside of parks are now beginning to experiment with interpretation. I have seen several timid programs by forest products firms in Washington State, in California,

and in Quebec. Someday someone who can do something about it will realize that interpretation and forestry were made for each other. What more dramatic, well-rounded ecological story of man and nature than a well-managed forest?

One of the best bits of interpretation I have seen was done by people, I suspect, who were quite unaware of interpretation as a communications system. The Bennett Dam on the Peace River was under construction; high on the lip of the canyon, overlooking the construction far below, was a small building, its windows giving a superb view of the action, its interior comfortably filled with lucid models and diagrams explaining the show and its full plot from start to finish. Buses on regular schedule took you right into the action.

It was beautiful interpretation creating understanding and involvement, while the scale of the show helped with the inspiration and revelation that interpretation strives for. And it is not sour grapes, but just the way it was, that as an engineering story it had a straightforward message that could be simply told. This natural simplicity was what gave it special effectiveness.

So what good is interpretation? I suppose the answer is simple enough. It is outstanding at communicating understanding to the public about natural resources, their structure, their ecology, their management, and their values.

The CWS plan

In 1967 the Canadian Wildlife Service entered the interpretation field convinced that a major need of wildlife preservation and management was an informed, involved public. The great strength of wildlife as a resource in competition for money and space is that people like wildlife. It is no accident that baby seals can cause an international uproar, that a bear by the highway can cause a traffic jam, or that Point Pelee every spring is crowded with people who have come to see birds. People "dig" wildlife. Interpretation is

a logical way to deepen and broaden such public interest.

The CWS interpretation plan aims at establishing a wildlife interpretation centre in each biotic region of Canada. These regions, from east to west, can be variously defined, but our labels for them are: Atlantic Coast; Maritimes Forest; Hardwood Forest; Canadian Shield; Prairie; Mountain Forest; Mountain Tundra; Great Basin Desert; Fraser Delta; and Pacific Coast.

Each should have a major centre. In addition, there will be smaller, more seasonal centres serving the public need on national wildlife areas and at wildlife spectacles of national importance, such as the world famous seabird colonies on Bonaventure Island in the Gaspé. To increase their effectiveness, major centres may look after signs or outdoor exhibits at stops-of-interest beside highways or in other suitable places outdoors frequented by the public.

These interpretation facilities will tell the total story of the Canadian landscape, specializing of course in the land that is close at hand. By "total story" I mean ecological story. Any idea that begins with spreading an understanding of wildlife is doomed to failure if it just stays with wildlife.

A robin is not, like a porcelain figure on a shelf, a complete thing in itself; a robin is a living breathing node in an ecological web of some size and complexity. To understand a robin there must be some understanding of the ecological forces that support it—or erase it. So to talk of robins is to talk of trees and weather, of lawns and earthworms and 2-4D, of cherries and cowbirds and maple trees and insects and migration, and men doing many things. So the CWS wildlife centres will of necessity have a general ecological message, but with heavy emphasis on wildlife.

Our thinking began with interpretation oriented mainly toward tourists, much as is park interpretation in federal and provincial parks. But when our first centre opened near Toronto,

we had already felt heavy pressures from quite another sort of audience. School boards were literally lining up to use the centre. This put a new dimension on the program and gave wildlife centres the opportunity to communicate for 12 months instead of four.

So we set up a year-round service for groups available by reservation; with school groups the main users of this service, our first centre is quite unable to meet the demand, except in summer holidays, and except in mid-winter. We are confident that we can erase the winter lull, if we want to. To date we have used mid-winter to write, create, and hammer together exhibits, signs, and other interpretation facilities, for we believe that top quality comes from doing it ourselves.

Why CWS interpretation?

To become philosophical for a moment, the basic reason for CWS entry into interpretation seems to be that most Canadians know very little that is important about their wildlife resource. This is a worsening condition.

As more Canadians become urbanites and as our cities become larger and spread longer urban shadows across their surroundings, most Canadians are in danger of total unawareness of why the hinterlands are important. A nation dominated by urbanized ecological illiterates is on a sure road to disaster. Wildlife is the most vulnerable component of land to improper landscape management, so concern for this social trend is understandably great in wildlife circles.

I suppose you can sum this up by saying that in a democracy, urban citizens ignorant of their ecological role on the landscape are not going to make the right decisions at home, in the office, or at the polls.

To me personally, the CWS interpretation plan had one great, new dimension that lured me off my Pacific Island. Most interpretation to date has been in parks, and quite properly the story there is preservation of the wild terrain. The

CWS story is about the face of Canada, with man and his activities a major influence on that face. This is new, this is therefore a unique challenge, and this is interpretation finally facing its full potential to involve people with their land.

How is interpretation done?

Perhaps the easiest way to explain how we interpret is to describe the program at Wye Marsh Wildlife Centre. Your initial experience there is an approach to a building while passing some outdoor displays. Inside, a movie or slide show introduces the land outside the building, and a display hall motivates people to go outside to see the real show.

Outdoors on the landscape there are trails, signs, outdoor displays, self-guiding nature trails, a window looking into the water of the marsh, a boardwalk giving access to the centre of the marsh, trained staff to answer questions, spontaneous talks and demonstrations by the staff, and regular guided walks through surrounding lands.

We also offer helpful literature for use outside on trees, flowers, birds, tracks, and other subjects. Guide books are sold. We also offer special lectures, special films and slide shows, seasonal displays, space for appropriate meetings, space and facilities for workshops and courses of study.

We plan to have public elevated platforms overlooking the marsh; literature or tape cassettes to encourage the exploration of nearby Ontario; and more winter use of the marsh and its environs by school children, since we believe that most Canadians are ignorant of what winter is really like. Our vaguer plans are many but perhaps the picture is now sufficiently complex.

We charge for use of the building. At 50 cents per adult, we suspect we could have tourists paying for our summer operation by 1975. We are encouraging a slow rise in attendance so we can learn to keep nature intact near the building

in spite of all the trampling feet. We charge groups as well, but at present we have no plans for groups to pay their way. In fact, we wonder if summer visitors should. After all, we have an important message, and we know we have more effective contact with people than has most give-away literature flowing from most public agencies. We do not have as much volume but we are confident that we lead in effectiveness.

When I came to Ottawa to launch this program Expo was in flower and everyone had Expomania. Everywhere I was told that Expo had shown the way, and that I was expected to turn people on with Expo methods. It was a tough fight, but I seem to have outlasted these pressures.

Expo was terrific. It was lights and images and projectors and canned sounds and architecture. It was fast-paced, at times almost a pathologically exciting experience. It was also just that. It was an end in itself, and it was a stupendous in-turning of man upon man. I can think of few more ineffective ways to interpret the landscape than to use Expo methods.

Everything we do to people in interpretation is aimed at pacing them with nature while sharpening their senses and opening their minds so they will look with new understanding on a tree, a leaf, a bird, water, and a great sweep of not very active looking land. The last thing we need is a prior experience of audio-visual frenzy before we take them into the peaceful green world. Most of them are already wound up too tightly to get our message easily.

Future centres

The general plan has been outlined, so I will add here a more specific account of places currently high in our interest.

Wye Marsh Wildlife Centre, 90 miles north of Toronto, at Midland, Ontario, is alive and well with a staff living in frantic activity. This centre is on land donated for interpretation purposes by the Ontario Department of Lands and Forests,

and Wye Marsh itself is owned and managed by that provincial department.

We have approval and funds to build a centre on our Cap Tourmente national wildlife area, about 25 miles east of Quebec. This centre will feature the greater snow geese which are there in numbers in spring and fall.

We have approval and funds to build a centre at Percé, in the Gaspé, to feature the Atlantic Coast in general and the seabird colonies of Bonaventure Island in particular.

A major wildlife centre building is designed for Last Mountain Lake national wildlife area in Saskatchewan.

Across Canada we have chosen other high priority areas, all tentative:

The Chignecto Isthmus, at the head of the Bay of Fundy, on or near Tintamarre national wildlife area.

The Fraser Delta near Vancouver, to feature wintering waterfowl.

The Okanagan Valley in British Columbia, to specialize in the Great Basin desert conditions found there.

The Ottawa region where a national story of national wildlife should be told. This centre would of necessity involve more information, less interpretation, than other

centres, so here the Expo enthusiasts, including me, might have their day.

The list ends here, with some important and exciting site possibilities unlisted.

The CWS interpretation program is off the ground and flying. Because of austerity it has built up only limited momentum through the past four years, but the two Quebec centres will almost put it back on schedule. In the meantime, using our one large centre as a guinea pig, we have been aiming at increased effectiveness from realistic costs achieved by avoiding the inflexibility and overhead of commercial audio-visual and exhibit producing services.

We do it ourselves, and this also lets us be spontaneous in our approaches to the public. Spontaneity is essential to good interpretation.

Last Words

I want to end on a philosophical note, and both time and words have run out. So I stole these final words from someone else because they summarize my thoughts on what interpretation should try to do:

"The one miracle is to bring Man down from the clouds of his egoism and replace his passion for destruction with the desire to understand."¹
¹*James Oliver Carwood, source otherwise unknown.*

Remarks made at the conference banquet in recognition of the retirement of Dr. C. H. D. Clarke J. S. Tener

Mr. Minister, honoured guests, ladies and gentlemen:

I have a duty which is a great honour and privilege to perform. There is an individual among us tonight to whom we all want to pay tribute.

Through a long and distinguished career, he has been:

- a seasoned arctic traveller in the early days when the Arctic was still an unknown wilderness,
- a productive museum researcher,
- a national parks biologist,
- a former governor and still Fellow of the Arctic Institute of North America,
- President of the Wildlife Society,
- adviser to the Kenya Government under CIDA auspices on wildlife management policies, legislation and programs.

He is an outstanding naturalist,

- a commissioner of the Great Lakes Fisheries Commission,
- a linguist,
- the author of *many* papers,
- the possessor of a photographic memory which has entertained and instructed us all.

He has a world wide grasp of vertebrate zoology,

- a deep sympathy for and perception of indigenous peoples and their problems, and indeed all people,
- a down to earth practical philosophy on wildlife management.

All of his accomplishments have contributed to placing him as one of Canada's, and indeed one of North America's, outstanding leaders in the wildlife management profession.

He was also formerly chief of the Fish and Wildlife Division of the Ontario Department of Lands and Forests.

Dr. C. H. D. Clarke.

Doug, on behalf of your many old friends and colleagues, of the innumerable people you have helped to get started in the wildlife field, both Canadian and non-Canadian, and on behalf of all of us here, may I present you with this testimonial as a token of our high esteem and affection and wish you Godspeed and good health in your new career.

The inscription reads as follows:

Presented to
Doug Clarke
a writer, colleague and friend
narrateur et raconteur, hors pair,
in recognition of his outstanding contributions
to the philosophy, science and art
of wildlife management in Canada

Federal-Provincial Wildlife Conference
Toronto
July 6 to 8, 1971

Good Luck.

Land use and the planning process

J. W. Maxwell

A recently released publication forecasts that "within the next three decades, Canadians will likely have to create more urban residences, more commercial and industrial facilities, more hospitals, more parks and recreation areas, more transportation facilities and more power and other utilities than have been created in the entire history of our nation" (J. W. MacNeill, *Environmental Management*, Information Canada, 1971, pp. 85).

When we survey the impact of past development on our urban, rural and wilderness areas, we cannot help but be apprehensive about the consequences that may be in store for us as this incredible pressure for development begins to imprint itself on our life-styles and landscapes. Will it mean that the present phenomena of urban sprawl, increasing pollution and massive exploitation of our natural resources for single purpose objectives will be compounded and present even more intractable problems?

This is a real possibility unless we take more concerted action to direct the form that development activity takes on our land. To do this, we must ensure that larger segments of our society, including key groups such as your own, develop a full understanding of the processes that determine how our land resources are used. Only by understanding these processes will we be able to influence them.

As I understand it, my job on this panel is to present a summary overview of some of the processes and issues involved in land-use development and planning. In a few minutes, only a generalized and superficial statement on the determinants of land use and on the application of planning concepts to land-use development can be given. Hopefully, we can air some of the points in more detail in the ensuing discussion.

I have chosen to address three questions. These are: What factors determine how land is used? Why do we need land-use planning? How may we develop a more effective land-use planning process?

The determinants of land use

No one factor establishes what kind of use will be applied to a given piece of land; rather a combination of variables determines the use. Factors such as topography and drainage, soil fertility and texture, growing season and effective precipitation can be important land-use determinants. But so can other factors such as the size and location of markets, transportation costs, credit availability, tariff policies, technological innovation and consumer tastes. The legacy of past land-use development, including existing land-use patterns, land survey and title registration systems and tenure structures, can also be significant factors, as can be public policy on land-use development.

For the purpose of general discussion, it is convenient to group these many land-use determinants into three classes: physical, economic and social.

Physical determinants

The physical determinants of land use include those characteristics of land that are determined by *physical location*, for example, climate and geology. By physical location is meant the position of any piece of the earth's surface in relation to the equator, the poles and the oceans. The characteristics of land that are based on these fundamental relationships are, for the most part, fixed and immutable in terms of man's planning horizon. It is they that largely determine the life systems and basic ecological characteristics of any given area. They present both opportunities and constraints to man's land-using activities.

Economic determinants

The economic determinants of land use include those many variables that enter into production functions and determine supply and demand schedules. Unlike the physical land-use determinants, the economic factors are very dynamic. They reflect man's ever changing needs and values, and his increasing ability to utilize the

land's physical endowments to satisfy his demands.

The ability of any land-using activity to compete for a specific parcel of land is determined largely by the activity's profit potential. Because the ratio between costs and profit differ greatly among different land uses, their ability to compete for given land units also varies greatly. Moreover, the profit potential of any particular land-using activity varies with location. Thus, the relative location of land parcel, i.e., its accessibility to markets, resources, etc., in terms of time and money costs, is an important determinant of land use. In many cases it is the relative location of a parcel of land that is the chief determinant of its use, not the natural qualities of the land.

Social determinants

The social determinants of land use include those public policies which, through controls or incentives, influence how land may be used. Also included are those interests, goals and capabilities of owners of rights in land which influence the manner in which these owners utilize their rights.

Public controls over private land use, such as zoning and building codes, are representative of social land-use determinants. Public expenditures for industrial incentives, national and provincial parks, wildlife sanctuaries and farm consolidation programs also belong in this group of land-use determinants.

Like the economic factors, the social determinants of land use also change through time in response to the changing needs of society.

The need for land-use planning

The land market and its imperfections

In our society the most important mechanism used to organize the interplay of the factors determining the use of land is the land market. In theoretical terms, a perfectly operating land market should result in all lands being allocated

to their "highest and best use", i.e., the use which provides the highest possible social returns to the community at large, as well as to individual owners of rights in land.

Unfortunately, in the real world the land market is far from perfect. As a result of its imperfection, the highest and best use of land, particularly from the community's viewpoint, is frequently not attained. The market's imperfections stem largely from the nature of the commodities transacted and from the inability of the market to consider certain characteristics of land uses.

In a sense, the land market is a paradox in that it does not deal in land. What is sold there are distinct interests or rights in land which can be held separately or in aggregate. It deals in fee-simples, limited interests of various kinds, easements and other rights and privileges over land. These rights do not pertain to all attributes of land; only to those having some social value and which can be pre-empted for the exclusive use of individuals or groups.

Because of this abstracting process, not all characteristics of land, nor all public interests in land, are considered in the land market. In terms of the factors determining land use, the land market deals only with some of the economic variables, and with those few physical factors that can be expressed in economic terms. Many ecological characteristics of land have no influence on the allocations made by the market. Similarly, man's non-quantifiable social needs and values are not registered adequately in the market equation.

This means that the market cannot deal effectively, in terms of social welfare, with common property resources. Nor can it consider the social or environmental consequences of its operations on existing land-use patterns. These short-comings result in the emergence of the classical land-use problem: the spill-over effect.

Spillovers are the side effects of one land-using activity on other activities. We are all only too

familiar with situations where undesirable “spillovers” occur: the slaughter house or piggery next to the residential area; the idle, weed-infested field adjacent to the seed grain crop; the sewer outlet upstream of the prime swimming area; the forestry operation in a wilderness park; and the new subdivision at the end of an already congested traffic artery.

Spillover effects and the desire to develop some means of registering man’s non-quantifiable social needs and values in land-use decisions were the factors responsible for the rise of public controls of land use.

Public control of land use

In western societies, governments have taken on certain powers to regulate, promote or limit the activities of citizens in their use of the land. This has been done to compensate for the inability of the land market to deal effectively with certain aspects of public welfare. The powers that governments hold over landed property can be divided into four categories:

The Police Power is perhaps the most important. It is the inherent right of governments to legislate for the advancement, preservation, and protection of the public health, safety, morals, convenience and welfare. This power has provided the legal basis for many actions employed to influence and direct the use of land resources. Of these actions, land-zoning is the best known. However, such measures as fire protection regulations, rent controls and smoke abatement ordinances also have their legal basis in the police power.

The Power of Expropriation entitles governments to take possession of private rights in land after just compensation has been paid to the owners. This power is exercised regularly to obtain lands required for highways, parks, public buildings and other public facilities.

The Taxing Power is used not only to raise revenues but also works intentionally and unintentionally to influence decisions on resource allocation. It can have a major impact on land-use patterns. For example, a heavy tax on land improvements might discourage such improvements, while a relatively low tax on undeveloped land may encourage speculators to hold large blocks of land long after all lands around have been developed.

The Spending Power is complementary to the tax power. Governments may tax one activity to discourage it, while encouraging another activity by placing additional funds into its development. Like the taxing power, the spending power can bring about substantial changes in land-resource allocation. Our national and provincial parks and many of our waterfowl sanctuaries and management areas exist as a result of the application of the spending power.

Like land uses themselves, these powers have “spillover” effects on one another. Although the exercise of each power, individually, may appear to be in the public interest, the interactions generated by the exercise of these powers may have undesirable consequences. It sometimes happens that an existing pattern of taxation, land-use regulation and spending, may be bringing about the worst possible land-use pattern in a locality.

If these powers are to be used effectively to create more socially and environmentally desirable land-use patterns, their use must be carefully planned. This need provides the principal justification for applying planning concepts to land-use development.

In simple terms, planning is a process that permits us to identify and assess the options available to us when attempting to achieve established goals and objectives. Several steps are involved in the planning process:

(1) Goals and objectives must be given or determined.

(2) Research leading to an understanding of the issues involved must be conducted.

(3) Alternate strategies for achieving the objectives must be identified and evaluated on the basis of their respective social benefits and costs.

(4) A particular strategy or plan of action must be selected and implemented.

(5) The plan's implementation must be monitored, and the plan modified in response to society's changing demands and values.

When this process is applied to land-use development, it will provide a strategy for achieving land-use patterns which are considered to represent the highest and best use of land as perceived at a given time. It will also provide a mechanism for changing the strategy as the perception of what is the highest and best use changes with changing social demands.

The development of a more effective land use planning process

In theory the operation of the land market, guided by public land-use policies and programs which are based on sound planning principles, should result in land-use patterns which are considered optimum at any given time. In fact, this performance is seldom achieved. This is not because land-use plans have not been prepared. Rather it is because too many plans are based on only a partial analysis of the issues involved and, more frequently, because insufficient provision is made to monitor plan implementation and to change plans in response to changing social and environmental conditions.

To be effective, planning must be an iterative, dynamic and continuous process. The planning process, not the plan itself, is the essential element. Until we provide the basis for the development and implementation of more comprehensive land-use plans, and for the creation of information systems which can supply the data required to up-date plans, we will continue to experience major land-use problems.

How does all this relate to wildlife specialists?

It suggests, first of all, that you might start knocking on the doors of the numerous local and regional planning offices to enquire on how your clients, the nation's fauna, fare in the land allocation decisions being made. That is, groups such as your own can play a major role in ensuring that some of those many elements not evaluated by land markets or economic planners get fair treatment in land-use development strategies. It also suggests that your job is not finished with the preparation of a land-use plan. Because most plans must be changed through time to meet new situations, you can provide information to planning officials on how suggested changes may affect your clients.

With proper lobbying, the day may come when the presence of a wildlife ecologist on the staff of city and regional planning agencies will pass without comment.

Interdisciplinary approach to land capability analysis and land-use planning

W. A. Benson

Governments have generally been fairly active in land-use planning until very recently. Their effect on land use was enormous and still is, but in most cases the effects were accidental to industrial development or incentive programs, welfare programs, veteran programs, Central Mortgage and Housing programs, highways programs, and so on. Little thought was given to the environmental effects or the effects compounded on our alternatives for way of life.

These conditions still exist in most governmental activities. Thus, Regional Economic Expansion, and its development-incentives children, has no built-in reference to land-use planning or environmental impact. It is axiomatic that some of the industries it spawns will run into conflict with the new Department of the Environment or its provincial equivalent in matters of pollution or land-use planning.

It is similarly true that wildlife land acquisitions without re-training clauses have impoverished some farmers and contributed to the strain on welfare and urban poverty areas—wildlifers have had little opportunity to purchase else their sins would be greater.

I have been told by a New Brunswick appraiser that farm consolidation and other rural land rationalization in that province have been greatly hampered by inflated prices paid for wildlife land. He did not challenge the wildlife use of the land, only the price, which he said was slowing down conversion of other lands to better uses, some of which could be wildlife.

The important fact to be drawn from the foregoing examples is that unilateral action is still taking place in volume. The more unilateral action takes place, the more possible that the total public good will be poorly served.

Planning itself is often unilateral action; it is often unidisciplinary because using another discipline's data is no more multidisciplinary (interdisciplinary) than a bear is a marmot having eaten one.

Most urban and municipal planners and many

provincial planners are required to be members of the Planning Institute of Canada and its affiliates. If you read their aims you will probably agree with them. Read the qualifications for membership and you will see that they exclude most disciplines required to achieve their aims. Most of the professional associations are the same, but most are by themselves not as important as planning at the present time. Wildlifers are fortunate in that they have not legislated their qualifications and need not put themselves in strait-jackets for classification.

These attitudes and platitudes all relate to capability analysis and to land-use planning. They are partially what determines who does the capability analysis or land-use plan and how it is done.

I will deal first with capability analysis. It is really only part of land-use planning and can play different roles in the process. Some groups in Canada still believe that capability analysis is land-use planning—some used to so believe and changed their minds as they tried to apply it—others always knew it was only a part.

The aim of capability analysis in all places is to reduce a large volume of land capability information to useable proportions in terms of best use. The resulting capability analysis maps vary from single use or mostly single use to coded multiple use.

There are three main methods used for arriving at capability analysis (and also for map requirements of land-use planning):

1. *Overlay process*—information is eliminated step by step but originally eliminated information may be used in succeeding steps; in short, information is put aside but may be recalled later.
2. *Sieve mapping*—information is eliminated in each step and is never referred to again.
3. *Computer handling*—by grid, by square, by rectangle, by map face. In this process information is theoretically always retrievable and practically, this is true. Loss of information occurs at the coding stage and theoretically nowhere else.

There are also three main approaches to the

kinds of people involved in analysis (and in part to land-use planning) :

1. Representatives from each of the data collecting groups and immediate user groups actually do the analysis.
2. A single agency does the analysis having discussed the data with the collectors and perhaps asked for opinions from users or collectors, of key or problem areas.
3. A single agency does the analysis using available data.

I personally have most interest and experience in the first method and the first approach to personnel. I would like to add the computer for data recall from expanded data sources to land-use planning and information communication exchange. I have no interest in ever associating with personnel in group 3 above though it is still the most common group.

Wildlifers, often by default, have found themselves most often associated with personnel group 3. They usually plan exclusively for their own field with data from their own field—or allow others to do all the planning and try to fit in or mitigate later. This has not always been a fault on the part of the wildlife agency because often they were given no choice.

Wildlife professionals as a rule have much more to contribute to planning than mere wildlife values since they are the largest group of what may be called practising ecologists. They can contribute much to urban planning per se that will be helpful even within the narrow confines of a city. There are more important reasons for wildlife to be involved in urban and suburban planning.

The location and density of urban areas and the places they spread to have great effect on pollution potential, which is of concern to wildlife. They also have an effect on the land itself and the enjoyment of it. The wildlifer can make pertinent statements on the advisability of bigger and denser megalopoli or of discrete, scattered, low-density communities. We can probably not undo present

large cities, but we have many choices about what we do next.

I believe wildlifers have important personal opinions to give on way of life. Wildlifers may not always agree that poverty can be measured by a purely arbitrary, national standard expressed in dollars. You all know trappers, fishermen and cattlemen who would fall short of any dollar standard so far suggested—but many of these do not consider themselves poor. Certainly they are not poverty stricken in the context of their whole environment and their enjoyment of it. Many of us envy them.

It is the philosophy of people and their aesthetic and moral values that are the fibre of land-use planning. Economics and economic values more and more will apply mainly in determining the least costly way of obtaining the desired life styles and supplying basic needs. Land-use planning is political when at its best. Political because it examines real life, life styles and requirements to determine the best method. This examination will often require redefinition of basic freedoms and rights, changes in legislation and in organization, even changes in whole governments—and there are Canadian examples.

Serious entry into planning is to be prepared for challenges. Challenges will occur to your authority, to what you have believed to be your soul, to your credibility, to what you state as your reasons for doing anything. If you become serious in planning you will immediately find yourself seriously questioning whether corporations or inheritance represent free enterprise, whether there should be any right to land as private property, whether taxation as presently applied or used has any relevance, whether revolutions are caused by land ownership. These are some of the first things you will begin to question—there will be many more.

To appreciate wildlife and the outdoors is a desire of many, and most of them are urban. Wildlifers are aware of this. They are aware that the mass of interested people often destroy wildlife areas close to cities, cause restrictions of quiet

enjoyment, or restrict or stop hunting altogether.

Why is it then that wildlife has never taken any compensatory steps to relieve the situation and perhaps provide education at the same time? Why is there no bird park in or near the city with good opportunity for viewing native species and being informed about them? Why is it that wildlife agencies usually licence zoos but make no effort to capitalize on these potential demonstration areas which can be live educational experiences in ecology and in conservation and management of natural resource? Many zoos have no native species at all.

Why do wildlife people let engineers build roads in the wrong places thus causing stream turbidity, erosion of banks and sometimes loss of gravel in spawning beds? If the engineer doesn't know enough to consult a pedologist, the biologist should.

Why do wildlife people let sewage engineers design subdivisions to fit their pipes and wires thus causing sewage outfalls harmful to wildlife? If the engineer needs to do this to continue making a living, the wildlife biologist does not. Both should consult pedology and climatology to match the dwelling to the sites available for field disposal.

Why do wildlifers fight foresters on the right way to cut, plant, etc., when the two should join together to control the sawmills and pulpmills which may harm both resources?

Why do wildlifers, foresters and agrologists and recreationists fight about who gets what part of the rural pie while ignoring irreversible encroachments by urban, industrial and highway interests which are most often on the best land for all?

All of these questions and more are involved in land-use planning, particularly in an interdisciplinary and/or public exercise. The questions can be re-stated for many other disciplines but this is the way they will come to you.

Another question you will get is "are animals more important than people to you wildlifers?" The wildlifer had better be ready with answers better than yes or no; better than the answers given in "Future Environments of North

America"; better than the hunter expenditure ploy. The answers must clearly show the wholeness of the environment; that we are not talking about either wildlife or people but both; that we are talking about real life styles for many and not the economic clichés of the past.

Having pursued a number of apparently disconnected thoughts it should now be apparent that land-use planning at the heart is not technical, scientific nor objective. It is entirely subjective. The technical portions of it are necessary background to achieving our life requirements with minimal loss of the values of our life style.

Thus from a technical standpoint we find that we don't have to build houses on a floodplain thus losing farmland, fearing flood, paying more for dykes, paying for sewage disposal and treatment or not paying and losing fishing, bathing and boating. We find that we can get what we wanted—a home, privacy and a sense of community at upland sites with fewer costs and disadvantages.

Why haven't we done it before? Because our system (C.M.H.C., N.H.A., subdivision requirements of Lands Act or equivalent, benefit cost formulas for road construction, drainage subsidies, sewage and waterworks subsidies, etc.) is designed to subsidize the developer for his profit while the government, hence us, absorbs the social costs. The change required?—Political.

I would now like to turn to the working structure used by British Columbia. Before I do, however, I wish to make some basic points very clear. The first point is that organizations and structures matter only so far as they allow information, ideas and recommendations to permeate all levels. The second point is that no matter how good your organization and structure appears to be, it is only as good as the men in it. Thirdly, good men given latitude can make any structure or organization work. Consequently, the structures I outline are no patterns to follow but examples of a working situation so that we can understand and discuss the implications.

Capability analysis

This analysis contains only the economics within Canada Land Inventory Capability Analysis Classifications. It assumes that first class wildlife areas are every bit as good and every bit as important as first class forestry, recreation or agriculture areas. The deputy ministerial committee has decreed that any later divergence from this capability analysis map by the environmental and land-use committee, or by individual departments, must be substantiated in written form to their committee. Thus the capability analysis serves as a check and means of communication interdepartmentally.

The capability analysis uses only the capability information of the Canada Land Inventory. Its structure is as follows:

Structure of capability analysis (predominantly C.L.I. personnel or led by C.L.I.)

1. Cabinet committee

Sets priority of areas—approves capability analysis.

Recreation and conservation; lands, forests and water resources; mines and petroleum.

2. Deputy minister's committee

Recommends priorities—recommends capability analysis—sets administrative frame work and policy.

Agriculture; lands, forests and water resources; recreation and conservation; mines and petroleum.

3. Sector committees

Universities; federal; provincial.

Assure technical competence—recommend and arrange allied research programs—assure correlation with other allied activities—correlate field activities, vehicles, photos, etc.—recommend allied action to deputies and agencies of members.

- (a) Soils, agriculture and forestry committee.
- (b) Recreation and wildlife committee.

- (c) Socio-economic—present land-use committee.

- (d) Climatology committee.

4. Working sectors

Produce maps, narrative and reports required by C.L.I.

Recommend and illustrate new data uses to sector committees and via co-ordinating chairman to deputies or departments or agencies—some direct liaison with users or potential users.

5. Capability analysis committee

Comprised of sector personnel responsible for sector maps and narratives plus selected government and university personnel plus chairmen of sector committees.

Produce capability analysis map and narrative and approve reports discussing compatibility, conflict, and logical presumption by each sector.

Environment and land-use

This committee is established under the Environment and Land-Use Act. The duties of the committee are:

- (a) to establish and recommend programs designed to foster increased public concern and awareness of the environment;
- (b) to ensure that all aspects of preservation and maintenance of the natural environment are fully considered in the administration of land use and resource development commensurate with a maximum beneficial land use, and minimize and prevent waste of such resources, and despoliation of the environment occasioned thereby;
- (c) if considered advisable, make recommendations to the Lieutenant-Governor in Council respecting any matters relating to the environment and the development and use of land and other natural resources;
- (d) to inquire into and study any matter pertaining to the environment or land use; and

- (e) to prepare reports and, if advisable, make recommendations for submission to the Lieutenant-Governor in Council.

The structure for the Environment and Land-Use Committee follows. The committee has the power to hold public inquiries and Orders-in-Council can result, etc. The committee has a series of priority regions. All available data for any particular region is brought together primarily through the technical sub-committee. Major data sources are Canada Land Inventory and each of the line departments represented. Smaller amounts of data come from other departments and other sources.

Environment and land-use structure
(predominantly line department personnel—responsibilities all departmental)

1. Cabinet committee

Known as the Environment and Land-Use Act Agriculture; lands, forests and water resources; recreation and conservation; mines and petroleum; municipal affairs; health and welfare.

2. Technical committee

Deputy ministers of agriculture; lands, forests and water resources; recreation and conservation; mines and petroleum; municipal affairs; health and welfare.

3. Technical sub-committee

A.D.M.'s or directors in above departments are committee members; co-ordinating chairman of C.L.I. is permanent advisor; special study groups appointed as required, eg. Rights of Way, Mineral Act staking, and recording problems related to responsibility of other Departments.

Describes the lands which shall be administered by lands service and those administered by forest service; provides framework, policy and administrative decisions (or recommendations

depending on level, requirements for new legislation, etc.) within which regional personnel can operate at management level.

The results used to date consist of a resource atlas and a report which contains recommendation and guidelines. The atlas and the report are transmitted to the field representatives of the line departments and to the regional districts. Senior field personnel of line departments comprise the major part of the technical advisory committee to the regional district board (a sort of super-municipal government).

Feedback can occur through normal line department channels or via the regional district board to the Department of Municipal Affairs or to the Environment and Land-Use Committee, or, occasionally, to another line department.

The next step will obviously involve greater detailed inputs and feedbacks at the local level. Much of the local activity will be stimulated by line departments.

I would like now to very quickly run through some projections which illustrate the ease of interdisciplinary involvement at a fairly detailed level with no crowding around light tables. The projector material can be made from 3M transparencies or from photo-reduction transparencies. Decisions can be marked and coloured on the white paper on which the material is projected. Scale does not matter because, in final reproduction, scaled maps are already available with all boundaries for a particular data source. The draftsman simply refers to the unscaled colour and knows which scaled boundary line to use.

Secondly and finally, I would like to show you some slides and a list of other data applicable to planning which you are not normally aware of. These data and many more are available from your soils (pedology) group in conjunction with other users such as engineers, foresters and climatologists. The combinations are often available in your Canada Land Inventory and its associates. In British Columbia they are in that organization.

Following is a list of slides shown in order of presentation:

1. *Landform base map*—This map showed with the groupings of soils with similar characteristics. Symbols are usually complicated and indicate the soil catena, the dominant (over 40 per cent of unit) and significant (20 per cent to 40 per cent of unit) subgroups, the drainage, the parent material and the vegetation usually associated. From this map most other interpretations are made.
2. *Wildlife habitat suitability*—the tendency of the land itself to be openland, woodland or marsh. Several other possibilities will be listed later.
3. *Intensive recreation playing fields*—the ability of the land to be developed for such intensive use with minimum inputs.
4. *Recreation suitability for cottaging*—where recreational attributes occur in conjunction with sewage disposal possibilities, good water supply, adequate slopes and footings for access and buildings.
5. *Winter recreation climates*—based primarily on slope in conjunction with suitable snow conditions, wind and chill conditions. A combination of landforms and climate for major winter recreational activities.
6. *Summer recreation climates*.
7. *Industrial climates*—based primarily on inversion probabilities and airsheds and their relation to other land uses. Included also are slope, aspect and elevation as they relate to radiation, climate and so on.
8. *Land capability for agriculture*—on the basis of the primary outputs of the Canada Land Inventory.
9. *Climate capability for agriculture*—based on growing degree days, likelihood of killing frosts, adequate precipitation in growing season and so on.
10. *Agriculture erosion hazard*—a number of soil and landform characteristics causing erosion hazard from moving water.
11. *Agriculture*—Soil suitability for perennial forage crops.

12. *Land capability for forestry*—one of the primary outputs of the Canada Land Inventory.

13. *Forestry regeneration method*—based on such factors as inundation, depth of litter above mineral soil, slope, texture, origin, structure and competition.

14. *Forestry*—Logging equipment trafficability—based on the degree to which factors such as steepness, soil texture and drainage restrict four-wheeled skidder operations.

15. *Forestry*—Regeneration competition—indicative of degree and type of management required to ensure successful restocking to maximize the capability of the site for volume growth of desired species.

16. *Hydrology*—Soil runoff potential—based on the infiltration rates of thoroughly wetted soils.

17. *Engineering*—Gravel and sand sources.

18. *Engineering*—Highways locations—requirements of soil to minimize highway construction and maintenance problems over a long period of time.

19. *Regional Planning Homesite Location*—considerations were flooding, highwater table, depth of soil, drainage, soil stability, stoniness, permeability, slope, ability to handle effluent and bearing capacity.

20. *Pollution*—Sewage effluent disposal—ability of the soil to absorb effluent without contamination of groundwater. Considerations include texture, water table, depth to impervious layer, drainage and slope.

Some additional use and management interpretations of Canada Land Inventory which can be presented cartographically but for which no slides are available:

1. Agriculture

- a. Soil productivity ratings (estimated yields)
- b. Crop suitability (each individual crop)
- c. Irrigation and drainage groupings
- d. Range productivity, capability, etc.
- e. Economic land classification

- f. Management groupings (fertilizer, irrigation combinations, etc.)
- g. Soil and water pollution probabilities due to agriculture

2. *Forestry*

- a. Species suitability
- b. Windthrow hazard
- c. Seedling mortality
- d. Erosion and slump hazard ratings
- e. Suitability for road location and construction
- f. Thinning prescriptions and stocking rates
- g. Browsing hazard
- h. Fertilizer requirements
- i. Planting difficulty
- j. Logging method

3. *Engineering*

- a. Fill material location
- b. Topsoil
- c. Building foundation hazards
- d. Embankment foundation hazards
- e. Pipeline corrosion and installation hazards
- f. Urban development suitability (subdivision design, etc.)
- g. Flooding hazard and erosion susceptibility
- h. Likelihood of ground-water supply
- i. Runoff potential

4. *Recreation*

- a. Campsite suitability
- b. Ski slope and winter sports suitability
- c. Picnic area suitability
- d. Path and trail suitability
- e. Golf course suitability

5. *Wildlife*

- a. Erosion susceptibility as it affects fisheries
- b. Areas initiating seasonal turbidity and potential siltation to spawning beds
- c. Vegetative succession trend probability
- d. Plant suitability for different types of habitat

6. *Combinations*

Combinations of the foregoing have direct use to regional land-use planning, zoning, hydrological studies, pollution and resource development potential.

Thus I have shown a number of information examples derived from basic data. There are many more. I hope I have stimulated involvement in planning and discussion.

A role for fish and wildlife biology in land-use planning

P. B. Dean

By this time you are probably all aware of the broad field encompassed by land-use planning and the many ramifications and implications that it has on our everyday life and the development of our countryside. Jim Maxwell has run down the philosophy, jurisdictional aspects and administrative framework of land-use planning. Art Benson then carried the process to a more detailed level, outlining the approach and processes involved in land allocation at the regional scale.

My purpose is to start at the opposite end of the scale and to examine the fish and wildlife resources and try to offer some suggestions as to how they could fit into and form an integral part of the land-use planning process. The primary purpose of participating in land-use planning is to try to prevent the needless destruction of fish and wildlife habitat. But very closely linked with the preservation of fish and wildlife habitat is the enhancement and creation of a quality natural environment for man.

Perhaps we should first examine whether there is a role for fish and wildlife biology in land-use planning. This in itself could form the topic of a paper, but I will just raise a number of examples that I believe indicate the need for a biological view point in the planning process.

First of all, let me quote from an article that appeared in the *Washington Post*. It was entitled, "New York plans a new town without cars on welfare island". One of the paragraphs reads as follows:

"The new town will house 20,000 people along with a school, neighbourhood centre, a glass-covered shopping mall, a hotel, restaurants, office buildings, two public swimming pools and an ingenious 25-acre ecological park with wildlife and native plants."

A second paragraph says:

"To allow for as much greenery as possible, Johnson has clustered both his apartment

houses and his town centre, separated by a little park, as tightly as possible in the centre of the Island. On either side are the existing hospitals. In between will be a sports park as well as the aforementioned ecological park, where urban people can observe natural environmental conditions and their interaction. It will be the first such park in the world."

One might ask oneself, what is an ecological park? I have always been under the impression that ecology is a continuing process going on about us at all times and in all situations. I didn't realize that there was a specific type of park where this phenomenon occurred.

However, my purpose is not to be sarcastic. I think this article points out two things:

1. That wildlife can be an important asset even in the centre of an urban area and is beginning to be viewed as such by planners and by the urban population.
2. The planner included the wildlife habitat for its interpretive and educational value, not for the purpose of preserving wildlife.

A second example is an editorial that appeared in the *Ontario Fish and Wildlife Review*, discussing urbanization. It noted that:

"It may be surprising to realize the size and variety of the wildlife population within a city, like metropolitan Toronto. Among the mammals which may be found are mink, muskrat, grey or black squirrel, skunk, racoon, white-tailed deer, coyote, ground-hog, cottontails, European hares, flying squirrels, bats and weasels. Game birds include ring-necked pheasants, Canada Geese and many species of ducks. The many song birds are too numerous to mention. One may catch pike, bass, smelt and suckers in the area as well."

One could safely assume that most of these animals occurred strictly by chance. It is highly unlikely that their habitat was recognized, in-

corporated, and managed as the City of Toronto expanded around it.

The final example is from the 32nd annual meeting of the Midwest Wildlife Conference, in 1970. Here the guest speaker, an architect, devoted his paper to wildlife in urban areas and used it as a plea to ask wildlife biologists to become more involved in urban planning.

I think these examples serve to point out that with the popular wave of ecology, there is a growing awareness that other species besides man inhabit this planet, and that they share the same environments that man enjoys. This awareness is growing among urban and regional planners, but they are not quite certain how to deal with it. Opportunities exist for the biologist to offer his services and explain the relationship between man's environment and fish and wildlife habitat, and the relationship between habitat and the fish and wildlife species utilizing it.

But what about the role of wildlife in regional or rural planning? The same principles apply here. Growth and development means change, and change to wildlife usually means loss or alteration of habitat. The magnitude of the change in our natural environments is becoming much more evident to people every day and it is becoming obvious that this development, growth, and change in the rural areas is going to have to be controlled in some manner. Land-use planning is an obvious method of implementing some control over development.

Land-use planning is an old discipline in urban areas, and zoning laws are a common thing around cities. However, to date there are very few rural land controls or rural zoning regulations. This, however, will have to be a thing of the future. It has to be in order to control growth in our rural environment. Thus, if we are going to control growth and control change through land-use planning, then it is imperative that fish and wildlife habitats are recognized as an integral part of the land-use plan. Merely by having it recognized on an official land-use plan, we are

taking the first step in preventing habitat destruction through ignorance or a lack of appreciation of its values.

But the zoning of an area as wildlife habitat is not done strictly on the basis of its fish or wildlife value. By maintaining an area in a state that will support a viable fish or wildlife population, we are maintaining a high quality of environment for man's enjoyment and use as well.

But what is the significance of wildlife and wildlife habitat to the land-use planner? Practically none. Thus, it is important that when fish and wildlife biologists become involved in planning, they go beyond the point of identifying the habitats for the planner and then retiring from the scene. It is necessary to participate and describe the ecological relationships of the habitat to the total environment and how that habitat can be used by man for his enjoyment and yet still maintain its integrity to produce fish and wildlife.

In other words, how can the area be managed for both man and fish and wildlife? Surely this is the same question to which the biologist has been addressing himself since the profession began. The land-use planner, on the other hand, has never had to deal with this problem.

So here is a role for the fish and wildlife biologist in the land-use planning process: to identify important fish and wildlife habitats, describe their importance in relationship to the fish and wildlife population, describe the relationships that are important to man and his environment, and to propose management practices so that man can utilize these natural intrinsic values without destroying them. Surely a profession that has been using the principles of ecology for years could take advantage of this experience in today's society.

The use of ecology in land-use planning is becoming an accepted and widespread phenomenon; however, in actual practice, ecology plays a fairly minor role in most of the actual planning agencies in Canada. To an even lesser extent,

the fish and wildlife that inhabit the environment are very seldom, if ever, considered in any land-use plan. The opposite, however, is always true. Any alterations in the environment from any development, whether planned or unplanned, is going to affect fish and wildlife habitat.

But what does this mean to the average Canadian? An article in the *Imperial Oil Review*, December 1968, puts it this way:

“Thirty years from now, in the year 2000, about 36 million Canadians, 90 per cent of us, will live in urban anthills of steel, glass, plastic and concrete. Montreal’s seven million will sprawl in a 35-mile radius as far as the satellite cities of Joliette, Sorel and Valleyfield. Another 4.5 million will occupy metropolitan Toronto and its fringe—a human fan spreading out 20 miles from the present downtown core. Beyond it, the Golden Horseshoe embracing the north shore of Lake Ontario will be solid with people from Oshawa to Niagara and north to Barrie. Another million will live in each of Edmonton, Calgary, Winnipeg and Ottawa; 2.2 in the lower mainland of British Columbia. There will be technological efficiency beyond our wildest dreams, but precious little privacy or natural beauty. The yearning to run in grass, sniff damp earth, fish in a brook or picnic among rustling leaves and bird songs will become an obsession.”

“What we need is some place to get away from it all in only an hour’s drive.”

But already it takes practically an hour to escape from downtown Toronto or downtown Montreal. Canada’s urban areas, where 90 per cent of the population lives, are expanding outward so that it will soon take two hours to get away from it all. The alternative is to create a natural environment system within the expanding urban areas, or rather to create expanding

urban areas within a natural environment system.

If biologists participate in planning for the expansion of our urban areas, then they can help ensure that fish and wildlife habitat forms a part of that natural environmental system.

Assuming that fish and wildlife can be an important aspect of urban life as indicated by the example from New York City, and that the maintenance of fish and wildlife is possible by the incorporation of ecology and total environment development in the land-use planning process, then let us examine some possible roles of fish and wildlife biology and its relationship to man’s environment.

The first step in the planning process, as in most problems, is an examination of existing material. This is usually the first stage at which a biologist could make some contribution to the land-use planning process. Most planners are working from a developmental point of view; that is to say, that their terms of reference indicate that they have to accommodate a certain amount of growth within a certain time period

The biologist at this point could take the view of the environmental advocate and identify and interpret all the existing values in the natural environment, such as important wildlife habitats, fragile ecological areas, areas of high aesthetic appeal and so on—a sort of natural environment sensitivity map. Once these areas are identified, their function and relationship within the total environment should be explained.

For example, an important waterfowl production marsh may be identified. As you are probably aware, marshes have a very high potential to accept sanitary, or unsanitary, landfill. They are also a good basis for reclaimed land. If neither of these high priority uses can be made of the marsh, then it can always serve as a routing for a major highway.

But what about its waterfowl potential? Obviously we are going to have to present more attributes than that to convince any planners that it should remain in its natural state. To do

so, we should examine the ecological relationships of the marsh to the surrounding area. The listing of attributes may present the following information:

1. The importance of the area to waterfowl production or migration;
2. The significance of the waterfowl habitat on a regional, provincial and national basis, since such habitat is in limited supply and is being decreased every year, with the result that the waterfowl resources of North America are decreasing;
3. The significance of the marsh on an area or regional basis with regard to its quality, size and productivity;
4. The importance of the marsh as a complete ecosystem, i.e. it is the habitat for a specific community of plants, reptiles, amphibians, insects, fish, bird and mammal life, as well as for a particular association of upland plants around the marsh edge;
5. The ecological significance of the marsh to the surrounding landscape, i.e. it may form the headwaters of a stream or it may be an important spawning area for fish in an adjacent lake. The marsh, in turn, may be fed from ground-water seepage in the surrounding basin and if the forest cover in the basin is removed, then it may result in severe water shortage and drying up of the marsh and the out-flowing stream;
6. The interpretation value of the marsh as an ecosystem should be stressed. An intensive waterfowl management program on the marsh along with the inter-relationships of the plants, animals

and insects in the areas would form an excellent basis for an interpretation program. A program of that sort would form an integral part of a park system.

Thus we could supply an ecological rationale for maintaining an area in its natural state and by its inclusion in a park system we also supply a means for protecting and utilizing it.

In the process of advocating the protection of a particular natural environment area, we must define the limits of the land concerned. To do so, we must define boundaries that will protect the complete ecology of the area. Such diverse things as drainage patterns, suitable nesting habitat for the waterfowl, sufficient vegetation to serve as a buffer zone to protect wildlife from the surrounding man-made development, and sufficient land to accommodate other recreational activities which may take place around the marsh area must be considered.

Depending on circumstances, it may also be advantageous to offer some suggestions as to the kind of development that can or should take place in the surrounding landscape. For instance, the area might offer an excellent view to highrise apartments or it might be worthwhile suggesting the location of a high school in the area, or adjacent to the area, so that science classes could take advantage of the outdoor facilities. Such things as cultural centres or fire halls are examples of public structures that could be located compatibly within the natural environment system.

A second example may deal with a deer wintering range. On a regional basis, the population of deer in the area is dependent on, and limited by, the acreage of wintering range. Often ungulate wintering range has a high capability for forest production or some form of recreation. If, in the process of planning, the wildlife interests are recognized, they are often designated as secondary to recreation or forestry

on the assumption by planners that wildlife use is compatible with either of these others. As a result, specific lands for ungulates are seldom identified on regional land-use plans.

The use of forests by deer and moose is generally compatible with forestry or recreational use but if those other resources begin to destroy wintering range, either through cutting or development for cottages or for some other reason, then it could pose severe limitations on the carrying capacity of the forest.

In cases such as this, where wildlife of all of the potential users is most likely to suffer from change, then it would be of advantage to have the area designated as a wildlife area with secondary uses of forestry and recreation. This would allow management programs to be drawn up that incorporate other uses but to the point where they will not be detrimental to the primary use of the area for ungulate wintering range.

Most important ungulate habitats are located in rural areas; however, with the expansion of cities it is possible that important habitats will become threatened by the expanding urban areas. Even under conditions such as this, it is important that the wildlife range be identified and efforts be made to preserve it for use by wildlife.

Too often we accept the fact that urban expansion and loss of wildlife habitats are inevitable. This need not necessarily be so and if wildlife habitat can be used as one of the arguments for maintaining a wide green belt around an urban area, then it should be brought forward.

Another example where fish and wildlife habitat can be used as a starting point for environmental protection is in the identification and description of a fishery. How can the fish population or fish potential in a stream or river system be maintained or upgraded? With regard to urban development, I think this is one of the places where we as fish and wildlife biologists have been particularly lax in our responsibilities.

Water and water courses are too often regarded simply as convenient gradient systems for sewage, highway or watermain locations or viewed strictly from their recreational point of view. Very seldom does anyone consider the fishery aspect of water, or the aquatic system as a unit.

When examining the aquatic environment, we would want to identify the fish species that are present or the fish species that could possibly live there. Also, we would want to identify important aspects of their habitats such as spawning beds; important escape cover; significant local and yearly temperature gradients; important food species, either plant or animal; and their location and source of production. Other important aspects of the aquatic environment would be pH, oxygen ranges at various localities and at various times of the year, turbidity, and nutrient levels under normal conditions.

The relationships between these aspects of the aquatic environment and the surrounding lands should be described and interpreted so that the effects on the aquatic environment resulting from changes in the surrounding landscape can be predicted. The next stage would be to examine the ways and means of maintaining or reclaiming the important elements of the environment for the fishery resource. This might require a series of low weirs across the river to create turbidity to re-oxygenate the water. Or, it may require advocating that no development take place on certain slopes along the water shed, thus protecting escape cover along the banks and at the same time protecting the stream from siltation and increased turbidity.

Certainly it would mean prevention of dumping of raw sewage or any other form of effluent detrimental to the water regime. What would result would be a series of management and development regulations or proposals for the maintenance of the aquatic environment. However, we must bear in mind that we are not only maintaining the aquatic environment for the fish, but rather we are maintaining the quality

of man's natural environment.

To increase man's utilization of the fishery resource, a program of stocking catchable size fish, or exotic fish or food species may be recommended. Management programs to upgrade the habitat may also be warranted. The important part is that the intrinsic value of the existing natural resource is shown to be of importance to the surrounding urban population. Once again, this type of proposal could form the basis for a park or natural environment program but it would stem from a concern for maintaining the fish production in the aquatic environment.

Other contributions that could be examined and interpreted would be important upland game bird habitat. How can it be maintained? What variety of uses can be made of this habitat by man and still maintain its importance and potential for wildlife production? If such a landscape was maintained in its natural state what would be its total role in the environmental complex?

Fragile ecosystems, such as sand dune areas, rare plant associations and special wildlife habitats, should also be identified and described.

In each case, what I have been discussing is the identification of important wildlife or ecological aspects of our environment, but then relating them to the broader total landscape picture and describing how man can utilize these assets in their natural condition. The relationships between the natural fauna and its environment are easily discernible to a wildlife biologist, but someone who is not trained to understand these relationships will not identify them. For this reason, it is urgent that fish and wildlife biologists become involved in land-use planning to identify, interpret and advocate the uses of our natural environment.

Often the identification of those types of assets will form a rationale for a natural environment system, either in an urban or rural area. Such a system quite often has important recreational aspects as well. The wildlife-recreation natural

environment system then creates a framework within which other developments can take place.

Thus, we are using the intrinsic values of the landscape in the best possible manner and putting man-made works where they can do the least damage ecologically and environmentally. Often this approach may mean increased costs to man-made developments, but then modern technology can do most anything. All it needs is a little bit more money. To date, however, technology cannot replace our natural environment and its fish and wildlife habitants, once they have been devastated.

However, one should point out that—even through participation in land-use planning and having wildlife and natural environment areas identified as such on official land-use plans—it does not mean these areas are then sacrosanct and completely protected.

Obviously, a land-use plan is a stage in development. However, by participating in the planning process, these values have at least been identified and recognized as part of the total landscape. This in itself would be a significant step forward. The next step would be the generation of policies and programs based on the land-use planning document. However, this is another subject and involves the political element and citizen participation, such as working with pollution and conservation groups to see that the environmental aspects of the plan are put forward to the politicians—both through the political process and through the civil service administrative process.

Rapporteur's report on the panel— Land-use planning in Canada Bob Dorney

I'll try to summarize briefly what I see in the papers and the slide presentations, and beyond that relate to the central issue of how planning in its professional context relates to wildlife management. Jim Maxwell began by suggesting that we are in a resource crunch. I agree that this is a valid perception of the situation; and furthermore, the pressures producing the crunch are intensifying. He asked the questions: how, when, and where does planning enter the picture. He also pointed out that the answers not only are environmental, in an analytical and scientific sense, but are integral to social, economic, historical and cultural realities.

It is a whole package of human ecology in an industrial context we're talking about; biologists can ignore the social science part of the package only at their own professional peril.

Jim Maxwell stressed, in addition, the increasingly heavy hand of legislation and governmental reviews that affect the uses that may be made of natural resources, and the effects that this increasing governmental involvement has on both our perception of individual incentive and profit as a motive and our perception of what is a natural resource.

Next, he stated that we need a follow-through in land-use planning, a point of view shared by Art Benson and Paul Dean, who think that, if biologists are going to get involved in the planning game, it isn't good enough merely to put points of view forward; they have to be put forward at the proper time, in the proper place, and in the proper way.

The necessity for a planning follow-through requires a holistic perception of wildlife values in historical, cultural, and economic terms. Unless all these elements are understood, the planning process with its inevitable trade-offs will only be frustrating to the wildlife biologist.

Art Benson took the present planning profession to task, stating that most planners are unilateral or too narrow in their thinking. I would agree, although this is beginning to

change. Most planners were trained in schools which did not stress the physical or natural resource base of planning. Their emphasis was on making maps or models look pleasing and identifying social issues—not on considering the sensitivity and viability of the natural landscape.

I think this educational divergence in training between biologists and those in the "design professions" is well worth remembering. This divergence is really one of the major difficulties in a planning school such as the one in which I work: our students do not have initially an environmental focus and our staff of ecologists has to work hard to instill the ecosystem concept into our planning students. Yet, our experience suggests it can be done.

Speaking of wildlife biology as being too narrow a base for community and professional land-use, Art Benson raised the question: what is an acceptable focus for wildlife biology? Those who have worked both in and out of wildlife biology will appreciate, as does the recent Science Council report, that biology is an extremely narrow professional base, especially when biologists must interface with the public on social, economic and attitudinal issues.

Art Benson then mentioned the administrative organizations in British Columbia dealing with land-use inventory and issues and some of the methodologies and technical ways of getting information "packaged" so the decision makers can understand issues and propose solutions. This is a matter that we too have found critical in our work with various public bodies. If the press, citizens, and politicians can't understand the issue in 20 minutes or so, the presentation technique is wrong. I think that generally this is all the time one has.

In our work with clients we have relied heavily on graphics to project rapidly the essence of a concept. Unfortunately, the production of graphic presentation material is an art, not a science, in which few biologists are trained effectively.

Paul Dean turned the discussion to the present evolution of environmental values, and of the necessity or the need to involve professional biologists in urban planning. This begs a whole host of allied questions about wildlife biology as a profession, and about biology as it interfaces effectively or not with other professionals in the urban planning areas, i.e. with the city engineer, engineering consultants, sociologists, town planners, architects, and landscape architects. Each profession has a territory staked out with professional boundaries. Trespassers are not necessarily welcome.

That's pretty well the essence, as I see it, of what the three speakers were trying to convey. I'd like, in turn, to raise some allied questions which cut across some of the preceding remarks.

1. It looks as if the increasing environmental regulations by government will force, inevitably, a major confrontation with the private market, and our personal freedom; they have to a considerable extent already. In the *Globe and Mail*, for example, the president of a large gas company said some very nasty things about environmentalists—suggesting that they need to be muzzled like mad dogs. This intellectual “warfare”, or ecotactics, between some sectors of the private market and the environmentalists, raises a lot of fundamental questions.

If environmentalists win, will we see a re-trenchment in personal and corporate freedoms that have slowly evolved since the Magna Carta? Over-regulation may be just as disastrous to the society as under-regulation is disastrous to natural resources. Can resource planners find a happy medium?

2. The other question, one involving methodology, that the other speakers alluded to is the scale of inventory; that is, the intensity of interpretation. How land-use interpretations are made depends critically on the scale used for mapping. We have found when working on the CLI mapping at the county and city level that the scale may be too coarse, or the variation in capability

ratings too flat to be meaningful; e.g. a county may have no recreation land above a four capability.

As the reinterpretation of 1/250,000 or 1/50,000 CLI mapping is critical at this urban and regional level, it means adjusting what is essentially a federal system to smaller units of land. There seems to be a need to develop techniques for the use of capability mapping at these urban and regional scales before these maps are misused and found to be wanting.

3. The next question is extremely fundamental. I'm not sure you want to see a practising profession of ecologists, and I'm not going to beat the drum for that here. However, in the next five years the issue has to be faced. There are some of us who are now engaged in part-time private practice trying to develop and open private markets for ecological consulting.

I would suggest that rather than governments taking the whole environmental pie, there is room for private practitioners. People who can follow an environmental planning issue from the first step to the final step, whether it is a high-way impact study or the design of a national park, seem to be essential. We have found in our consulting work in urban areas that this follow-through is what it takes. An environmental team not only has to do the initial inventory and make recommendations, but someone from that team must attend each of the design, engineering and planning meetings where their recommendations are discussed, rejected, or accepted. Without this follow-through, we've found that land-use planning from the environmental point of view is ineffective.

We saw some of our original plans last night, for example, in which the architect had butchered our concept of a city park and open-space configuration. This has to be pointed out. If the developers' plans are approved, the unique forest stand would not be able to survive the impact of construction.

The question of who's an ecologist extends to

what are the ethics which will regulate the profession, what are the fees, and what are the limits of liability for bad advice. The code of ethics adopted by the Wildlife Society makes a good beginning in this regard. We find that fees that are directly related to the scale of mapping and sampling are flexible categories which must be negotiated between client and ecologist.

Liability for bad advice can be extremely critical. We would be liable at the moment for over one million dollars in damages if we hadn't included environmental geology in the work we're doing. For example, mapping of slopes having a potential for slippage, identifying leakage of natural gas through shale, etc. Because the value of urban real estate may be \$25,000 or more per acre before construction begins, or the construction cost for public buildings may be \$20,000,000, off-the-cuff advice can be poor advice indeed. We have seen a great amount of such "free" environmental advice from well-meaning civil servants, and believe that it does no credit to the individual, the agency or the profession.

Art Benson spoke much of parity on environmental councils where environmental matters can be articulated properly to decision makers. Some of my students and I were able to convince the county planning board in Waterloo County to organize an interagency environmental advisory committee; he has done similar work at the federal-provincial level.

Here may be a common ground where a hierarchy of environmental councils—federal, provincial, regional, urban—can work together setting policy and program. The professional ecologist can provide the interface between the planner, architect, and engineer at the project level. In this way we may achieve flexibility, follow-through, and communication, and build a meaningful role for a practising profession of ecology.

4. Another aspect I think wildlife biologists have tended to ignore, which may be worthy of mention, is that many people in urban areas do

not like wildlife. They prefer not to have to swat mosquitoes, listen to birds and generally deal with the nuisance of wildlife established on their property. We would be naive if we did not realize that there are large social and economic groups that do not perceive wildlife as a positive factor in their life style. Wildlife biology should not only have a middle class bias.

5. Concerning wildlife epidemiology, the mixing of wildlife and humans, especially in the tropics, can be extremely dangerous. North America is not as vulnerable because critical epidemiological or epizootological transmission patterns do not exist commonly; but we do have rabies and arbor viruses in our cities. If we are going to practise wildlife management in urban regions, we must be aware of these wildlife disease realities.

6. Another question I would like to ask is why biologists generally view development as a negative factor. Why not view it instead as a positive factor? With knowledge of ecosystem structure and function we can rebuild deteriorated environments with the same money we put into development projects. But we have to be fast on our feet, know a little bit about economics, and communicate ecosystem values to the development team early in the planning phase.

In terms of environmental guidelines, the critical one is that development must, when finished, have produced a net improvement in the natural environment. Viewed in this way land could be renovated at the same time we're altering it. Viewed in this way environmental change can be turned into a positive force whereas at present it seldom is, or only is by accident not by plan.

7. The last topic Art Benson insisted that I mention is that of the Town Planning Institute of Canada and its counterpart in the U.S., the American Institute of Planning. The teaching of ecology is very rudimentary in most planning and design schools. Why is this the case? I think, as biologists, we have failed to back up far enough.

Tony de Vos got me involved in the planning

school at the University of Waterloo four years ago; I think he saw that, although education of a new generation of professionals is slow, it may be the quickest in the long run. If most of the Canadian planning schools would put some ecology into their curriculum and sensitize the students about the issues in the environmental field, your job would be much easier.

At the University of Waterloo, our planning and architectural students get a minimum of one course in ecology with an optional second course. This environmental orientation of our students is beginning to be felt in their practice already. My students come back now as graduates and talk of environmental planning with meaningful dialogue. I believe they can develop a minimum level of conceptual communication with ecologists and resource managers with this course background, as minimal as it may seem.

If we can get more professions involved during

their university training in environmental matters we'd be much better off in later years. Our enrollment in ecology or environmental management courses at Waterloo has gone from about 35 students three years ago to between 600 to 1,000 last year. This total includes a pollution-environmental management course for engineering students.

I think that wildlife biologists by approaching now the university administrators throughout Canada could see that students in their province have the option of taking a general course in ecology or some related environmental field, free of electives, and cut loose from the narrow academic confines of a biology department curriculum. Legal, social, cultural, and historical aspects of environmental issues should be discussed; I can guarantee the course will be relevant, exciting, and well-attended.

Recommendations of the 35th Federal-Provincial Wildlife Conference

Recommendation 1

That the conference express its appreciation to the Government of Ontario and especially to the Honourable Rene Brunelle, minister of Lands and Forests, Dr. Stuart Peters, executive director of Outdoor Recreation and their staff for the excellent arrangements and the warm hospitality extended to the delegates of the 35th Federal-Provincial Wildlife Conference.

Recommendation 2

That the structure of conference be revised to run for three complete days, during the first complete week of July, and that the provincial forum be scheduled to take one complete day of the three-day meeting.

Recommendation 3

That the conference express its concern that staffing in provincial and territorial wildlife agencies be adequate in order that the requirements of wildlife be properly considered in integrated resource management.

Recommendation 4

That the federal and provincial governments co-operate in protecting the white pelican colonies and other unique bird communities in Canada.

Recommendation 5

That the conference express its concern over the continuing lack of public understanding of wildlife management principles and objectives resulting in misconceptions about the role of hunting and its effect on species of wildlife and recommends:

(a) that federal and provincial agencies co-operate to improve public understanding of the effect of hunting;

(b) that the Canadian Wildlife Service information and interpretation programs give recognition to this problem, and

(c) that the Canadian Wildlife Federation take this problem into consideration and assist

in a program to improve the public image of the Canadian hunter, and

(d) that a co-ordinating committee be established to study the problem in detail and prepare recommendations for submission to the 1972 conference together with a report on action taken in the interim.

Recommendation 6

That the conference express its approval of the broadening program of activities by the Canadian Wildlife Service involving environmental issues, preparation of a federal wildlife act and socio-economic research into wildlife values.

Recommendation 7

That the conference recommend that all jurisdictions responsible for the management of polar bear immediately implement the tag system as recommended by the technical polar bear committee.

Recommendation 8

That the conference express its appreciation to C. H. D. Clarke for his pioneering efforts and for the dedication of Dr. Clarke in gaining recognition for and promoting the principles of scientific wildlife management in Canada.

Recommendation 9

That the theme for National Wildlife Week in 1973 be "Preservation of wetland habitat" and that all provincial agencies take advantage of the 1972 theme, "Conservation education", to become involved where possible through the regular educational system in promoting "Conservation education" in the school system.

Recommendation 10

That the National Film Board film *Atonement* produced for the Canadian Wildlife Service be withheld from public viewing until such time as it can be edited to show more about the scope of wildlife management and resource use.

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