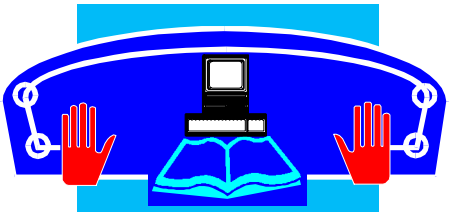

The Potential Effects Of Increased Industrial Activity On Polar Bears In The Beaufrot Sea

Wildlife Products, Nwt Wildlife General

Date of Report: 1983

Author: G.n.w.t. - Beaufort Sea Environmental Assessment Panel

Catalogue Number: 5-1-51

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Sector: Wildlife Products

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Analysis/Review

Government of the Northwest Territories
Submissions to the

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1983

THE POTENTIAL EFFECTS OF INCREASED INDUSTRIAL ACTIVITY ON POLAR BEARS IN THE BEAUFORT SEA

1983

Paul Latour

September 1983

A. INTRODUCTION

Several populations of polar bears (Ursus maritimus) could be affected by hydrocarbon exploration, production and transportation in the area outlined by the Proponents in the Environmental Impact Statement (EIS). These populations have been identified through population ecology studies of polar bears conducted during the last 15 years (Stirling et al. 1975, 1980; Stirling 1978; Schweinsburg et al. 1981). My evidence deals primarily with that population of polar bears described by Stirling et al. (1975, 1978 and 1981) which occupies the offshore Beaufort Sea region extending from the Alaska-Yukon-Northwest Territories mainland and the west coast of Banks Island eastward to include Amundsen Gulf (Figure 1).

Polar bears are a species of cultural and economic value across much of the Northwest Territories (NWT). Inuvialuit hunters harvest approximately 90 polar bears annually from the Beaufort Sea population under a strictly controlled community quota (Schweinsburg 1981). In addition, polar bears assume national and international importance under such charters as the Northwest Territories Act (endangered species), Convention on International Trade in Endangered Species (control list #1) and the Agreement on the Conservation of Polar Bears (1976) which

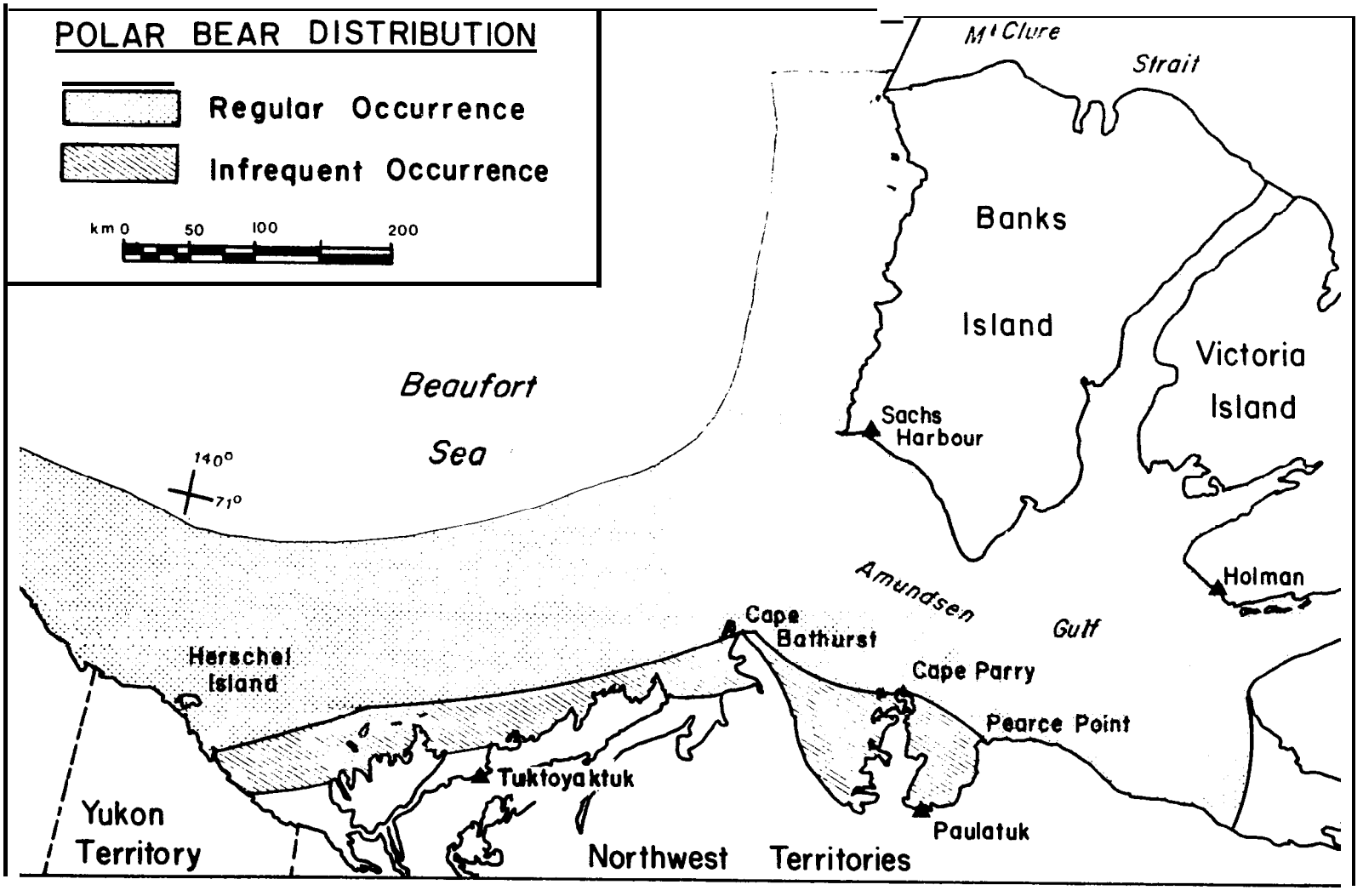

Figure 1: Polar bear distribution in the Beaufort region

states in part that "Each contracting party shall take appropriate action to protect the ecosystems of which polar bears are a part. .." and "they (contracting parties) shall . . . consult with other parties on the management of migrating polar bear populations, and exchange information on research and management programmed. .." . Canada and other nations having populations of polar bears are contracting parties to the Agreement. Implicitin this Agreement is that Canada will ensure that polar bears and their habitats in the Beaufort Sea Region are protected from any adverse effects of hydrocarbon exploration, production and transportation. This implied responsibility was not acknowledged by the Proponents in the EIS.

B. BIOLOGY OF POLAR BEARS IN THE BEAUFORT SEA

Population ecology studies were conducted by the Canadian Wildlife Service between 1971 and 197? (Stirling et. al. 1975, 1978 and 1981) . The techniques we used involved extensive aerial searching for polar bears. All bears encountered were chemically immobilized and lip tatooed. Physical characteristics of each bear were recorded and a premolar tooth was pulled for age determination in the laboratory. Data on ice characteristics and indirect evidence of bear activity such as tracks were also recorded in the various areas searched.

Those population ecology studies of polar bears during 1974 - 1975 indicated a population size of 1200-1500 polar bears in the Beaufort Sea study area. We concluded that characteristics of the i3eaufort Sea population were typical of a long-lived, slow

reproducing species (Stirling et al . 1975, Stirling and Pearson 1976). Females generally give birth at 5 to 6 years of age and produce one litter every three years thereafter. The average litter size calculated from all family groups encountered was 1.66 cubs. Cubs generally remained with the mother until 2.5 years of age. Mortality was highest in the sub-adult age classes (3 to 5 years), after which it was relatively constant at 12 per cent per year. Both sexes have a lifespan of 15 to 20 years.

As indicated by the resighting of captured and marked polar bears (Stirling et al. 1978) and radio-tracking (Schweinsburg and Lee 1982), individual polar bears are highly mobile and daily movements of 30 to 50 km are not uncommon. However, recapture of marked polar bears also indicated that the population is composed of two components with limited interchange between the two. One component, is international , being associated primarily with the offshore transition ice zone between landfast ice anchored to the coasts of NWT, Yukon and Alaska, and the moving pack ice of the Beaufort Sea gyre. The second, Canadian component is associated with this same transition ice zone off the west coast of Banks Island. In summer, both components evidently follow the pack ice as it retreats north and west, then during the autumn freeze, they return closer to the coastal areas. Stirling (1978) suggested that, at least in part, the component separation may be a result of the earlier freezeup off the west coast of Banks Island enabling bears to move into these areas earlier than the region between Banks Island and the mainland. The degree of mixing between components in the summer and the proportion of the

Beaufort population that remains far offshore all winter well past the transition zone, remains unknown. Safety considerations and aircraft limitations have prevented researchers from examining those problems to date.

Stirling and Pearson (1976) and Stirling et al. (1978 and 1981) documented a sudden change in polar bear distribution, population size, and productivity between the periods of 1971 to 1973 and 1974 to 1975. Continuous ice cover instead of the usual floe ice off the mainland and west coast of Banks Island coupled with reduced snow cover made conditions unfavorable for seals, the main prey of polar bears. Decreased seal numbers and productivity caused a greater than normal mortality among the sub-adult and family group cohorts of the polar bear population. Subsequent studies (Stirling et al. 1977 and Stirling 1978) documented a recovery of both ringed seal (Phoca hispida) and bearded seal (Erignathus barbatus) populations in the Beaufort Sea with a concomitant recovery of polar bear productivity and population size to the estimate for 1972-74 of 1800 bears.

After analyzing track and sighting data we found that adult males in both population components favoured either moving ice with 85 per cent or more ice cover or the floe edge proper (Stirling et al. 1975 and 1981). In contrast, females with newborn cubs favoured the stable land fast ice having deep snow drifts along the pressure ridges. We suggested that this partial segregation may be a result of avoidance behaviour on the part of adult females toward other segments of the population. Adult males in particular may be potential predators of newborn cubs.

Sub-adult males showed a slight preference for activeice and floe edge habitats while sub-adult females appeared to favour the more stable land-fast ice. We suggested that active ice areas were, in general, favoured by polar bears because of the greater accessibility to ringed and bearded seals which maintain breathing holes in the thin ice that is continually forming in areas where ice is moving and leads are opening up. Within the entire Beaufort Sea study area, polar bears were concentrated most heavily from winter to early summer along the Cape Bathurst polynya, an area of broken ice and open water between Baillie Islands, Cape Parry and the southwest of Banks Island (Figure 2). The most important inshore stable ice area was the landfast ice along the west coast of Banks Island and northern Amundsen Gulf.

Sightings of maternity dens and of females with newborn cubs in April were much more frequent along the west coast of Banks Island and along the coasts of small islands immediately off the west coast of Banks Island than they were along the mainland coast. There are some indications, mainly reports from local hunters and Alaskan biologists, that denning occurs on the coast west of the Mackenzie Delta. Stirling et al. (1981) speculate that heavy hunting pressure along the mainland coast early in this century may have selected out those females predisposed to denning along the mainland coast leaving only Banks Island as an important maternity denning area.

C. HARVEST AND ECONOMIC IMPORTANCE OF POLAR BEARS TO PEOPLE IN THE BEAUFORT SEA REGION

In 1967 polar bear quotas were established for each community

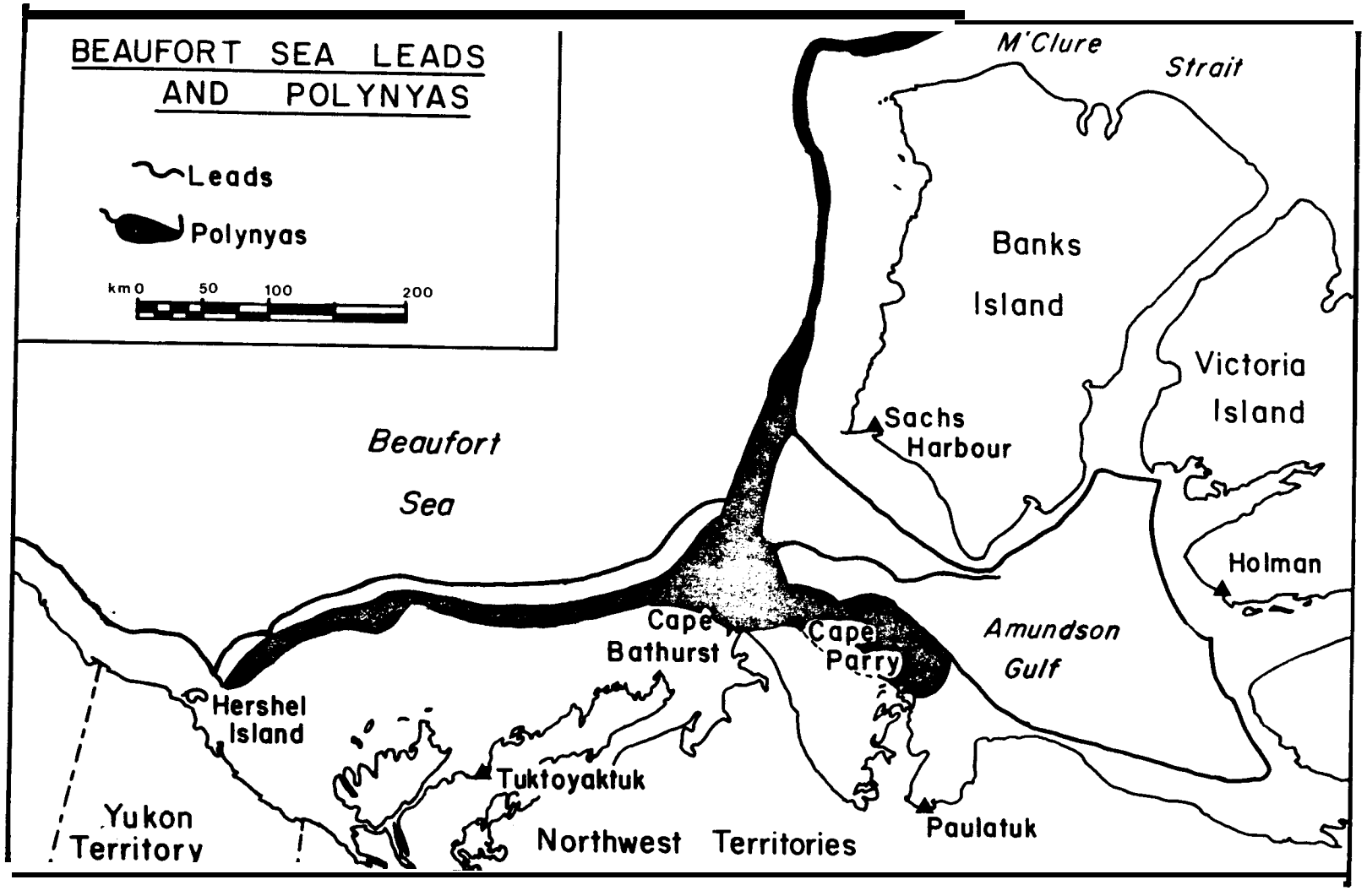

Figure 2: General location of leads and polynyas in the Beaufort Sea during winter.

in the NWT on the basis of average annual polar bear hide returns from each community. Biologists felt that a long term average probably provided at least an approximation of the safe harvest level in a particular area (Schweinsburg 1981). Population ecology studies have indicated that the original quota allotments were realistic in most cases. In some locales there may have been reductions in polar bear numbers where the harvests were excessive (I. Stirling pers. comm.). At present several communities within the Beaufort Sea Region harvest polar bears. The quota alotted to each community is: Sachs Harbour - 22; Paulatuk - 17; Holman Island - 20; Tuktoyaktuk - 26; and Aklavik - 5. Stirling et al. (1975 and 1978) concluded that the total quota of 77 bears for Beaufort Sea communities was at the maximum allowable harvest based on population models using the raw data collected during 1971 to 1976. Community quotas are filled in most years and quota size actually has risen from 77 to 90 bears since those studies. With a lack of contemporary population data we do not know whether present day harvest is not seriously exceeding the safe maximum. If polar bear mortality should increase because of activities associated with oil development then the only management option to compensate for this would be quota reductions, something undesirable to both hunters and the Department.

Polar bears and polar bear hunting are important in the culture of the Inuvialuit of the Western Arctic. In addition, polar bears are of economic importance to various communities on the Arctic coasts including those situated around the Beaufort Sea. The sale of a polar bear hide can be a significant source of

cash to a hunter. Over the last 10 years, prices have fluctuated considerably (Smith 1979) and currently a hunter can sell an average size hide for approximately $1000. Native hunters in various communities recently began outfitting and guiding sport hunters. The Hunters' and Trappers' Association allots a number of tags from their community quota to sport hunters. Such hunts, regardless of hunter success, may add $5 000 to 10 000 per hunt to a guide and outfitter's income (J. Amos pers. comm.).

D. EFFECTS FROM HYDROCARBON DEVELOPMENT

The proposed locations of exploration and production facilities and activities overlap with much of the sea ice habitat favoured by polar bears between November and May (Fig. 2). Ship traffic around these facilities, if it kept leads open all winter, could concentrate seals and thus polar bears in the vicinity of the islands. We do not know to what extent artificial islands will attract polar bears. Polar bears are inherently curious and are known to congregate around human facilities or activities particularly where a potential source of food exists (Stirling et al. 1977).

We are concerned over the possibility of polar bear mortality resulting from bears frequenting facilities used in hydrocarbon exploration and production and being shot by personnel at these sites who perceive the bears as a threat. Several such incidents have already occurred in the Beaufort region during the last 3 years (Stirling 1978). Biologists are concerned that mortality resulting from bear/human conflicts added to natural mortality and

a harvest thought to be at the allowable maximum may cause the Beau fort Sea population of polar bears to decline. The NWT Wildlife Service in cooperation with industry is developing means of detecting and deterring bears from human associated installations (Stenhouse 1982).

The Proponents concluded that there would be minor impacts from normal activities over a 20 year period on the "regional polar bear population" (Vol. 4, p. ?..18, 2.24, 2.45 and 2.88). In my opinion, however, the problem is not so simple. At present we have no knowledge of the degree to which bears may habituate to an increasing number of facilities and attendant activities in the vicinity of the transition ice zone. It is a well established fact that at least a certain proportion of a polar bear population! can become habituated to human presence and waste with resulting deleterious results to both humans and bears (Stirling et al. 1978). The Proponents disregard other aspects of bear biology that further complicate and raise doubt over their conclusions. Given the mobile nature of individual bears and the increasing number of offshore industrial structures, most. of the polar bear population, especially the component associated with the mainland offshore, could come into contact with industrial structures in the transition ice zone. Indeed, the Proponents in defending their position of minor impacts suggested that 1.3 per cent of the Beaufort Sea population or 23 sightings out of a population of 1800 bears (estimate for 1972-74 in Stirling 1978) may have been in contact with Tarsiut, just one artificial drilling island in the transition ice zone (Vol. 4, 2.24). This calculation assumes

that all 23 sightings were of different bears.

In view of polar bear movement patterns, a quota which is near the maximum allowable harvest, a possible 1.3 percent of the population already in contact with one island, and increasing numbers of industrial facilities, the proponents' assessment of only minor impact on polar bears appears to be an underestimate.

There is a further cause for concern because of the extreme toxicity of crude oil to polar bears (Oritsland et al. 1981, Vol. 6, 4.8, 6.30, 6.45 and 6.64). Polar bears exposed for 15-20 minutes to a 1 cm thick slick of oil, chemically similar to that found in the Arctic, showed acute physiological stress resulting from ingestion of oil during grooming and a severe reduction of the insulative properties of the fur. Tissue damage was extensive in many major systems including blood, gastrointestinal tract, kidneys, brain, liver and lungs. Loss of insulation induced , severe cold stress causing an increase in metabolism and depletion of readily mobilized energy reserves. The lower critical temperature was elevated, meaning that an individual would have to counteract a heat loss at normal arctic temperatures. Two of the three experimental bears died within six weeks of the initial exposure to oil .

In considering the possible effects of oil spills on polar bears (Vol. 6, 6.16) the Proponents once again do not appear to show enough appreciation for the mobility of polar bears. In predicting the effects of a worst case scenario, a sub-sea blowout during winter, there is the possibility that many bears would contact oil coming to the surface at leads and cracks along which

the bears concentrate to hunt seals. Statements which suggest that effects could be mitigated by "chasing bears from oiled areas" such as coastlines in the case of a summer spill (Vol. 6, 6.64) only demonstrate a naive approach to the problem. Polar bears are simply not as tractable as the Proponents believe. The effect on the population from a major oil spill or smaller, chronic spill could likely be higher than the Proponents' prediction of minor to moderate.

Onshore facilities associated with hydrocarbon exploration and production will probably have negligible impacts on the Beaufort Sea polar bear population. Some denning occurs along the Yukon and Northwest Territories coasts west of the Mackenzie Delta but little occurs east of the Mackenzie Delta (Stirling et al. 1975 and Stirling 1978). The bears favour ice types located in areas 50 to 80 km offshore. At two locations, however, the transition ice zone impinges upon the coast --- Baillie Islands and Cape Parry. Because of the open water at those locations, bears do concentrate there. Because of their importance to polar bears and other marine life, these two areas warrant special consideration where coastal industrial development is concerned. Coastal installations, especially those accommodating personnel, could attract bears traveling near shore.

At present, the overall effect of hydrocarbon development on the polar bear population in the Beaufort Sea is difficult to predict, I believe more caution over potential impacts is required than that displayed in the Proponents' EIS. Detecting possible impacts on polar bears will require a long-term

commitment to research as shown by the findings in the 1970's where population decline and recovery occurred over a three year period. Separating natural oscillations from those caused by development, excluding large scale effects from a disaster such as a major oil spill, will always be difficult. However, research studies focussing on ice conditions and ringed seal population levels would at least allow a partial sorting of the variables potentially responsible for changes in the population.

E. PRESENT RESEARCH

The recent studies on polar bear distribution around artificial islands is an excellent example of a potential problem identified by resource users and subsequently followed by a field program designed by government and Industry to investigate the problem.

Because it was unknown how the presence of industrial facilities situated in the habitat most favoured by polar bears will affect the distribution and movements of these bears, the NWT Wildlife Service and industry initiated studies to examine this question (Stenhouse and Latour 1983). The first year's work was intended to test the methodology. We flew radial transects 38 km out from both an artificial island and a site where an island was partially constructed under the ice. We also flew an identical pattern at a control site adjacent to each of the two island sites. While on transect we recorded all direct and indirect evidence of polar bears including actual sightings, tracks, track direction and seal kills.

Our data suggest that polar bear distribution within the island sites did not differ significantly from the control sites, however, we consider our results tentative because the considerable variability in ice conditions during the study confounded interpretation of the data. Although the methodology tested gave reproduceable results, some modifications are suggested to reduce uncertainties resulting from variable ice and weather. Because of the inter-year variability in the sea ice and ever greater numbers of industrial facilities in the transition ice zone over the next several years, we believe that three to five years are required to research the problem of how such facilities possibly effect polar bears. However, this program was terminated after Industry dropped their funding support.

The recent Northern Oil and Gas Action Paper (NOGAP) exercise illustrates the level of cooperation that can be attained by various agencies in identifying research needs and Formulating research plans. Unfortunately, this exercise is also an example of how inadequate leadtime renders an excellent opportunity much less effective than its potential. If research is to be meaningful then resource users, funding agencies and investigators must have ample time to consider the exact questions to be asked by researchers and the best approaches.

The initial intention of NOGAP polar bear research was to conduct an intensive mark-recapture study similar to the 1971 to 1979 studies. However, the money for the 1982 to 1983 season was received in February 1983 -- too late to prepare and conduct the planned research. NOGAP funds were then channeled toward

cooperative work with Alaskan biologists who were already engaged in a study of movements and habitat use by radio-collared polar bears in the Beaufort Sea. Our contribution was used to track polar bears, especially those west of Banks Island, and to attach radio-collars to 20 female polar bears in the Canadian Beaufort Sea. The data gained from this study will increase our knowledge of the movement patterns of individual bears and the distribution of this population along the coasts of Canada, Alaska and perhaps USSR. We hope to compare the importance of denning habitat along the mainland coast with that on Banks Island and to investigate the characteristics of actual den sites. A more refined understanding of polar bear movement and denning habitat allows us to assess the allocation of quotas and to predict possible conflicts with proposed industrial activity.

F. INFORMATION REQUIRED

The study of polar bears poses many problems to a biologist. Polar bears are highly mobile, solitary, long lived and occupy one of the harshest environments on earth. Data collection is laborious, often uncomfortable, expensive and time consuming. Despite the obstacles, biologists from various agencies, often with cooperation from Industry, accumulated much information on the ecology and behaviour of polar bears in a variety of arctic and sub-arctic locales.

Although the population of polar bears in the Beaufort Sea remains one of the best studied to date, large gaps in our knowledge of this population still remain. The population was

increasing from the severe reduction which occurred during 1974 to 1975 when population monitoring ceased. Stirling (1978) recommended continued monitoring which was unfortunately prohibited by lack of funding. Consequently, we have had no information on the status of the population since 1979. Gaps have always existed in our understanding of how the Beaufort Sea polar bear population is distributed, especially at the time of year when ice cover is maximum. For instance, what portion of the population frequents the transition ice zone where most of the sampling in past studies has been done and what portion remains further out well past the transition ice zone where it is impossible to sample using present day techniques?

Stirling (1978) recommended future monitoring of the polar bear's prey base, namely ringed and bearded seals. The 1974 to 1975 decline in polar bears was correlated with a dramatic decline in both ringed and bearded seal populations in the Beaufort Sea (Stirling et al. 1975) which was hypothesized to be a result of severe ice conditions during the winter of 1973 to 1974.

Before more money is allocated to polar bear and seal research in the Beaufort sea, consultation among local hunters and Territorial and Federal wildlife agencies is required. The importance we place on polar bears should be reflected by research and management efforts. Do we wish to support and encourage the long term approach necessary for adequate research? How important is our international responsibility to preserve Arctic ecosystems?

If research on polar bears is to proceed, cooperation among all parties should continue. The local knowledge and expertise of

hunters must be used and every attempt made to involve them in research and management programs. Industry and government must agree on the ultimate goals of research projects and commit the time and money necessary to reach those goals.

G. GOVERNMENT ROLES

In addition to the research discussed above, education is another major role of Territorial and Federal government wildlife agencies in the management of polar bears in the Beaufort Region. As development proceeds, Industry must be kept abreast of techniques and operating procedures designed to minimize effects on the bear population. It will be our Department's role to anticipate potential problems specific to polar bears, to consult, with local hunters and Industry to co-ordinate suitable studies and to direct mitigative measures which address those problems.

Much of the initial government contact with problems between bears and Industry would be by the Department's regional enforcement staff. As development escalates, the Department will ensure that the enforcement staff are adequately trained to deal with bear problems around industrial sites and that enough enforcement staff are available to permit regular visits to sites where problems are most likely to develop. In turn, enforcement staff and biologists will maintain continuous communication so that joint responses to specific bear problems will be swift. Open communication will also enable identification of chronic problems between bears and sites of industrial activity and facilitate the design of management and research projects on polar

bears.

Our Department will continue to interact with the public, especially local hunters, on all polar bear management matters. The Department will be open and responsive to the concerns of hunters about the possible effects of industrial projects on polar bears. The Department will also adhere to a management program that emphasizes the welfare of the polar bear population. Ideally, our polar bear management program would rely on current data but should such a situation not exist then our management program willremain conservative, based on the bestand most recent data available.

H. RECOMMENDATIONS

1. International and federal charters identify the polar bear and its habitat as threatened. Our Department will continue to uphold its responsibility to maintain polar bears and their habitat.
2. Polar bears concentrate near Baillie Islands, Cape Parry and the west coast of Banks Island from winter to early summer. The west coast of Banks Island is also maternal denning habitat. Problems could arise between bears and industrial activity or installations at those sites. If facilities or activities are located here, we recommend that our bear detection and deterrent methods be adopted and, possibly, seasonal restrictions in activity.
3. The effects of hydrocarbon development in the Beaufort Sea are difficult to predict. Our Department in conjunction with

the Canadian Wildlife Service will continue to conduct polar bear research studies. The Proponents should continue to participate in research programs which relate to the effects of industrial facilities and activities on polar bears. If production of the oil and gas reserves in the Beaufort region proceeds then several studies should begin immediately. These include:

a. the effects of artificial islands and associated activity located *in* the transition ice zone on the movements and distribution of polar bears

b. continuing population estimates of polar bears in the Beaufort region will be required. No population ecology studies have been conducted in the Beaufort region since 1979, thus three field seasons of marking and recapturing bears will be required to determine a population estimate

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CURRICULUM VITAE

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Polar Bear i-ethnical Committee - member

Publication: Latour, P. 1981. Spatial relationships and social behavior of polar bears concentrated on land during the ice-free season of Hudson Bay. Can. J. Zool. 59(9): 1763-1774

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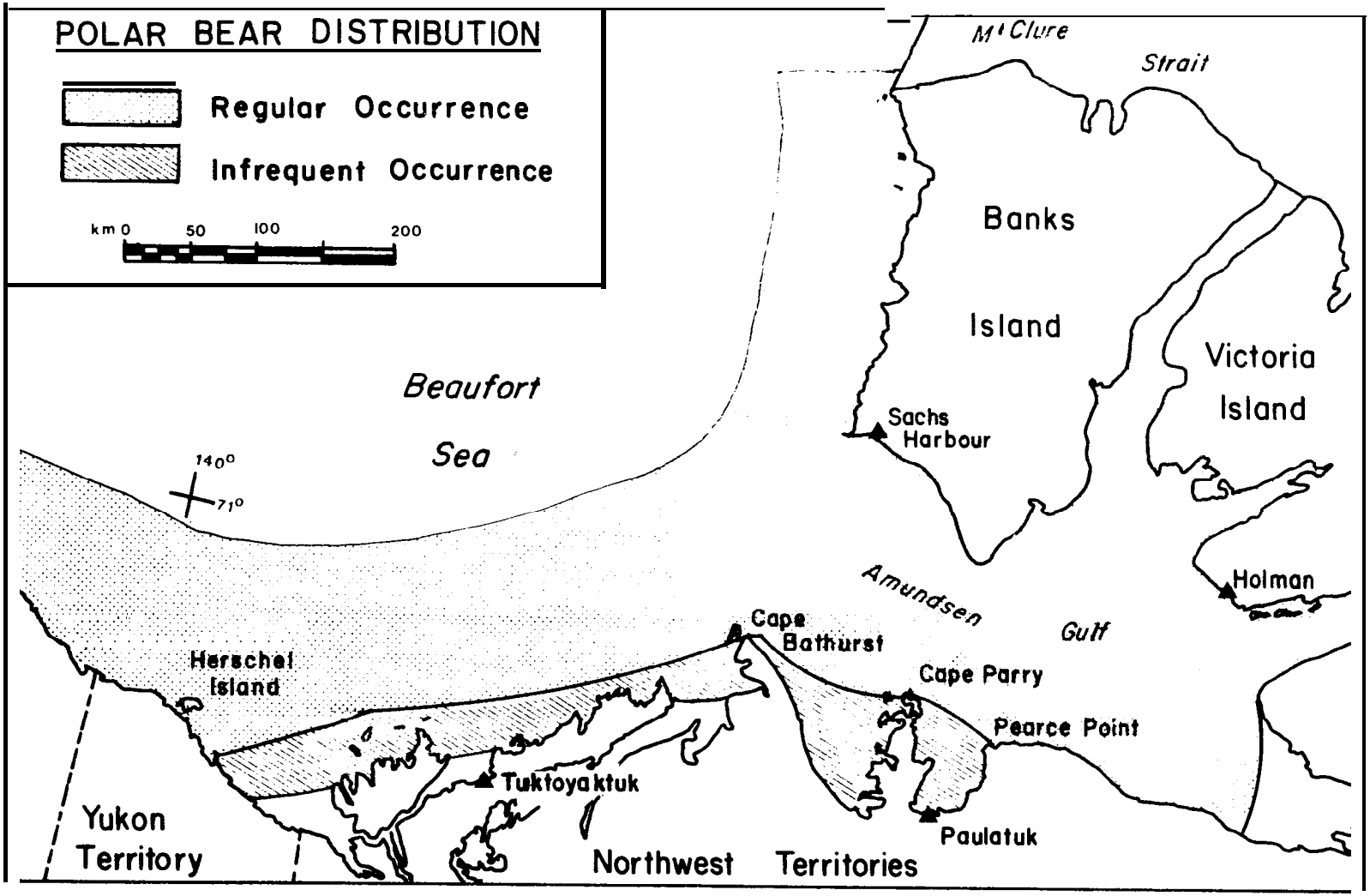

Figure 1: Polar bear distribution in the Beaufort region

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reproducing species (Stirling et al . 1975, Stirling and Pearson 1976). Females generally give birth at 5 to 6 years of age and produce one litter every three years thereafter. The average litter size calculated from all family groups encountered was 1.66 cubs. Cubs generally remained with the mother until 2.5 years of age. Mortality was highest in the sub-adult age classes (3 to 5 years), after which it was relatively constant at 12 per cent per year. Both sexes have a lifespan of 15 to 20 years.

As indicated by the resighting of captured and marked polar bears (Stirling et al. 1978) and radio-tracking (Schweinsburg and Lee 1982), individual polar bears are highly mobile and daily movements of 30 to 50 km are not uncommon. However, recapture of marked polar bears also indicated that the population is composed of two components with limited interchange between the two. One component, is international , being associated primarily with the offshore transition ice zone between landfast ice anchored to the coasts of NWT, Yukon and Alaska, and the moving pack ice of the Beaufort Sea gyre. The second, Canadian component is associated with this same transition ice zone off the west coast of Banks Island. In summer, both components evidently follow the pack ice as it retreats north and west, then during the autumn freeze, they return closer to the coastal areas. Stirling (1978) suggested that, at least in part, the component separation may be a result of the earlier freezeup off the west coast of Banks Island enabling bears to move into these areas earlier than the region between Banks Island and the mainland. The degree of mixing between components in the summer and the proportion of the

Beaufort population that remains far offshore all winter well past the transition zone, remains unknown. Safety considerations and aircraft limitations have prevented researchers from examining those problems to date.

Stirling and Pearson (1976) and Stirling et al. (1978 and 1981) documented a sudden change in polar bear distribution, population size, and productivity between the periods of 1971 to 1973 and 1974 to 1975. Continuous ice cover instead of the usual floe ice off the mainland and west coast of Banks Island coupled with reduced snow cover made conditions unfavorable for seals, the main prey of polar bears. Decreased seal numbers and productivity caused a greater than normal mortality among the sub-adult and family group cohorts of the polar bear population. Subsequent studies (Stirling et al. 1977 and Stirling 1978) documented a recovery of both ringed seal (Phoca hispida) and bearded seal (Erignathus barbatus) populations in the Beaufort Sea with a concomitant recovery of polar bear productivity and population size to the estimate for 1972-74 of 1800 bears.

After analyzing track and sighting data we found that adult males in both population components favoured either moving ice with 85 per cent or more ice cover or the floe edge proper (Stirling et al. 1975 and 1981). In contrast, females with newborn cubs favoured the stable land fast ice having deep snow drifts along the pressure ridges. We suggested that this partial segregation may be a result of avoidance behaviour on the part of adult females toward other segments of the population. Adult males in particular may be potential predators of newborn cubs.

Sub-adult males showed a slight preference for activeice and floe edge habitats while sub-adult females appeared to favour the more stable land-fast ice. We suggested that active ice areas were, in general, favoured by polar bears because of the greater accessibility to ringed and bearded seals which maintain breathing holes in the thin ice that is continually forming in areas where ice is moving and leads are opening up. Within the entire Beaufort Sea study area, polar bears were concentrated most heavily from winter to early summer along the Cape Bathurst polynya, an area of broken ice and open water between Baillie Islands, Cape Parry and the southwest of Banks Island (Figure 2). The most important inshore stable ice area was the landfast ice along the west coast of Banks Island and northern Amundsen Gulf.

Sightings of maternity dens and of females with newborn cubs in April were much more frequent along the west coast of Banks Island and along the coasts of small islands immediately off the west coast of Banks Island than they were along the mainland coast. There are some indications, mainly reports from local hunters and Alaskan biologists, that denning occurs on the coast west of the Mackenzie Delta. Stirling et al. (1981) speculate that heavy hunting pressure along the mainland coast early in this century may have selected out those females predisposed to denning along the mainland coast leaving only Banks Island as an important maternity denning area.

C. HARVEST AND ECONOMIC IMPORTANCE OF POLAR BEARS TO PEOPLE IN THE BEAUFORT SEA REGION

In 1967 polar bear quotas were established for each community

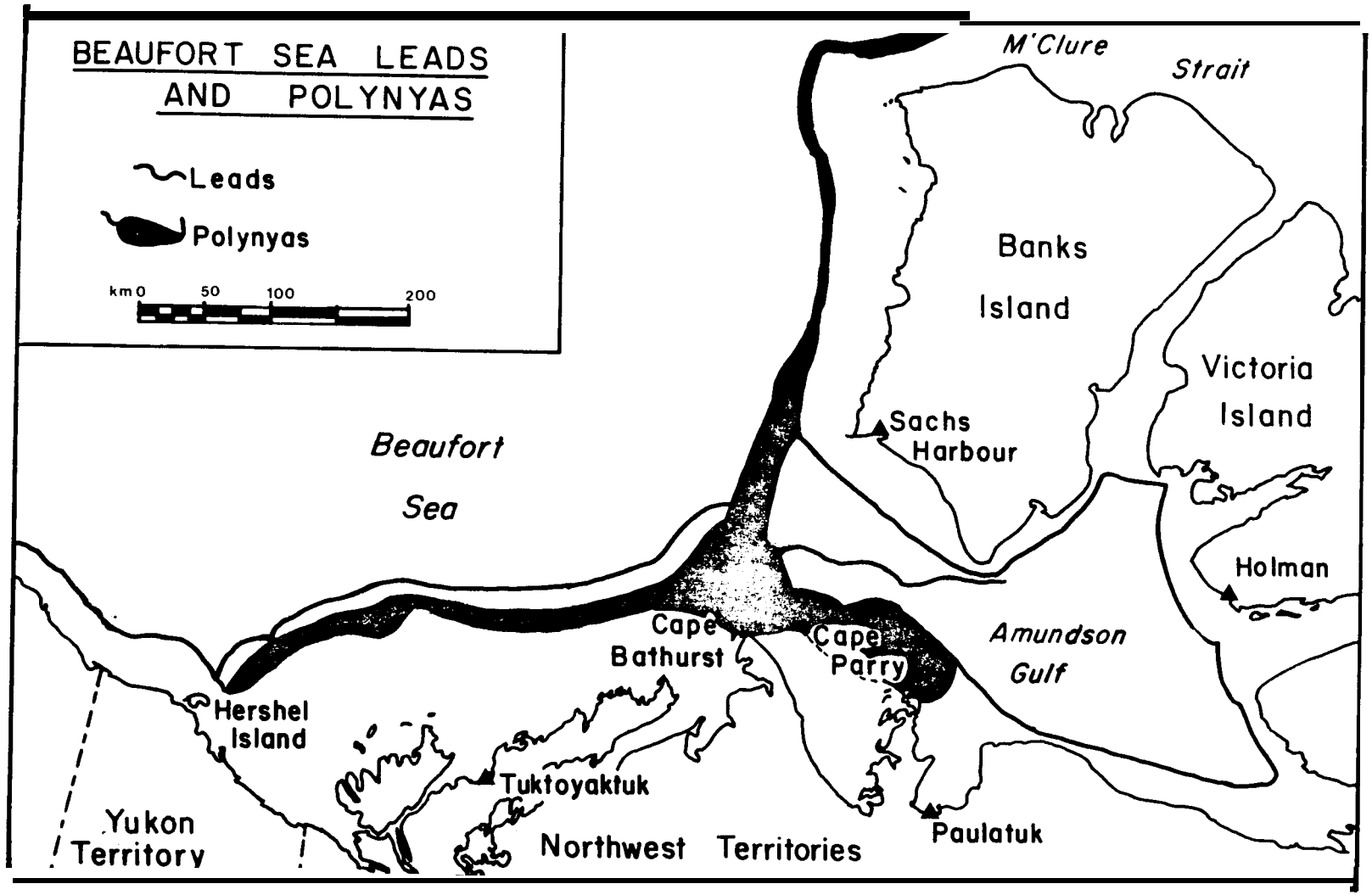

Figure 2: General location of leads and polynyas in the Beaufort Sea during winter.

in the NWT on the basis of average annual polar bear hide returns from each community. Biologists felt that a long term average probably provided at least an approximation of the safe harvest level in a particular area (Schweinsburg 1981). Population ecology studies have indicated that the original quota allotments were realistic in most cases. In some locales there may have been reductions in polar bear numbers where the harvests were excessive (I. Stirling pers. comm.). At present several communities within the Beaufort Sea Region harvest polar bears. The quota alotted to each community is: Sachs Harbour - 22; Paulatuk - 17; Holman Island - 20; Tuktoyaktuk - 26; and Aklavik - 5. Stirling et al. (1975 and 1978) concluded that the total quota of 77 bears for Beaufort Sea communities was at the maximum allowable harvest based on population models using the raw data collected during 1971 to 1976. Community quotas are filled in most years and quota size actually has risen from 77 to 90 bears since those studies. With a lack of contemporary population data we do not know whether present day harvest is not seriously exceeding the safe maximum. If polar bear mortality should increase because of activities associated with oil development then the only management option to compensate for this would be quota reductions, something undesirable to both hunters and the Department.

Polar bears and polar bear hunting are important in the culture of the Inuvialuit of the Western Arctic. In addition, polar bears are of economic importance to various communities on the Arctic coasts including those situated around the Beaufort Sea. The sale of a polar bear hide can be a significant source of

cash to a hunter. Over the last 10 years, prices have fluctuated considerably (Smith 1979) and currently a hunter can sell an average size hide for approximately $1000. Native hunters in various communities recently began outfitting and guiding sport hunters. The Hunters' and Trappers' Association allots a number of tags from their community quota to sport hunters. Such hunts, regardless of hunter success, may add $5 000 to 10 000 per hunt to a guide and outfitter's income (J. Amos pers. comm.).

D. EFFECTS FROM HYDROCARBON DEVELOPMENT

The proposed locations of exploration and production facilities and activities overlap with much of the sea ice habitat favoured by polar bears between November and May (Fig. 2). Ship traffic around these facilities, if it kept leads open all winter, could concentrate seals and thus polar bears in the vicinity of the islands. We do not know to what extent artificial islands will attract polar bears. Polar bears are inherently curious and are known to congregate around human facilities or activities particularly where a potential source of food exists (Stirling et al. 1977).

We are concerned over the possibility of polar bear mortality resulting from bears frequenting facilities used in hydrocarbon exploration and production and being shot by personnel at these sites who perceive the bears as a threat. Several such incidents have already occurred in the Beaufort region during the last 3 years (Stirling 1978). Biologists are concerned that mortality resulting from bear/human conflicts added to natural mortality and

a harvest thought to be at the allowable maximum may cause the Beau fort Sea population of polar bears to decline. The NWT Wildlife Service in cooperation with industry is developing means of detecting and deterring bears from human associated installations (Stenhouse 1982).

The Proponents concluded that there would be minor impacts from normal activities over a 20 year period on the "regional polar bear population" (Vol. 4, p. ?..18, 2.24, 2.45 and 2.88). In my opinion, however, the problem is not so simple. At present we have no knowledge of the degree to which bears may habituate to an increasing number of facilities and attendant activities in the vicinity of the transition ice zone. It is a well established fact that at least a certain proportion of a polar bear population! can become habituated to human presence and waste with resulting deleterious results to both humans and bears (Stirling et al. 1978). The Proponents disregard other aspects of bear biology that further complicate and raise doubt over their conclusions. Given the mobile nature of individual bears and the increasing number of offshore industrial structures, most. of the polar bear population, especially the component associated with the mainland offshore, could come into contact with industrial structures in the transition ice zone. Indeed, the Proponents in defending their position of minor impacts suggested that 1.3 per cent of the Beaufort Sea population or 23 sightings out of a population of 1800 bears (estimate for 1972-74 in Stirling 1978) may have been in contact with Tarsiut, just one artificial drilling island in the transition ice zone (Vol. 4, 2.24). This calculation assumes

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that all 23 sightings were of different bears.

In view of polar bear movement patterns, a quota which is near the maximum allowable harvest, a possible 1.3 percent of the population already in contact with one island, and increasing numbers of industrial facilities, the proponents' assessment of only minor impact on polar bears appears to be an underestimate.

There is a further cause for concern because of the extreme toxicity of crude oil to polar bears (Oritsland et al. 1981, Vol. 6, 4.8, 6.30, 6.45 and 6.64). Polar bears exposed for 15-20 minutes to a 1 cm thick slick of oil, chemically similar to that found in the Arctic, showed acute physiological stress resulting from ingestion of oil during grooming and a severe reduction of the insulative properties of the fur. Tissue damage was extensive in many major systems including blood, gastrointestinal tract, kidneys, brain, liver and lungs. Loss of insulation induced severe cold stress causing an increase in metabolism and depletion of readily mobilized energy reserves. The lower critical temperature was elevated, meaning that an individual would have to counteract a heat loss at normal arctic temperatures. Two of the three experimental bears died within six weeks of the initial exposure to oil .

In considering the possible effects of oil spills on polar bears (Vol. 6, 6.16) the Proponents once again do not appear to show enough appreciation for the mobility of polar bears. In predicting the effects of a worst case scenario, a sub-sea blowout during winter, there is the possibility that many bears would contact oil coming to the surface at leads and cracks along which

the bears concentrate to hunt seals. Statements which suggest that effects could be mitigated by "chasing bears from oiled areas" such as coastlines in the case of a summer spill (Vol. 6, 6.64) only demonstrate a naive approach to the problem. Polar bears are simply not as tractable as the Proponents believe. The effect on the population from a major oil spill or smaller, chronic spill could likely be higher than the Proponents' prediction of minor to moderate.

Onshore facilities associated with hydrocarbon exploration and production will probably have negligible impacts on the Beaufort Sea polar bear population. Some denning occurs along the Yukon and Northwest Territories coasts west of the Mackenzie Delta but little occurs east of the Mackenzie Delta (Stirling et al. 1975 and Stirling 1978). The bears favour ice types located in areas 50 to 80 km offshore. At two locations, however, the transition ice zone impinges upon the coast --- Baillie Islands and Cape Parry. Because of the open water at those locations, bears do concentrate there. Because of their importance to polar bears and other marine life, these two areas warrant special consideration where coastal industrial development is concerned. Coastal installations, especially those accommodating personnel, could attract bears traveling near shore.

At present, the overall effect of hydrocarbon development on the polar bear population in the Beaufort Sea is difficult to predict, I believe more caution over potential impacts is required than that displayed in the Proponents' EIS. Detecting possible impacts on polar bears will require a long-term

commitment to research as shown by the findings in the 1970's where population decline and recovery occurred over a three year period. Separating natural oscillations from those caused by development, excluding large scale effects from a disaster such as a major oil spill, will always be difficult. However, research studies focussing on ice conditions and ringed seal population levels would at least allow a partial sorting of the variables potentially responsible for changes in the population.

E. PRESENT RESEARCH

The recent studies on polar bear distribution around artificial islands is an excellent example of a potential problem identified by resource users and subsequently followed by a field program designed by government and Industry to investigate the problem.

Because it was unknown how the presence of industrial facilities situated in the habitat most favoured by polar bears will affect the distribution and movements of these bears, the NWT Wildlife Service and industry initiated studies to examine this question (Stenhouse and Latour 1983). The first year's work was intended to test the methodology. We flew radial transects 38 km out from both an artificial island and a site where an island was partially constructed under the ice. We also flew an identical pattern at a control site adjacent to each of the two island sites. While on transect we recorded all direct and indirect evidence of polar bears including actual sightings, tracks, track direction and seal kills.

Our data suggest that polar bear distribution within the island sites did not differ significantly from the control sites, however, we consider our results tentative because the considerable variability in ice conditions during the study confounded interpretation of the data. Although the methodology tested gave reproduceable results, some modifications are suggested to reduce uncertainties resulting from variable ice and weather. Because of the inter-year variability in the sea ice and ever greater numbers of industrial facilities in the transition ice zone over the next several years, we believe that three to five years are required to research the problem of how such facilities possibly effect polar bears. However, this program was terminated after Industry dropped their funding support.

The recent Northern Oil and Gas Action Paper (NOGAP) exercise illustrates the level of cooperation that can be attained by various agencies in identifying research needs and Formulating research plans. Unfortunately, this exercise is also an example of how inadequate leadtime renders an excellent opportunity much less effective than its potential. If research is to be meaningful then resource users, funding agencies and investigators must have ample time to consider the exact questions to be asked by researchers and the best approaches.

The initial intention of NOGAP polar bear research was to conduct an intensive mark-recapture study similar to the 1971 to 1979 studies. However, the money for the 1982 to 1983 season was received in February 1983 -- too late to prepare and conduct the planned research. NOGAP funds were then channeled toward

cooperative work with Alaskan biologists who were already engaged in a study of movements and habitat use by radio-collared polar bears in the Beaufort Sea. Our contribution was used to track polar bears, especially those west of Banks Island, and to attach radio-collars to 20 female polar bears in the Canadian Beaufort Sea. The data gained from this study will increase our knowledge of the movement patterns of individual bears and the distribution of this population along the coasts of Canada, Alaska and perhaps USSR. We hope to compare the importance of denning habitat along the mainland coast with that on Banks Island and to investigate the characteristics of actual den sites. A more refined understanding of polar bear movement and denning habitat allows us to assess the allocation of quotas and to predict possible conflicts with proposed industrial activity.

F. INFORMATION REQUIRED

The study of polar bears poses many problems to a biologist. Polar bears are highly mobile, solitary, long lived and occupy one of the harshest environments on earth. Data collection is laborious, often uncomfortable, expensive and time consuming. Despite the obstacles, biologists from various agencies, often with cooperation from Industry, accumulated much information on the ecology and behaviour of polar bears in a variety of arctic and sub-arctic locales.

Although the population of polar bears in the Beaufort Sea remains one of the best studied to date, large gaps in our knowledge of this population still remain. The population was

increasing from the severe reduction which occurred during 1974 to 1975 when population monitoring ceased. Stirling (1978) recommended continued monitoring which was unfortunately prohibited by lack of funding. Consequently, we have had no information on the status of the population since 1979. Gaps have always existed in our understanding of how the Beaufort Sea polar bear population is distributed, especially at the time of year when ice cover is maximum. For instance, what portion of the population frequents the transition ice zone where most of the sampling in past studies has been done and what portion remains further out well past the transition ice zone where it is impossible to sample using present day techniques?

Stirling (1978) recommended future monitoring of the polar bear's prey base, namely ringed and bearded seals. The 1974 to 1975 decline in polar bears was correlated with a dramatic decline in both ringed and bearded seal populations in the Beaufort Sea (Stirling et al. 1975) which was hypothesized to be a result of severe ice conditions during the winter of 1973 to 1974.

Before more money is allocated to polar bear and seal research in the Beaufort sea, consultation among local hunters and Territorial and Federal wildlife agencies is required. The importance we place on polar bears should be reflected by research and management efforts. Do we wish to support and encourage the long term approach necessary for adequate research? How important is our international responsibility to preserve Arctic ecosystems?

If research on polar bears is to proceed, cooperation among all parties should continue. The local knowledge and expertise of

hunters must be used and every attempt made to involve them in research and management programs. Industry and government must agree on the ultimate goals of research projects and commit the time and money necessary to reach those goals.

G. GOVERNMENT ROLES

In addition to the research discussed above, education is another major role of Territorial and Federal government wildlife agencies in the management of polar bears in the Beaufort Region. As development proceeds, Industry must be kept abreast of techniques and operating procedures designed to minimize effects on the bear population. It will be our Department's role to anticipate potential problems specific to polar bears, to consult, with local hunters and Industry to co-ordinate suitable studies and to direct mitigative measures which address those problems.

Much of the initial government contact with problems between bears and Industry would be by the Department's regional enforcement staff. As development escalates, the Department will ensure that the enforcement staff are adequately trained to deal with bear problems around industrial sites and that enough enforcement staff are available to permit regular visits to sites where problems are most likely to develop. in turn, enforcement staff and biologists will maintain continuous communication so that joint responses to specific bear problems will be swift. Open communication will also enable identification of chronic problems between bears and sites of industrial activity and facilitate the design of management and research projects on polar

bears.

Our Department will continue to interact with the public, especially local hunters, on all polar bear management matters. The Department will be open and responsive to the concerns of hunters about the possible effects of industrial projects on polar bears. The Department will also adhere to a management program that emphasizes the welfare of the polar bear population. Ideally, our polar bear management program would rely on current data but should such a situation not exist then our management program willremain conservative, based on the bestand most recent data available.

H. RECOMMENDATIONS

1. International and federal charters identify the polar bear and its habitat as threatened. Our Department will continue to uphold its responsibility to maintain polar bears and their habitat.
2. Polar bears concentrate near Baillie Islands, Cape Parry and the west coast of Banks Island from winter to early summer. The west coast of Banks Island is also maternal denning habitat. Problems could arise between bears and industrial activity or installations at those sites. If facilities or activities are located here, we recommend that our bear detection and deterrent methods be adopted and, possibly, seasonal restrictions in activity.
3. The effects of hydrocarbon development in the Beaufort Sea are difficult to predict. Our Department in conjunction with

the Canadian Wildlife Service will continue to conduct polar bear research studies. The Proponents should continue to participate in research programs which relate to the effects of industrial facilities and activities on polar bears. If production of the oil and gas reserves in the Beaufort region proceeds then several studies should begin immediately. These include:

a. the effects of artificial islands and associated activity located in the transition ice zone on the movements and distribution of polar bears

b. continuing population estimates of polar bears in the Beaufort region will be required. No population ecology studies have been conducted in the Beaufort region since 1979, thus three field seasons of marking and recapturing bears will be required to determine a population estimate

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