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Wildlife

A number of the principal environmental concerns identified in Volume One of my report will be alleviated by implementation of the major environmental recommendations in that volume. My recommendations that no pipeline be built and no energy corridor be established across the Northern Yukon, and that a wilderness park be created in that area, are designed to protect this unique wilderness region. This region includes vital habitat for wildlife and migratory birds on the Arctic Coastal Plain and Old Crow Flats, and, in particular, the critically important calving and summer range of the Porcupine caribou herd.

My recommendations that no pipeline be built and no energy corridor be established across the Mackenzie Delta, together with the recommendations for the white whale sanctuary and bird sanctuaries in the outer Delta area, are designed to protect the unique land-and-water ecosystems that characterize the Delta and the littoral of the Beaufort Sea. Only in this way will it be possible to safeguard the critical life stages of the migratory birds, whales, and other mammals and fish that depend upon this fertile and productive area. In addition, the bird sanctuaries that I proposed along the Mackenzie Valley are designed to protect major populations of migrating and nesting birds at critical localities.

Beyond these recommendations, there must be a wide range of specific measures designed to avoid or to mitigate the adverse effects of construction and operation of a pipeline on mammals, birds and fish. In this chapter and the following chapter on fish, I present the criteria, approaches and standards that I consider appropriate for the protection of these valuable but vulnerable resources.

Of course, the pipeline project will inevitably have some environmental impacts that cannot be mitigated. So I emphasize the importance of minimizing disturbance and of maintaining land, water and air, insofar as possible, in their natural state. With regard to mammals, birds and fish, I focus my concern on critical habitats and critical life stages — on the tracts of land and water of limited size that are vital to the survival of whole populations of certain species at certain times of the year. The recommendations I made regarding

withdrawals of land for a wilderness park, a whale sanctuary and bird sanctuaries offer the firmest protection to such habitat, but further measures are needed. My recommendations for the protection of birds relate to their migration routes and their nesting, moulting and staging areas; those for mammals concentrate on calving, lambing or den sites, on winter habitats, and on travel routes. I emphasize protection for species that are harvested by local people, as well as rare species, such as the peregrine falcon, the survival of which is of national or international concern.

The great challenge we face in the Mackenzie Valley is to maintain its living resources, a challenge that demands the same resolve with which we plan the development of northern energy and transportation systems.

Mammals

Caribou and Reindeer

In Volume One, I discussed in some detail the importance and vulnerability of the Porcupine caribou herd and why I was convinced that a gas pipeline should not be built across the Northern Yukon. My major recommendations that no pipeline be built across that area, but that a wilderness park be established there, were designed to offer the firmest protection for the habitat of this herd. I also mentioned the Bluenose and Bathurst caribou herds, which winter close to the Mackenzie Valley; the woodland caribou, which are year-round Valley residents; and the semi-domesticated reindeer, which live in the Tuktoyaktuk peninsula.

According to testimony before the Inquiry, the Bluenose herd once wintered in the Mackenzie Delta and ranged west across to the foothills. In recent years, this herd has been reoccupying winter range near the Delta, and it is possible that gas production facilities and the pipeline may disturb the herd in that region. The herd's apparent increase in numbers and its expansion of range is and will continue to be an important feature in the renewable resource economy of the

people of the Mackenzie Delta and of the lower Mackenzie Valley.

The large-scale movements of migratory caribou herds allow them to use a wide range of habitat and environmental conditions. Nevertheless, the loss of any particular portion of a herd's total range may reduce its vitality and potential population.

The construction of a gas pipeline, the completion of the Mackenzie Highway, other developments, and increased access along the east bank of the Mackenzie River may, in my opinion, halt the continued westward expansion of this herd. The reduction of territory into which this herd might expand is, of course, significant, but it does not have the same serious implications for the future of the herd that the Dempster Highway and a pipeline along it would have on the Porcupine herd.

DEMPSTER HIGHWAY

In my discussion of the Porcupine caribou herd in Volume One (pp. 42-43), I drew attention to the impacts on the herd during migration and on its winter range caused by the existence of the Dempster Highway, by traffic on the highway, and by increased hunting related to the highway. These concerns have now been reinforced by the National Energy Board's decision to favour the possibility of a gas pipeline along a Dempster Route as well as by recent experience on the Dempster Highway.

The Dempster Highway and any pipeline along it would dissect the herd's winter range and might cut the herd off from a substantial part of that range. Although the Dempster Highway is not yet complete, there is evidence that the access it now provides to the herd's winter range and migration routes has greatly increased both subsistence and sport hunting in the region. Canadian Arctic Resources Committee, the Yukon Conservation Society and others, including Ronald Jakimchuk, a biologist who has spent years studying this herd, believe that the Dempster Highway poses a threat to its well-being. The threat comes from uncontrolled harvesting and from the obstruction to herd movements that the highway itself and traffic along it represents.

The whole point about the Dempster from an environmental point of view is that the decision to build the highway was made without adequate environmental assessment. But the highway is in place now. It is virtually complete, so we shall have to devise measures to cope with it. The highway must be our principal concern so far as protection of the Porcupine caribou herd's winter range is concerned.

I consider that measures are needed now to protect the Porcupine herd on its wintering range near the Dempster Highway. If we can devise measures to cope with the highway, we may, in due course, be able to cope with a pipeline along the same route if it comes. I deal with these measures in detail in the section on Wildlife Management

and Research, but I think this recommendation is appropriate here.

1. A restricted hunting zone should be established that extends two miles on either side of the Dempster Highway and of all connecting access roads and seismic lines within the winter range of the herd, but with provisions made for continued traditional use of this land by native people. All vehicle traffic and construction activity on the Dempster Highway should be controlled during the caribou herd's seasonal migrations through the region.

The Alaska Highway Pipeline Inquiry, in its report, made this statement on our present knowledge of the environment along the Dempster Highway:

First, there is not sufficient information, nor has there been adequate study, of the Dempster Highway as a pipeline route. Further environmental, economic, and social research is necessary before this route may be seriously considered as an alternative to a pipeline along the Mackenzie Valley. There is an urgent need for detailed and extensive studies on the Porcupine caribou herd, and for studies of the probable impact on the herd of increased human activity along the Dempster Highway. Time is essential to permit adequate study of these subjects.

Apart from the Porcupine caribou herd, there are other environmental consequences of a pipeline along the Dempster Highway that must be studied. No doubt much may be learned by the experience of constructing a pipeline across the southern Yukon, but, until we know much more about the Dempster Highway route, we cannot make an informed comparison of the advantages and disadvantages of that route and the one along the Mackenzie Valley. We therefore recommend that at least five years be given to studies of this nature. [p. 130]

I cite this recommendation because it is fundamental to the protection of the caribou herd and to the pending decisions regarding a pipeline along the Dempster Highway.

2. Before a pipeline along the Dempster Highway is given further consideration, the recommendation of the Alaska Highway Pipeline Inquiry should be implemented and a thorough comparison should be made of the alternative routes.

BARRIERS AND DIRECT MORTALITY

The possible effects of roads and other obstacles as barriers to caribou herds vary from minor diversions in the line of travel to delay in herd movement, increased exposure to hunters or to predators in unsuitable habitat, and abandonment of part or all of a traditional range. It has been demonstrated in Scandinavia and Alaska that highways and railways do not in and of themselves cause reindeer or caribou to abandon their ranges. However, in conjunction with heavy traffic and with hunting, which is of special concern (See Wildlife: Wildlife Management and Research), the herds are likely to abandon their ranges, with the result that a herd's population declines — perhaps drastically.

During construction, it should be possible to avoid most contact with the migrating caribou by the careful scheduling

of work, including contingency planning, and by continuously monitoring the progress of the migration. Despite wide annual and seasonal variations in the use of ranges and of travel routes, the traditional use of certain locations, such as river crossings, allows observers to make some predictions about migration.

A number of activities related to pipeline construction could constitute both a physical barrier and a direct threat to caribou. An operating spread, complete with open ditch, strung pipe and operating equipment, or a well-travelled highway or haul road could present a formidable hazard to a migrating herd or to individual animals. Snow fences in unbroken lines perpendicular to a migration path, deep-drifted snow associated with roads or fences, steep road embankments, and elevated portions of the pipeline and feeder lines could also be serious barriers to caribou movements.

The main concern, as I emphasized in Volume One, is the Porcupine caribou herd. There is no similar large migrating herd in the Mackenzie Valley, although the fact that the Bluenose caribou herd winters not far east of the proposed route and part of the herd winters in the vicinity of the route, suggests the possibility of some impact on it. Woodland caribou in the Mackenzie Valley could also be affected, but their low density and relatively local migrations should keep the impact on a minor scale.

3. *The Company shall schedule construction and all other activities associated with the project so that barriers to groups of caribou during migration or on their winter range are minimized. The Company shall, therefore, prepare detailed schedules, including contingency plans, to handle annual variations in the patterns of migration and occupation of wintering grounds. These schedules shall be approved by the Agency before the Company proceeds with construction.*

4. *Before and during construction, a monitoring program shall be maintained to define the seasonal distribution and day-to-day movements of caribou during critical periods. This monitoring program will form the basis of the Company's contingency plans to safeguard the well-being of caribou.*

5. *The Company shall submit to the Agency for approval, measures that will prevent caribou from being obstructed or entrapped by project-related activities. These measures may include but are not limited to the scheduling of construction to minimize the time lapse between trenching and backfilling; the construction of earthen plugs in open trenches to permit the animals to pass across or to escape from the trench; and the skewing or stacking of pipe strung out along the right-of-way to enable the animals to move freely.*

6. *The Company shall submit for approval by the Agency steps that will be taken to minimize any disturbance of, or interference with, the movement of concentrations of caribou that approach a construction site. These measures may*

include, but are not limited to, backfilling parts of the trench, moving pipe strung out along the right-of-way, and shutting down operations.

7. *The Agency should ensure that the design and maintenance proposals for any of the project's rights-of-way guarantee free and easy passage to the caribou. In particular, the Company shall design and maintain roads to ensure free and easy passage of caribou. Snow shall be controlled and cleared so that caribou movements are not impeded by long, unbroken stretches of snow fence or of deep drifts or snowbanks caused by snow fences or by road clearing. Snow fences shall be removed in spring before the caribou arrive.*

8. *To keep to a minimum the number of caribou killed as a direct result of increased hunting in the project area, the Agency, in cooperation with the Company and the relevant government departments, should restrict access to the pipeline right-of-way and related facilities to personnel directly associated with the project. (See Wildlife: Wildlife Management and Research.)*

9. *To avoid disturbance and mortality to caribou, a highway traffic management plan should be developed by the appropriate authorities for areas in which there are concentrations of caribou. Such measures as speed limits, convoying and staggered scheduling of traffic, and periodic closures of highways should be considered.*

HABITAT AND DISTURBANCE

In the Mackenzie Delta and Mackenzie Valley, the construction of gas plants, feeder lines, compressor stations and the main pipeline will not pre-empt any significant portion of the range of the woodland caribou, the Bluenose caribou herd or the reindeer. There are, however, some overall concerns about habitat that are related to fire and to emissions from facilities, especially because the production facilities and the pipeline are concentrated in the Delta, where a major part of the reindeer range and part of the Bluenose caribou herd's range is located.

The destruction of critical winter range by wildfires must be considered, although such fires will not necessarily be caused by activities associated with the pipeline project. There is some disagreement over what use caribou can make of recently burned areas, but it is evident that the animals avoid areas that have recently burned. The regeneration and growth of the lichens that are a major part of the caribou diet is very slow in the North, and for many years burned areas are unsuitable for pasturage. Although the number of fires may increase because of activity associated with the pipeline, better communications and improved access may help to reduce the total acreage burned.

10. *The Company shall develop contingency plans for the suppression of fires and give high priority to fire prevention and control in areas of important caribou habitat. (See Terrain Considerations: Forest Fire Prevention and Suppression.)*

Disturbance from a number of pipeline-related sources, including aircraft flights, machinery, human presence and compressor station noise, is potentially one of the most serious impacts on birds and mammals and is particularly significant for caribou. Although construction is scheduled for winter, a time when most animal species are widely dispersed, it is a time when the food supply is low and the animals' energy reserves are becoming depleted. The effects of disturbance can be severe.

Uncontrolled aircraft flights are probably the most serious form of disturbance. I deal with this in detail in the chapter on Aircraft Control, and make only one general recommendation here.

11. To minimize aircraft disturbance to caribou, the Company shall control the flying heights and the frequency of project-related air traffic over occupied caribou range.

Hunting and the increased presence of humans, which follows from easier access to a region, are other major forms of disturbance, both of which I discuss in more detail in *Wildlife: Wildlife Management and Research*.

If disturbance of wildlife is to be kept within acceptable levels, a number of regulations will have to be imposed. Many of my recommendations on this subject apply equally to birds and fish, and they may be found in relevant sections. Others that are related to project activities are contained in the appropriate chapters of Part Three: The Project.

White Whales

In Volume One, I dealt extensively with white whales and recommended that a whale sanctuary be established in the west Mackenzie Bay area and that no pipeline be built across Shallow Bay. These measures are necessary if we are to protect the calving areas of the Beaufort Sea population of white whales, but they will not totally protect the whales. The sanctuary is, in itself, a compromise between the needs of the oil and gas industry and the necessity for preserving critical habitat of the whales. Thus, my concern for the well-being of these marine mammals does not end with those measures. As I explained in Volume One, there is a great deal of gas and oil exploration going on in the Delta and offshore in the Beaufort Sea. This activity will not cease, even if a gas pipeline is delayed or is not allowed to cross Shallow Bay. Exploration and other activities, which will extend well into the future, continue to pose a danger to the white whales of the Beaufort Sea through increased disturbance from water and air traffic and because of the risk of oil pollution.

Investigations to date have not been detailed enough to draw firm conclusions about the effects of disturbance on white whales. In *The 1975 White Whale Study*, Slaney and Company summarized their four years of investigations on the impact of construction of offshore drilling islands and of barge traffic on the whales in this way:

Boat traffic has, in some instances, resulted in short-term

changes in whale distribution. Reaction of whales to boats is variable, probably due to the interaction of a complex of factors...

The possibility of adverse effects on whales and whale hunting as a result of current levels of industrial activity does exist, however, there is no evidence suggesting that the overall pattern of whale movement and/or hunting has been affected. [p. 41]

Dr. David Sergeant and Wybrand Hoek, in their testimony before the Inquiry, suggested that more detailed studies of the effects of waterborne noise on whales are required. They cited evidence from Churchill, Manitoba, where whales, because of increasing and continued disturbance, are believed to have abandoned their traditional calving area in favour of another area where they are not disturbed. The evidence stated that the white whales were most sensitive to waterborne disturbance during calving and were somewhat less sensitive to airborne disturbance.

Many aspects of the white whale's life cycle are not yet well understood. My concern is that whales outside of the proposed sanctuary may be adversely affected by the host of activities that are, and will be, impinging upon the white whale habitat in the Beaufort Sea as a consequence of oil and gas exploration, development, production and transportation.

Although existing levels of activity are producing only short-term effects, increased activity could result in long-term changes in the whale's pattern of behaviour, with consequences that could lead to a decline in the Beaufort Sea population of the species. Such changes could, of course, have a serious effect on the economy of native people who harvest white whales.

12. Shipping corridors should be established in the waters adjoining the outer Mackenzie Delta to avoid disturbing white whales, particularly during their calving season.

13. The Company, the Agency and the responsible government departments shall protect the white whales from disturbance by prohibiting harassment by low flying aircraft and water craft. Also, because information on the effect of air cushion vehicles on white whales is lacking, these vehicles should not be operated near the whales during their critical seasons.

Oil spills, whether from a blowout or from a tanker accident, are another potential threat to the whales. Although most adult whales could probably avoid an oil slick, females that are calving or nursing might be reluctant to move from the warm estuarine waters. And, if they did move, probably many newborn calves would lose body heat and die in the cold oceanic waters. An oil spill could also taint the whales' food.

14. Oil spill contingency plans prepared by government and industry shall outline measures to protect and clean up areas used by white whales for calving. (See Management of Fuels and Hazardous Substances.)

15. *The design and construction of feeder lines that connect offshore wells to the onshore pipeline shall avoid the areas and seasons that are of critical importance to the white whale population of the Beaufort Sea.*

Moose

Throughout the Mackenzie Valley, moose are an important species in the native economy. Moose range widely and are found throughout the forested region and, occasionally, above the tree line. The greatest cause for concern is that improved access will lead to increased moose hunting during and after pipeline construction. According to Dr. Peter Lent, a biologist with the University of Alaska, this has already happened in Alaska.

16. *To help control access and hunting, the Company, the Agency, and the relevant government departments should restrict access to the right-of-way and to related facilities to personnel performing work on the project. (See Wildlife: Wildlife Management and Research.)*

During winter, when the movement of moose is impeded by deep snow, weather and limited habitat, they gather in areas such as river valleys that provide shelter and food. Moose are sensitive to disturbance at this time, when, like the caribou, they are in a negative energy situation. Additional stress caused by disturbance would be detrimental to their well-being.

17. *Wherever practicable, the pipeline right-of-way and facilities, such as haul roads and compressor stations, shall be located to minimize disturbance to critical moose wintering areas and, in particular, to class 1 moose habitat (as defined by Watson et al., 1973.)*

18. *The Company shall minimize disturbance to moose by instituting measures such as those recommended in the section on Caribou and Reindeer above and in the chapter on Aircraft Control.*

Foxes and Wolves

Many witnesses from northern communities explained their fears of hydrocarbon developments in general and of oil spills in particular by describing what might happen to the arctic food chain. I dealt with this subject at some length in Volume One, but foxes and wolves are good cases in point. Arctic foxes are known to scavenge the seal kills of polar bears. Seals could be regionally depleted as a result of an oil spill, so although not directly involved, the arctic fox could certainly be affected in a serious way by activities associated with industrial development. Similarly, the decline of any of the ungulate populations, especially the barren-ground caribou herds, would affect the wolf population. We have to view foxes and wolves – indeed all animals – in the overall context of the food chain, but my discussion of them here will be limited to the species themselves.

The pipeline project will affect only local populations of arctic foxes, coloured foxes and wolves. The concerns for these species arise mainly in two areas: the disturbance of the animals and their habitat; and the attraction of these animals to waste disposal sites.

All three of these species den in high, well-drained soils – soils that frequently provide prime borrow materials for construction. Because the pipeline will be constructed during the winter, disturbance during the denning period may not be a problem since these species occupy their dens in the spring. However, the danger remains that denning sites may be altered physically or destroyed by the alignment of the right-of-way or by their exploitation for borrow material. This could be significant because all three species tend to use the same den sites year after year.

Many of the reported arctic fox dens are on the Yukon Coastal Plain. My recommendation for a wilderness park there should protect the habitat of that species as well as of the wolf population. Throughout the Mackenzie Valley and Western Arctic the dens of arctic fox, together with those of the coloured fox and wolf, will need protection.

19. *During final design, the Company shall identify all arctic fox, coloured fox and wolf dens within one-half mile of the right-of-way and other pipeline facilities so that the project can be designed, located and scheduled to avoid prime denning areas. Unless authorized by the Agency, construction shall avoid such areas by a distance of at least 100 yards.*

The habituation of foxes and wolves to waste disposal sites and other camp facilities has always been a problem in the North and it was of concern during the construction of the Alyeska pipeline. Concentrations of these animals around campsites may become a nuisance, and could cause problems associated with rabies.

20. *Every effort shall be made to prevent foxes and wolves from becoming a nuisance around campsites. To this end:*

The feeding of foxes and wolves shall be prohibited.

The Company shall manage all domestic and other waste in a manner that will minimize the attraction of foxes and wolves to construction sites and facilities. Fencing shall be installed around all incinerator, food storage and domestic waste handling areas. (See Waste Management.)

Bears

Grizzly, polar and black bears inhabit the Mackenzie Valley and Mackenzie Delta in varying densities. The grizzly bear of the Delta and central Arctic, referred to as the barren-ground grizzly, may be taxonomically distinct from the grizzly bear of the Yukon. If this is the case, the barren-ground grizzly bear would be considered endangered. Its special relation to the tundra environment gives the species evolutionary interest and significance, and every effort should be made to maintain a healthy population.

Interactions between men and bears are usually viewed as threats to human safety, and bears are therefore usually eliminated from areas in which there is human activity. As is the case with foxes, the concerns for bears arise mainly in two areas: the attraction of waste disposal sites and disturbance of the animals and of their denning habitat.

Because of ineffective waste management practices in the North, bears have been attracted to areas of human activity and many of them have been destroyed in the name of human safety. This is a problem that can be solved only by improved techniques of waste disposal. Except when human safety is immediately threatened, only an authorized government representative may dispatch the animal as the last resort after all other possibilities have been exhausted.

21. *The Company shall collect, store and dispose of all domestic waste in a manner that will minimize the attraction of bears to construction sites and facilities. (See Waste Management.)*

22. *The feeding of bears should be regarded as an act that threatens human life. Any person feeding bears should be immediately dismissed, reported to the Agency, and then returned to point of hire. Persons or companies who, through negligence or otherwise, provide bears with an opportunity to become habituated to waste materials should be prosecuted.*

23. *The Company shall ensure that each working unit (survey crew, right-of-way clearing crew, etc.) likely to encounter bears is equipped and familiar with the use of approved devices to scare bears away from centres of human activity. Each working unit shall be equipped with only one sealed firearm for use only when there is a real and immediate threat to human safety. Each firing of this firearm should be reported, and it must be resealed without delay by an authorized representative of the Agency.*

24. *The Company shall immediately report to the Agency any bear that may be considered a nuisance or that threatens human safety.*

Although construction of the pipeline will alter bear habitat only minimally, certain critical habitats must be protected. Denning sites are found on high, well-drained slopes, which are also good locations for borrow material. Bears occupy their dens during winter, and any occupied dens must be protected from disturbance. If a bear is disturbed and forced to abandon a den in winter, the lack of food, inability to dig a new den in the frozen soil, and the cold would certainly lead to the bear's death. At other times of the year, extended harassment might deplete stored reserves of energy or cause death by physical exhaustion or overheating.

25. *During final design, the Company shall identify bear dens within one-half mile of the right-of-way and other pipeline facilities so that the project can be designed, located and scheduled to avoid these sites. To prevent disturbance to denning bears, construction activities, especially blasting,*

shall avoid occupied dens by a distance of at least 500 yards, or as otherwise approved by the Agency.

26. *The Company shall institute measures to ensure that there is no harassment of bears by aircraft and vehicles and that encounters or conflicts between men and bears are minimized. (See Facilities Complexes and Equipment Operations, and Aircraft Control.)*

All three species of bears are hunted for food and sport, but the polar bear and grizzly bear are regarded as prize trophies. The harvest of polar bears is controlled by a quota system, whereas the harvest of grizzly and black bears is controlled by Territorial Game Regulations. Improved access, increased numbers of people and better facilities could have an adverse impact on the grizzly bear population.

27. *To prevent overharvesting, the government should review existing game regulations respecting grizzly bears. Particular consideration should be given to suggestions made by Pearson (1976) regarding new game regulations that might reduce overharvesting and permit bear populations to be maintained.*

Birds

It may be difficult for many Canadians to understand why it is necessary to make recommendations to preserve birds and their habitat. There has been a tendency to downplay the concerns expressed about northern bird populations by biologists and by others for whom birds are important. In most cases, I think this dismissive attitude is based on a misunderstanding of what is now at stake in northern Canada. The distribution of birds in the North is very different from what most of us have seen in southern Canada.

As I explained in Volume One, the Mackenzie Valley and, to a lesser extent, the shores of the Beaufort Sea, are major flyways for millions of geese, swans, ducks, gulls, terns and the many other species that converge on this region every summer to nest and raise their young. During these critical periods of their life cycles, these international bird populations rely on the habitat provided by the Mackenzie Valley, the Mackenzie Delta and the Beaufort Sea coast. Nature, political boundaries and treaties have made these populations a Canadian responsibility.

At least 230 species in 41 families of birds are nesters, migrants or casual visitors in the Western Arctic. Many of these species are continental in their distribution, so the proportion of their total population that might be affected by pipeline-related activities is small. Some species, however, are vulnerable to pipeline construction and operation either because a total population is relatively small or because a significant proportion of a total population gathers within the project area at some vital stage of its life cycle. For some

species, a significant proportion of their critical habitat lies within the proposed project area.

Every species of bird that is found in the area is an integral part of both northern and continental ecosystems. A rational approach to the problem of protecting these birds requires us to define exactly what is at stake and then to devise a practical means of ensuring that what must be protected is protected. No amount of research and certainly no recommendations that I can offer will afford complete protection to all of the birds everywhere in the region. Our objective, therefore, is to permit both international migratory populations and local populations to continue to use this region year after year without having their numbers progressively diminished.

With this in mind, I turn now to the critical habitats and critical life stages of northern birds, to those tracts of land and water that are vital to the survival of whole populations of birds at certain times of the year.

There are three major groups of birds that must be protected and, if measures are taken to ensure their protection, many other species will also be protected. The first group comprises the rare or endangered species, such as the peregrine falcon, the whooping crane and the Eskimo curlew, that are of national or international concern. Raptors and, in particular, the peregrine falcon, gyrfalcon, bald eagle, golden eagle and osprey make up the second group. Finally, there are the waterfowl, especially the species that nest in colonies or form large, vulnerable congregations during moulting and staging.

Areas Important to Birds

In Volume One, I made recommendations to protect critical habitats and life stages of birds by specially designating certain land areas that are vital to them. It was, in part, the very heavy avian use of the Northern Yukon that led me to recommend the creation there of a wilderness park. I also recommended that human use of certain areas be strictly regulated to protect important waterfowl and falcon habitats and I proposed the outer Mackenzie Delta, the International Biological Programme sites at Campbell Hills–Dolomite Lake, Willow (Brackett) Lake and Mills Lake as bird sanctuaries. I also noted that many islands in the Mackenzie River are important to migratory waterfowl and, I suggested that, at some time, some of them should be designated as bird sanctuaries.

The designation of lands on which industrial activity should be prohibited or appropriately controlled is only one way of protecting birds. When we have in view a specific project, such as a pipeline, a second method – that of specific regulations – is also appropriate. In my opinion, the protection of birds and their habitat can be achieved in three ways. First, the pipeline route and the location of its associated facilities can be adjusted. Second, engineering designs that minimize impact can be used: noise attenuation devices fall

into this category. Third, the timing of construction activities can be scheduled so that birds would not be disturbed during their seasonally critical life stages.

28. Birds and their habitat shall be protected from adverse effects associated with surveying, construction, operation and maintenance of the pipeline. Before construction begins, the Agency shall identify important and restricted areas and periods for birds, particularly for raptors, and waterfowl, and shall devise whatever restrictions may be necessary on project location, engineering design, project scheduling, access and aircraft activities in these areas and during these periods.

PROTECTION FROM SPILLS

Spills of oil, fuel and other hazardous substances are one of the greatest threats to birds and their habitat. Biologists spoke at length at the Inquiry about the devastating impact of oil spills on birds and emphasized that we are not able to rehabilitate birds that come into contact with oil, even in temperate climates. Waterfowl in particular are threatened by such spills. If extensive areas of waterfowl habitat or small areas used by large numbers of individual birds are affected by a spill, the effect could be catastrophic.

I dealt with the problem of spills at some length in Chapter Six of Volume One and I make specific recommendations elsewhere in this volume on the means of minimizing the chances of a spill. But because our ability to handle large spills is rudimentary and because the effects could be so severe, I make the following recommendation with specific reference to birds.

29. The Company's plans for the transportation, handling, storage and disposal of fuels, lubricants and other toxic materials shall demonstrate that bird habitat, and particularly waterfowl habitat, will be avoided or in some other way protected from the risks of spills. Contingency plans shall demonstrate that the Company has fully considered and has the technical, logistical and financial ability to protect critical waterfowl habitat. (See Management of Fuels and Other Hazardous Substances.)

PHYSICAL DISTURBANCE OF LAND AREAS

Other general issues related to bird habitat warrant mention. The bars and islands of the Mackenzie River constitute important mating and resting areas for migrating birds in the spring. Physical alteration of these areas may affect the birds' chances of breeding success and survival during the summer. I have already recommended in Volume One that these islands be designated as bird sanctuaries.

Specific activities related to the project will affect various aspects of terrain and water that are important for birds, particularly waterfowl, which tend to congregate in large numbers at various times in their life cycle. For example, trenching and other activities in wetland areas may lead to the draining or drowning of waterfowl nesting and feeding habitat, and excess siltation from stream crossings could

affect waterfowl food supply. The mouths of the tributaries of the Mackenzie River are particularly important habitat.

30. *Degradation of important bird habitat such as the river islands of the Mackenzie River, the beach bars of the Arctic Coast, wetlands and the riparian vegetation of streams and lakes shall be avoided, wherever possible, and shall otherwise be kept to a minimum. Critical habitat that has been degraded shall be restored following the construction period.*

DISTURBANCE FROM NOISE AND PEOPLE

There is much more to the disturbance of birds than simply startling them. If that were the only problem, the birds would probably fly from the area, alight elsewhere and carry on as normal. The problems of disturbance are far more complex. The disturbance of birds during critical life stages or in critical areas may lead to abandonment of nesting sites and death. Take the case of the snow geese: because they nest in colonies, any continuous disturbance of them during their nesting season could cause the loss of one year's brood through exposure of the eggs or young to the weather or predation; similarly, if snow geese were harassed on their fall staging grounds and were, therefore, not able to store up enough energy, large numbers of them could die on their southward migration.

Most construction activity will take place in winter when there are few birds in the area. Nonetheless, during the summers of the construction period, there will be movements of aircraft and barges, activities at stockpile sites, compressor sites and airfields, and perhaps operations at gravel pits and other activities along the pipeline route. During the operation of the pipeline, there will be noise from compressors and from pipe blowdowns, aircraft and barge movements, vehicles, and repair and maintenance work. I make specific recommendations on many of these activities in Part Three: The Project, but it is worthwhile to review here the scope of the problem in its ornithological context and to make appropriate recommendations to mitigate the adverse effects.

31. *As far as practicable, construction and maintenance activities shall be scheduled for winter or for other times of the year when birds are not present. Activities undertaken when birds are in the area shall be strictly controlled to limit the extent and level of disturbance.*

There will be substantial numbers of people working at wharf, stockpile and compressor station sites during the summer. The amount of disturbance to the bird populations near any given facility will depend on the type and frequency of the disturbance emanating from the site, its effects on surrounding vegetation and topography, and the sensitivity of particular species to disturbance.

The location of pipeline facilities and of ground-based activities will be critical to the well-being of raptors and colonial nesting birds. Any source of disturbance that is immediately adjacent to the nesting areas of these birds could

have a serious effect on them. Both groups are particularly sensitive to human presence when they are nesting and rearing their broods. Unrestricted human access to their nesting areas could lead to reduced reproduction of these species.

Compressor stations located near sensitive wildlife areas are of particular concern. I note that the National Energy Board has accepted Foothills' undertaking to keep noise from compressor stations down to 60 decibels (dBA) at the fence line. However, research commissioned by the pipeline companies has suggested that even that level of noise can have significant effects on bird populations. Staging snow geese vacated an area within 1.5 miles of a compressor-station-sound simulator that had a noise level of 50 dBA at 1,000 feet, and it was suggested that a level of 56 dBA at 1,000 feet would cause geese to vacate an area within a 2.5-mile radius. Extensive observations of geese during the drilling of Imperial Oil's gas well at Taglu suggested that staging geese would vacate an area within a 5- to 10-mile radius around a compressor station, depending on the amount of aircraft disturbance associated with the site.

32. *The Company shall locate all facilities and design all devices associated with those facilities to minimize disturbance to birds. In particular, noise attenuation devices shall be installed on all appropriate equipment to reduce noise to the lowest practicable level. In certain locations and at certain times that are deemed to be sensitive for birds, the Agency may require special noise attenuation equipment and procedures. (See Facilities Complexes and Equipment Operations.)*

33. *Upon request, the Company shall provide the Agency with all data used to assess the cost-effectiveness of various levels of attenuation and to assess the impact of various levels of noise on birds at any construction site.*

Of all the forms of disturbance to birds that may be caused by industrial development in the North, uncontrolled movement of aircraft is potentially one of the most serious. The degree of susceptibility to such disturbance will vary among the species, depending on the season, weather and location.

Ornithological studies submitted to Arctic Gas have suggested that aircraft disturbance may cause gyrfalcons to abandon their nests and that staging snow geese may be disturbed within nine miles by a light aircraft flown at an altitude of 10,500 feet. The results of many of these studies are inconsistent, and firm conclusions based on them are not possible. However, because aircraft will be a major means of transportation during construction and operation of the pipeline, some form of control will have to be exercised to regulate the altitudes and frequencies of aircraft flights.

The protection of birds through the regulation of aircraft is such an important issue that I discuss it in a separate chapter entitled Aircraft Control. There I make proposals for flight corridors and the regulation of flight ceilings and schedules so

that critical locations and life stages of the bird populations that are susceptible to disturbance may be avoided.

Increases in river traffic during the construction and operation of the pipeline and related facilities are also a source of disturbance for birds. The Mackenzie Valley is one of North America's most important flyways. In spring, the northward migrating birds generally pass through before the barging season on the river begins. But in years when waterfowl, especially geese and swans, may not have stored up enough energy for their flight south, the islands and bars in the Mackenzie River become extremely important to them as resting and feeding areas. Barge traffic at this time might so disturb the birds that many of them would fail to complete their flights south. Increased barge traffic may also disturb ducks in the Beaver and Mills Lakes areas, but it is in the Mackenzie Delta that disturbance from such traffic would be most serious. There waterfowl use the river islands and channels for moulting and staging sites from July to September.

34. *The routing and scheduling of water traffic shall be regulated to minimize the impact on birds and their habitats during sensitive periods in the Mackenzie Delta and elsewhere along the Mackenzie River. Water traffic shall avoid areas identified as critical to bird populations. Similarly, docking and other shoreline facilities shall be located to avoid the disturbance of such areas. (See Facilities Complexes and Equipment Operations.)*

Rare or Endangered Species

At present in Canada, there is no official federal recognition of any rare or endangered species, and because there is no national policy or legislation for dealing with such species, the designation of a species as rare or endangered may be highly subjective. Under these circumstances, it is difficult to ascertain the relative significance of the designation of a species as rare, uncommon or endangered.

During the Inquiry, mention was made of many species, the majority of which are birds, that biologists consider to be rare or endangered. The peregrine falcon, whooping crane and Eskimo curlew are the best known of this group, which also includes the Hudsonian godwit, buff-breasted sandpiper and Thule white-footed goose. Except for the peregrine falcon, little attention was focused on any of these species, perhaps because our knowledge of them is limited. My concern for the peregrine falcon is dealt with below in my recommendations on raptors. The breeding habitat of the whooping crane is already protected, and it is unlikely to be affected by the present alignment of the pipeline. So little is known of the ecology of the other rare and endangered birds that it is impossible at present to make recommendations to protect them. Continuing research will reveal more information about these birds, but in the meantime recommendations to protect other species will hopefully protect rare species.

We have an obligation to do all we can to ensure the survival of species of birds that may be in danger of extinction, especially if that danger is caused by human disturbance.

35. *The government should develop a national policy and should draw up legislation to provide for the protection of rare and endangered species of birds.*

Of course, the problem of rare and endangered species goes well beyond bird species. The bowhead whale inhabits the offshore waters of the Beaufort Sea and is listed by the International Whaling Commission as being endangered. The barren-ground grizzly bear that I mention in *Wildlife: Mammals* may also be considered rare or endangered.

Raptors

The raptors (birds of prey), that nest in the Western Arctic constitute a significant proportion of the remaining North American populations of these species. There are nesting sites all along the Mackenzie Valley and, in particular, in the Campbell Hills and Franklin Mountains.

Raptors such as the falcons, bald eagles, golden eagles and ospreys are fairly common in the North, although their populations elsewhere in North America are low. It is necessary to give northern populations of all raptors attention, but it is the peregrine falcon that requires particular protection. Here is what Finney and Lang said in a report prepared for Foothills Pipe Lines Ltd.:

The population [of the peregrine falcon] is at a dangerously low level and there is no indication that recovery is imminent. Due to the sensitivity of the peregrine population, developers have to face the fact that the destruction of a single nest site or interference with nesting in a single year is a serious and unacceptable impact. These constraints apply to no other bird species regularly nesting along the proposed pipeline corridor. [Finney and Lang, 1975, *Biological Field Program Report: 1975*, Vol. VI Section 4, p. 32]

The recommendations I make for raptors therefore apply primarily to the peregrine falcon.

The maintenance of wilderness within critical distances of the nest sites is of paramount importance because raptors are extremely sensitive to disturbance by men, machinery and aircraft. Such disturbance could cause direct destruction of the eggs or young by exposure, predation or accidental ejection of the eggs or chicks from the nest, or it could reduce the wilderness seclusion of the area around the nest so that it was no longer acceptable to the breeding pair. Low-intensity, repeated disturbance over a period of time frequently has a cumulative effect that leads to permanent desertion of the nest. We can best protect raptors by isolating their habitats from the disturbances caused by the project.

36. *The pipeline and its related facilities shall be located, designed, constructed and operated in a manner that avoids disturbance to raptors and their habitat.*

37. For purposes of project review and control, the Agency shall designate Raptor Protection Zones around regularly and irregularly occupied raptor nest sites that are considered to be threatened by project activities. Such zones should be applicable to peregrine falcons in particular but may also apply to other raptors. These zones should be approximately two miles in radius or of the size that is required to protect the nest site. Access to these zones shall be prohibited unless authorized by permit.

Applications for an access permit to Raptor Protection Zones shall be accompanied by sound biological evidence that the proposed activity will not jeopardize the raptors during their nesting period and will not adversely affect the nest site itself.

Because of the need to provide complete protection for raptors and their habitat, the Company must understand that there may be lengthy delays if it plans to undertake activities in a Raptor Protection Zone.

38. To limit disturbance to raptors, barging operations and other movements of pipeline material that infringe on any Raptor Protection Zone during the periods of occupancy shall be subject to site-specific limitations imposed by the permit.

39. The frequency and altitude of aircraft flights over Raptor Protection Zones shall be controlled by the Flight Control Group. (See Aircraft Control.) In general, aircraft shall maintain an altitude of at least 3,000 feet above ground level over any Raptor Protection Zone during a sensitive period. Flights at lower levels shall be diverted around the zone. Airstrips and heliports shall be located so that approaches and take-offs avoid Raptor Protection Zones. Pipeline surveillance flights at less than 3,000 feet above ground level, helicopter landings and motorized terrestrial access for maintenance or repair shall be prohibited within a Raptor Protection Zone during the period of occupancy, except as specifically authorized by the Agency.

Waterfowl

The Beaufort Sea coast, particularly the Blow River-Shallow Bay area and, to a lesser extent, the coastal plain out to Herschel Island, provides important nesting habitat for whistling swans. Brant, many species of ducks, loons, gulls, and other species use the coastal lagoons, beaches and islands of the Beaufort Sea as resting, nesting and moulting areas. From June through August, the tundra lakes of the Yukon Coastal Plain are important nesting, feeding, brood-rearing and moulting areas for many species of swans, geese, ducks, loons and shorebirds. At any one time in the late summer and autumn, between 300,000 and 500,000 geese, swans and ducks gather on the Yukon Coastal Plain and Shallow Bay for a period of concentrated feeding to build up their energy reserves for the long southward migration. Snow geese are most numerous during this period and, on any one day in late August, almost the entire Western Arctic population of this

species might be gathered on the coastal plain between Bathurst Peninsula and the Canning River in Alaska. Old Crow Flats, in the Yukon interior, are second only to the Mackenzie Delta as a critical waterfowl production area in northwestern Canada.

In Volume One, I recommended that no pipeline be built and no energy corridor be established across the Northern Yukon and that a wilderness park be created in that area. This recommendation was intended, in part, to protect vital habitat for waterfowl there.

The Mackenzie Delta is also an important waterfowl production area and it has breeding populations of several hundred thousand ducks and geese. Of particular concern are the snow geese at Kendall Island, where there is a colony of 1,200 to 8,000 breeding birds; approximately 20,000 whistling swans nesting in the Eskimo Lakes-Liverpool Bay area; and the rare trumpeter swan, which has been reported nesting near Moose Channel. Many parts of the Delta are critical for moulting ducks, swans and geese during summer. For example, in any given year the Delta may be as vital as the Yukon Coastal Plain to the snow geese. Normally, the majority of the snow geese stage on the Yukon coast, but, in 1975, when the geese arrived in early September it was covered with snow and most of the geese moved into the Shallow Bay area of the Delta. The peak number of geese there, at that time, was an estimated 325,000 out of the region's total population of 375,000. Snow geese are easily disturbed by aircraft movements of the kind that would be associated with the construction and operation of a pipeline and production facilities.

In Volume One, I recommended that a bird sanctuary should extend across the outer part of the Mackenzie Delta, thereby giving the Canadian Wildlife Service jurisdiction to regulate industrial activity in the area.

The Mackenzie Valley, one of North America's major flyways, is used by many species of birds that breed in the Western Arctic and sub-Arctic. In May and early June, large numbers of migrating waterfowl find the only available open water around islands in the Mackenzie River between Camsell Bend and the Mackenzie Delta and in some of the lakes near the river. At this time, these areas of open water are heavily used for mating, nesting and feeding. As many as 100,000 northbound geese and swans may be concentrated on sandbars, spits and island fringes. These same areas also provide resting areas vital during the fall migration in years when young birds have been unable, for any reason, to store adequate reserves of energy to complete their long southward migration. With so short a season, the waterfowl cannot be delayed, and disturbance of them must be kept to a minimum.

Large numbers of ducks, some Canada geese, sandhill cranes, loons and various other species, nest in the forest and forest-tundra habitats of the Mackenzie Valley. The Ramparts River, Mackay Creek, Willow (Brackett) Lake, Mills Lake and Beaver Lake areas are the most important nesting,

brood-rearing, moulting and staging areas for water-oriented birds in the Mackenzie Valley between Great Slave Lake and the Mackenzie Delta.

In Volume One, I recommended that Willow Lake (Brackett Lake) and Mills Lake, which were identified under the International Biological Programme as sites important to waterfowl, be designated as bird sanctuaries.

In addition to the designation of sanctuaries, regulations will have to be developed to control the adverse effects on waterfowl of activities associated with pipeline construction. Disturbance to populations of waterfowl could increase stress and alter normal behaviour patterns during critical life stages, such as spring migration, nesting, moulting and staging for fall migration. Disturbance could also decrease reproduction success and cause birds to desert traditional areas, such as nesting sites for which there may be no suitable alternative. The impact of disturbance on a particular species is a function of the type and intensity of the disturbance, as well as of the time of year, location, distribution of the species, and its sensitivity to disturbance and its ability to avoid the sources of disturbance. These variables become more important farther north, where shorter summers impose even tighter limits on the hatching and raising of healthy young in time for the fall migration.

40. *The Company shall control, restrict and otherwise alter its terrestrial and airborne activities and those of all its contractors and subcontractors to avoid disturbance to waterfowl and their habitat and to comply with restrictions of access and activity in important waterfowl areas, as defined by the Agency. Such measures should include the designation of corridors for air traffic and the designation and regulation of flight altitudes. (See Aircraft Control.)*

a) *Habitat critical during the spring migration throughout the Mackenzie Valley, including islands, deltas of tributaries, and adjacent marshes. Within these critical habitat areas, concentrations of birds should be protected from disturbance by a two-mile-wide buffer-zone. The period of restriction would generally be from May 1 to May 31. In addition, if these areas are used in the fall by migrating geese and swans, contingency plans should provide for the adequate protection of the birds and this habitat during such periods.*

b) *Areas in the Mackenzie Delta where there are concentrations of migrating, nesting, rearing, moulting and staging geese and other waterfowl. In general, construction activities should be minimized and personnel should be restricted to their immediate work areas from May 5 to October 5.*

c) *Areas critical for snow geese. All construction and other activity likely to cause disturbance and all human access should be strictly controlled within two miles of occupied areas from about August 15 to October 15.*

d) *Waterfowl habitat in the Mackenzie Valley forest areas between Great Slave Lake and the Mackenzie Delta.*

41. *Because of the extensive disturbance created by air cushion vehicles to waterfowl while they are nesting, rearing their young and staging, these vehicles shall be prohibited within the critical waterfowl areas described above, while birds are concentrated in them.*

Wildlife Management and Research

It became evident during the Inquiry that, although the North has abundant wildlife resources, relatively little scientific information is available about wildlife populations. In this respect the North is still very much a frontier area. Much of the information that is available has been gathered as a result of gas and oil exploration and the proposal for a gas pipeline. As I stated in Volume One, much more information is needed if the populations of northern birds and mammals are to be managed scientifically for the benefit of northerners and conserved for all Canadians.

At present, five separate agencies are responsible for the management of northern wildlife resources. The Yukon Game Branch and the Northwest Territories Fish and Wildlife Service are responsible for the management of mammals and non-migratory birds, including raptors, within their respective territories. The Department of Indian Affairs and Northern Development is responsible for land management within the Yukon Territory and the Northwest Territories. The Canadian Wildlife Service, Department of the Environment, is responsible for the management of migratory birds, and the Fisheries and Marine Service, also part of the Department of the Environment, is responsible for the management of marine mammals.

During the Inquiry, I heard from representatives of all of these government agencies. The general conclusion was that, without more intensive wildlife management, a gas pipeline could have severe and long-term effects on many wildlife populations. Although there has been industrial development of various kinds in the North for some time, the pipeline is regarded by many as the first in a series of large-scale industrial developments there. I concur with this view; as I stated in Volume One, construction of a gas pipeline will

trigger a series of other activities, and the pipeline should not be viewed in isolation. Without effective wildlife management programs many of the now abundant populations will decline.

Northern Wildlife Management

The essence of wildlife management is the manipulation of an animal population or its habitat for the benefit of man. The territorial government's wildlife management programs are, for the most part, directed towards the benefit of native people. Dr. Norman Simmons, Director of its Fish and Wildlife Service, described territorial policy to the Inquiry: "The management programs of the Fish and Wildlife Service are designed primarily to satisfy the food and psychological requirements of [the] indigenous people." (F20898) Whereas management policy may have these objectives at present, that has not always been the case. Commission Counsel summed up what I think has been, and is still, an essential fact about wildlife in the North:

The recent history of the North is replete with examples of the ability of mechanized man to decimate animal populations. These include not only the well-known nineteenth and early twentieth century examples, such as fur seal, sea otter, balcen whales, muskoxen, and caribou, but also more modern instances of wildlife depletion by northern residents, witnessed by the wildlife vacuums surrounding all northern centres of habitation. Where abundant wildlife populations still exist in the North, it is generally due in large part to limited human access. This isolated position of large areas in the North is rapidly being reduced. Without corresponding large scale increases in wildlife management efforts in the North, this loss of isolation will be accompanied by rapid depletions in many animal populations. [Commission Counsel, 1976. "Wildlife Protection: Wildlife Management and Monitoring," p. 1]

In the previous sections that describe individual species, I repeatedly mentioned the two most important causes of impact: disturbance and increased access. These causes may have long-term effects and may cover a much larger area than the actual right-of-way of a pipeline. Having already discussed this problem as it relates to individual species, I shall discuss later the measures necessary to mitigate disturbance from specific aspects of this project.

Increased use of many areas that are still virtually wilderness areas will be a direct result of the greater numbers of people and of better and more facilities in the North. This threat to many wildlife populations is recognized by, and accepted to be, the responsibility of the wildlife management agencies. The success of a game management policy, whatever it may be, depends to a considerable degree on the staff and the funds that are made available. Even today, these agencies do not have adequate resources to meet their full range of responsibilities.

If northern wildlife is to be preserved, funds for management and research are required, whether or not a pipeline is built tomorrow or ten years from now. Not only will the

wildlife aspect of the Agency have to function during the construction of the pipeline, but the management functions of the various wildlife departments will have to be increased to meet a broad range of demands stimulated by the pipeline development. Because these increases will in part be directly attributable to the pipeline construction, it is logical that at least some of these costs should be borne by the Company. This is not a new concept: the development of the James Bay hydro-electric project has involved Hydro-Québec financially in the surveys of native harvests now going forward.

42. In addition to funding the Agency so that it may undertake its functions related to wildlife, the government should ensure that the funding of various other agencies and organizations before, during and after pipeline construction is sufficient for them to meet increased responsibilities related to wildlife management and research in the face of a major industrial development. In so doing, the government should ensure the meaningful involvement of native organizations in all aspects of wildlife management in the region and should specify the extent and nature of the financial and professional involvement that will be required of the Company during the life of the pipeline.

In Volume One, I indicated that certain areas should be excluded from industrial development and that certain other areas, such as bird sanctuaries, should be closely managed by the responsible government agency. The wilderness park in Northern Yukon and the whale sanctuary in the Beaufort Sea come into the first category, whereas the expansion of the Kendall Island Bird Sanctuary and the designation of the Mills Lake and Brackett Lake sites as sanctuaries come into the second. So far, in this volume, I have recommended that protection zones be set up around raptor nest sites, especially those of the peregrine falcon; that a game preserve be established along both sides of the right-of-way and around all pipeline facilities; and that a similar game preserve be established along both sides of the Dempster and Mackenzie highways. These areas of excluded or restricted access that I have identified are a major tool of wildlife management. There are, however, a variety of other means to effective management that must be used to protect wildlife populations so that they may continue to be used as renewable resources. I shall deal more explicitly with these other means in the following paragraphs. Because aircraft are considered a major source of impact, I have dealt with this subject in a separate chapter entitled Aircraft Control.

Wildlife Management and Pipeline Regulation

During the Inquiry, it became apparent that, at all stages of the pipeline project, programs dealing with the enforcement and adaptation of regulations, the rehabilitation of habitats, and contingency plans are central to ongoing comprehensive wildlife management. For example, advice from wildlife specialists will be needed to review designs and to approve

schedules, the location and relocation of facilities, and equipment.

The inspection and enforcement of regulations governing pipeline construction activities will be very difficult tasks, especially since they may lead to delays or work stoppages. Field inspection staff will have to be given pragmatic training and the authority to carry out their duties effectively. If they do not have that authority, there will be needless delays, frustration and non-compliance. The greatest emphasis must be placed on having knowledgeable and experienced people in the field while construction is underway.

During the construction phase it will be necessary to document changes in the numbers and the movements of animals, damage to habitat, success of mitigative measures, and so on. Without collection and assessment of this type of information, the impact of the pipeline would not be apparent nor would mitigative techniques and methods be progressively improved.

43. To ensure that the concerns for wildlife that have been expressed are considered and incorporated during all stages of design and that regulations concerning wildlife are enforced during the construction of the proposed pipeline, the Agency staff shall include specialists and high-level administrators to review and approve designs, to inspect and to enforce regulations, to design mitigative measures, and to collect and evaluate data on both the project and wildlife activities. These activities must be done in close coordination with the appropriate wildlife management agencies of government and must involve consultation with and input from native organizations.

The regulation of the pipeline operation will involve protection of mammals and birds from the noise and disturbance involved in starting up the pipeline, in the routine operation of compressor stations and other facilities, in routine maintenance and repairs, and in contingency repairs. I assume that the Agency will be terminated soon after construction of the pipeline is completed and, therefore, that the regulatory tasks necessary during operation of the pipeline will become the responsibility of the permanent wildlife regulatory bodies under whatever arrangements may apply after the settlement of native claims.

44. Before the Agency is disbanded at the end of the construction period, the roles of ongoing wildlife agencies and the responsibilities of the Company should be established. Consideration should be given to factors such as who will assume specific Agency functions during the operation and abandonment phases of the pipeline, and the funding and staff requirements necessary to maintain a comprehensive monitoring and management program.

Hunting and Access

One of the major concerns that I have mentioned throughout this chapter and in Volume One is that the construction of this pipeline will afford easier access to areas that have, until now, been relatively inaccessible to man. This improved access, together with the increasing number of residents and tourists in the North, will undoubtedly increase stress on many wildlife populations through direct mortality (hunting), by increased disturbance, and by habitat loss or alteration.

Both Foothills and Arctic Gas have stated that movement of pipeline personnel will be restricted and that they will not be allowed to hunt on company property. The pipeline companies will similarly restrict access to the right-of-way and to the pipeline facilities to company personnel. However, in view of the large number of people that will be attracted to a major project of this sort, it will be difficult for the Company alone to enforce these good intentions. Therefore, to protect the wildlife populations and the traditional harvest of them, a number of measures are required that will go beyond the Company's jurisdiction.

It will be necessary to control in some manner access to the right-of-way and to all access roads, wharves and other pipeline facilities. Otherwise many wildlife populations will decline or they will abandon certain areas.

One particularly important aspect of game management is the need to protect the Porcupine caribou herd in the vicinity of the Dempster Highway, both from the adverse effects of the highway and its traffic and from increased hunting pressure that has followed the highway. In Volume One, I quoted Ronald Jakimchuk on this subject. After publication of Volume One and of the National Energy Board report, he wrote to me about his observations along the Dempster Highway this spring. He said, "The herd is in existing and continuing jeopardy from the Dempster Highway." He urged "a commitment by government to implement timely regulations . . . to ensure free and unimpeded movement of migrations and to monitor and regulate the kill," and he added, "The proposed wildlife range does not solve these problems as it does not encompass the Dempster" (Jakimchuk, personal communication, June 17, 1977).

In view of the continued work on the Dempster Highway and the undoubted increase in traffic and hunters on it when it has been completed and particularly in view of the endorsement that the National Energy Board has given to the idea of a pipeline along the Dempster Highway, I consider that it is of great importance for government to institute measures as soon as possible to protect the herd when it is near the Dempster Highway and to reinforce these measures whether or not a pipeline is built along the highway.

45. A two-mile restricted hunting zone should be established along both sides of the pipeline right-of-way and all access roads and around all pipeline facilities. A similar restricted

hunting zone should be established along the Dempster and Mackenzie highways and all access roads that are within the winter range of the Porcupine caribou herd. Within this game preserve, traditional native harvesting would be allowed to continue, provided that the wildlife populations can support such harvesting.

46. The government should develop a traffic management plan for the Dempster Highway and other rights-of-way in areas that are important to caribou. When caribou are present in such areas, regulations such as slower speed limits, convoying or the staggered scheduling of highway traffic, and periodic closures of sections of the highway that may be the locations of large-scale caribou crossings should be instituted.

47. During construction the Company shall limit access to its facilities to only those persons who, in the course of their employment, need to be there. All haul and access roads, the right-of-way, and all airstrips and helipads built and operated by the Company shall be closed to public access, except in emergency situations or as approved by the Agency.

48. After pipeline construction is completed, the Company shall remove or otherwise make unusable (in an approved manner) all access facilities and structures that are not necessary to the continued operation of the pipeline.

49. To help control hunting during and after pipeline construction, revisions to the hunting regulations should be contemplated. Measures such as increasing the length of the residency requirement to obtain a hunting licence and restricting hunting areas and seasons, should be actively pursued. (See Renewable Resources.)

Wildlife Research and Monitoring

In Volume One, I drew attention to our lack of knowledge about northern birds and mammals, which, according to the biologists who gave evidence before the Inquiry, has hampered them in predicting the impacts of pipeline development. This lack of knowledge will also hamper the development of measures for the protection and management of wildlife during construction and operation of the pipeline.

50. *Wildlife studies should be undertaken before, during and after pipeline construction to gauge the nature of populations, to develop comprehensive mitigative responses and to assess the effectiveness of ameliorative measures on both a short- and long-term basis.*

MONITORING

The monitoring of animal populations involves repeated checks or surveys of the populations to determine whether or not there are changes in the health, demography or distribution of a population. Monitoring is also used to document the movements of migrating animals. Should a migrating population come into contact with development activities, the knowledge gained from monitoring permits appropriate

precautions to be taken. Both short-term and long-term monitoring programs are necessary in any management plan to protect wildlife.

Obviously it is not possible, at this time, to specify which mammal or bird populations will have to be monitored, or where and when the monitoring will have to be done. These matters will have to be worked out by the relevant wildlife management bodies, the Agency and the Company.

51. *Because a wildlife monitoring program is vital to any successful plan to observe and to mitigate impacts on wildlife resources, a comprehensive short-term monitoring program shall be an integral part of the work of the Agency. This program shall be designed to locate migrating mammals or birds and sites of concentrated wildlife activity and, on the basis of this information, to alter pipeline project activities that may cause unacceptable impact. This monitoring should also be used to assess the effectiveness and improve remedial measures.*

52. *The long-term monitoring program associated with continuing wildlife management in the region should be the responsibility of ongoing wildlife management agencies. Such a program should start before construction and continue through the life of the project and afterwards, to determine the health of populations and to develop comprehensive management programs that relate to all aspects of the wildlife resources in the region. This, of course, must include a harvest monitoring research component. (See Renewable Resources.)*

WILDLIFE RESEARCH

The Inquiry was presented with a variety of proposals regarding the research that is needed to understand the impact of pipeline development on mammals and birds and to serve as the basis for programs of wildlife management and protection. Such proposals can be found in material presented by Canadian Arctic Resources Committee, Committee on Original Peoples Entitlement, Environment Protection Board and Commission Counsel, in the evidence of witnesses, in exhibits filed with the Inquiry, and in the final arguments before the Inquiry. For example, Canadian Arctic Resources Committee's "Final Arguments and Recommendations" contains a multitude of recommendations for wildlife studies, including 39 separate research proposals related to caribou.

The studies that have been proposed differ greatly in urgency, practicality and utility for wildlife management as it relates to pipeline development. But it is clear that there are important gaps in the knowledge that is required for effective wildlife management and that a great deal of field research is needed to fill these gaps.

53. *Concrete plans for research that is essential to wildlife management in relation to pipeline development should be prepared by the agencies that regulate wildlife. The government should make funds available for this purpose so that*

independent government research may be started well ahead of the commencement of construction of the pipeline.

To those charged with planning this research, I particularly commend Commission Counsel's proposal for disturbance studies (Commission Counsel, 1976, "Wildlife Protection: Wildlife Management and Monitoring," p. 7).

54. *The effects of various forms of disturbance, such as aircraft, noise from fixed facilities, blasting, ground transport and watercraft, on wildlife populations should be studied in*

some detail to allow more precise prediction of these effects. The following groups of animals and birds are pointed out as species that deserve particular attention in these studies: all species of geese, swans and eider-ducks, especially at their moulting and spring and fall staging sites; all species of raptors, but particularly peregrine falcons, because more precise definition of the zone of protection for them and the degree to which raptors may adapt to various disturbances is required; and caribou, including behavioural and physiological reaction to various disturbances.