Hydrocarbon Development In The Beaufort Sea – Mackenzie Delta Region

ENVIRONMENTAL IMPACT STATEMENT

1982

VOLUME 5 SOCIO-ECONOMIC EFFECTS

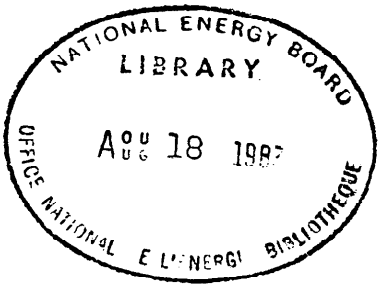
ENVIRONMENTAL IMPACT STATEMENT

FOR

HYDROCARBON DEVELOPMENT

IN THE

BEAUFORT SEA - MACKENZIE DELTA REGION



VOLUME 5
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1982

BEAUFORT SEA-MACKENZIE DELTA ENVIRONMENTAL IMPACT STATEMENT

The Beaufort Sea Production Environmental Impact Statement was prepared by Dome Petroleum Limited, Esso Resources Canada Limited and Gulf Canada Resources Inc. on behalf of all land-holders in the Beaufort Sea-Mackenzie Delta region.

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ENVIRONMENTAL IMPACT STATEMENT

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OVERVIEW

1. INTRODUCTION

This Overview is both a summary of the more important points found in this volume and an attempt to present major themes as clearly as possible. It is written for the busy reader who will not have time to do more than skim through the volume but who nevertheless wants to grasp the essence of it.

In general, the headings used in the Overview correspond with those found in the volume. An important exception is that material under heading 4 in the Overview on the effect of oil and gas exploration on various types of Beaufort Sea communities is found in Chapter 3 of the main volume. In the volume, Chapter 4 is concerned only with the presentation of detailed community profiles.

This volume, like the rest of this Environmental Impact Statement, is the joint product of Dome Petroleum Limited, Esso Resources Canada Limited and Gulf Canada Resources Inc., the principal explorers for oil and gas in the Beaufort Sea region. They are referred to as "the Industry" throughout the volume.

1.1 OBJECTIVES

The objectives of the volume are:

- to clarify and predict the possible magnitude and nature of oil and gas generated growth and development in the northern territories;

- to demonstrate how such growth may affect northern populations, economic structures and social institutions; and

- to recommend policies that would enhance the positive and beneficial aspects of oil and gas development and mitigate the negative aspects.

1.2 THEMES

Several matters which are fundamental to the present and future development of the north run through this volume as important themes:

One is that it should be, and indeed must be, possible to develop the oil and gas resources of the Beaufort Sea without significantly affecting the lifestyle of northern peoples or the environment on which these peoples depend. The Industry has employed many northern people, dealt extensively with northern businesses, endeavoured to understand the northern point of view, and participated in the many discussions concerning the future of the north that have taken place during recent years. From this experience, the Industry firmly believes that its record with respect to both people and the environment has been exemplary, and that it can continue to be responsible in the future.

Another matter is that northern options are limited. While the Industry would not pretend that the type of development that it is proposing is the only future available to northerners, it would argue that economic growth and diversification of a modern and progressive kind must have a leading or driving sector. Development based on northern renewable resources or on tourism could provide some impetus to the northern economy, but this would not likely be sufficient even in the medium term, given the potential for population growth in the predominately young native population. Something much larger is needed if the north is to become a place in which people, and especially younger people, can exercise genuine choices concerning careers and lifestyles. The Industry is convinced that the kinds of activities it is proposing would provide the scale of impetus that would now seem needed.

Northern expectations concerning incomes and material lifestyles are rising and at the same time changing. More people now want the goods and services that Canadians have come to associate with "the good life." The acquisition of such things requires cash income in increasing amounts, typically far more than can be generated by the more traditional sources of cash in the north. Just as has been the case in all parts of Canada, wage employment can provide the income that will enable northern people to buy the things they want. However, how much cash income people want, and therefore how long they will work for wages, are matters of personal choice. The Industry intends to establish employment conditions that allow flexibility with respect to such choice.

Despite changing expectations and standards, northern native people remain closely tied to the land and to hunting, trapping and fishing. The technology used in the traditional economy has changed greatly, however. Boats with motors, skidoos, high powered rifles, and even aircraft have increased the productivity of hunting, trapping and fishing and have enabled native people to harvest the land while being based in communities. Yet, the new technology does not come cheaply, and equipment requires frequent replacement in the harsh environment of the north. Cash is thus important to the continued capital needs of the native economy and, as in the case of larger consumer purchases, cash needs for major items are typically beyond the means of more traditional income sources. Wage employment with the Industry can

often mean the difference between whether a native person can continue to hunt, trap and fish effectively, or whether his position is an increasingly marginal one.

Another matter is that there are limits to the more traditional means of making a living. The indigenous native population is growing and could grow even more rapidly in future. The fact that people now hunt, trap and fish out of fixed communities means that the animal resources near those communities are often heavily utilized. People who once went further afield by dog team may now do so by aircraft, but that is expensive and cannot be done often. Pressures on resources are a concern, and at some time the prevention of overharvesting of economically important species may require that only hunters and trappers whose livelihood depends largely on harvesting have priority access to such resources. Others will simply have to find their income elsewhere, and the wage and business sectors are bound to become of increasing importance.

This raises the question of how prepared indigenous northerners are to enter into wage employment or business. To date, it has been possible to get by in the north without much education, and education has not, therefore, been seen by many people as important. The nature of activity in the north is now becoming more complex and technical, and more demanding that people be able to conform and perform to industrial standards. There is already a considerable gap between the educational attainment of most northerners and the standards required by many jobs; unless matters are taken firmly in hand, this gap will increase. The result could be a situation in which northern residents would be able to qualify for only the more menial of the available jobs associated with Beaufort development, while people from the south would take the good ones.

Northern business is also at a disadvantage in comparison with competitors and potential competitors from the south. An expanding market will, in part, remove some of the obstacles that northern firms now face, but more will have to be done to ensure that they are able to avail themselves of modern management techniques and have at their disposal services that are commonplace elsewhere in Canada.

Another important theme is that the involvement of the north with the world beyond its boundaries will continue to grow. Isolation is no longer really possible. One way or another, the region will be tied to the broader Canadian and world economy. To date, the north has been in a deficit position with respect to the rest of Canada. The costs of providing government administration and services to small, far flung communities, and of searching for minerals over vast areas of land have been enormous, in comparison with the limited revenues the region has thus far generated. Now, with the prospect of oil and gas development, there is a strong possiblity of turning this situation around and making the north not only one of Canada's wealthier regions, but also a major contributor to the wealth of Canada as a whole.*

1.3 GEOGRAPHY

Volume 5 focusses on the following areas:

The Beaufort Sea Region: This region encompasses ten communities in the Northwest Territories and Yukon Territory, including Tuktoyaktuk and Inuvik. Old Crow is the only Yukon community included. This region will be the scene of the development and production of oil and natural gas. The associated employment opportunities, business growth and population changes will have some effect on all of the communities of the region, and particularly on Inuvik and Tuktoyaktuk.

Five Northern Supply Regions: Yukon, the Great Slave Lake Area, the Central Arctic, the Eastern Arctic and the Keewatin could supply goods, services and/or manpower to hydrocarbon development in the Beaufort Sea region. These supply activities could improve the socio-economic circumstances of communities throughout each region, and especially of Whitehorse, Hay River and Yellowknife.

Three Inland Pipeline Corridors: These are the Mackenzie Valley, Dempster Highway and Polar Gas Y-Line corridors. The first could be the route of a pipeline to transport Beaufort oil and later possibly gas to southern markets. The other two are proposed routes of a pipeline to move Beaufort natural gas southward. Pipeline construction, operations and maintenance could have a range of effects on northern communities.

Two Tanker Corridors: These routes run eastward and westward from the Beaufort Sea. Use of the first could have some bearing on the development of Canadian communities near Parry Channel and, to a lesser extent, on Canadian and Greenlandic communities near Baffin Bay and Davis Strait. Use of the second route would be of interest to Alaskan coastal communities.

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* Volume 2 should be consulted concerning projected Canadian benefits of Beaufort development.

1.4 TIMING

The period considered in the volume extends from the present to the year 2000. Where sub-divisions are relevant or helpful, distinctions are made between the short term (roughly from the present to about 1985) the medium term (roughly from 1985 through approximately 1990) and the long term (roughly from 1990 to about 2000).

1.5 SCOPE, METHODS AND ORGANIZATION

Chapter 1 describes the methodology and some of the philosophy that is the basis for the volume. It states that, throughout the volume, the primary focus of analysis and impact assessment is the northern community. It acknowledges the regional importance of hunting, trapping and fishing, and the hopes that native people have for the continuation of these activities in the future. It emphasizes the Industry's position that it should be possible to expand the oil and gas sector without undermining the resource harvesting sector.

The Industry's view is that hydrocarbon development would broaden the range of choices and opportunities available to regional residents and provide new incentives and additional avenues and resources for tackling long-standing problems. It is argued that hydrocarbon development, while not the solution to problems facing northerners, could provide a foundation on which governments and regional residents, with the Industry's assistance, could build solutions.

The introductory chapter also emphasizes that the Industry is not attempting to gloss over the fact that oil and gas development would have adverse as well as beneficial effects. It is acknowledged that considerable change would occur in some Beaufort Sea communities, and the need for early and continuing cooperative planning involving government, communities and the Industry is stressed.

The subsequent thirteen chapters of Volume 5 contain descriptive material and an assessment of the positive and negative effects that oil and gas development may have in the Beaufort Sea region, in the various northern supply regions, and along the tanker routes and pipeline corridors. Industry's current or proposed socio-economic policies for fostering positive effects and minimizing negative effects are also presented.

The core of the volume consists of **Chapters 2 to 9**, which deal with the region in which oil and gas will be produced - the Beaufort Sea Region. These chapters deal with several topics. They outline the region's geographic setting and history. They discuss the current socio-economic status of regional communities, including the continuing role of traditional activities and the effects of the increasing presence of the oil and gas industry. There are profiles of each of the ten Beaufort communities, and a discussion of their resource harvesting activities. Four **Chapters, 6, 7, 8** and **9**, deal with the future of the region. The prospects for the region without hydrocarbon development are discussed and shown to be limited. The socio-economic dimensions of Beaufort Sea hydrocarbon development are identified. The growth that would occur in regional and community population, employment, incomes, and business opportunities is discussed and, where possible, stated quantitatively. **Chapter 9** sets out the Industry's policies that would enable development without undermining aspects of life that people value; for example, hunting, trapping and fishing and the small-village character of most communities.

2. THE BEAUFORT REGION-BACKGROUND

It is noted that the region is a harsh land that is frozen for much of the year, and is capable of supporting only limited plant and animal life. Many migratory species are found in the region but only during the brief summer.

In aboriginal times the semi-nomadic band was the unit of social organization best suited to the region's physical and biological environments. Because resources were not abundant, bands were small and typically separated from each other. In general terms, aboriginal peoples accepted the natural world as it was, and concepts of physically altering the environment to suit human purposes had little place in native cultures.

Early explorers, whalers and traders were also forced to accept the region on its own terms, but in more recent times, new technology and sophisticated support systems have made it possible to overcome many of the limitations formerly imposed by nature.

Although people have lived in the region for some 4000 years, major social, economic and technological change has occurred only within the last 100 years, during which the region became a hinterland to larger metropolitan centres in southern Canada, the United States and Europe.

The search for whale oil and baleen brought whalers to the region in the late 1800's. By the time commercial whaling activity ceased around 1910, the Eskimo* population of the Mackenzie Delta region had been virtually wiped-out by disease.

The fur trade was introduced among the Dene in the mid-nineteenth Century by the Hudson's Bay Company; whalers subsequently stimulated Eskimos to join in the trade. Trapping was compatible with native culture, although it tended to localize formerly nomadic populations. During the 1920's, when fur prices were high, the native population which had reoccupied the lands of the Mackenzie Delta and adjacent coasts prospered. In later years fur prices were often depressed, but people were still generally able to turn to the land for the bulk of their food supply and some of their clothing materials.

By the mid 1940's the fur economy was no longer capable of providing the cash income to which native people had become accustomed when fur prices were high. A return to the semi-nomadic, self-sufficient lifestyle of aboriginal times was no longer possible on any major scale. The economic circumstances of native people had become very difficult.

New initiatives beginning in the 1950's helped to partially remedy this situation and, at the same time, set in motion new forces of change. The construction of the Distant Early Warning Line (the DEW-line), and a new administrative centre (Inuvik) for the western Arctic, provided employment and exposed native people to values and lifestyles characteristic of the wage economy.

Such major construction projects and government's decision to make better health and education services available in the north, precipitated the rapid urbanization of the region's population between 1955 and 1965. In area after area people were encouraged to abandon their traditional camps and to move into settlements where they could be closer to health facilities and schools. Within a short period the region's native population was struggling with the problems of living in groups much larger than the traditional band, adapting to settlement life, and searching for new ways to earn money to meet growing cash income needs.

The performance of native people during the construction of the DEW line and Inuvik suggests a ready acceptance of wage employment as a means of earning income. Had these two major projects been followed by more opportunities of a similar scale, the effective and experienced segment of the northern native labour force would probably now be considerably larger than it actually is. The major problem in the creation of a modern northern labour force has not historically been the attitudes of northern people, but the fact that whether or not jobs would be available was rarely a predictable matter. Until recent years, when employment in oil and gas exploration became more generally available, wage employment was often less secure as a source of income than trapping, and people had to journey as far away as the Great Slave Lake Railway to find it with any regularity.

The construction of Inuvik as the key government centre in the western Arctic, and the increased range of services available in the north were accompanied by an influx of non-native people into the Beaufort region. Most went to Inuvik to fill government positions. Some were posted to smaller communities as government administrators, nurses, teachers and adult educators.

By the late 1960's, if not earlier, interests in the south were dominant in determining the conditions under which the Beaufort region would continue to evolve. The region was, and continues to be, in a deficit position to the national economy because:

- it has not been able to produce commodities for export to other parts of Canada or internationally in significant quantity and value since the collapse of the fur trade in the 1940's;

- major government and private investment programs have been of a kind that either did not yield a measurable payoff, or that were unlikely to yield such payoffs in the immediate future;

- the influx of non-native people into the region has meant that a larger portion of the population now has no direct links to the land and cannot, therefore, directly provide for its subsistance;

- the limited tax base of the region has been insufficient to match the cost of the services that government has provided, and government programs must be highly subsidized by the national economy.

Well before oil and gas exploration got underway in the region, in the 1960's many native people were concerned that settlement life, non-native education, and wage employment was changing and perhaps undermining their culture. The influx of the oil and gas industry raised the prospect of further outside dominance of the region. Native people organized political interest groups and have lobbied for the recognition of their aboriginal rights and the settlement of their land claims.

Much of the change that has occurred in the region in the past decade has been associated with the activities of the oil and gas industry. Early discoveries in the Mackenzie Delta and the prospect of pipelines along

* Note: Throughout this volume, where appropriate, the term "Eskimo" is used to denote historic populations. Inuit and Inuvialuit are used mainly in reference to present populations.

the Mackenzie Valley resulted in a boom in Inuvik in the early through mid 1970's. The community's population grew, and business people and elected officials made substantial investments on the assumption that there would be continuing growth. When the Arctic Gas pipeline proposal was turned down by government in 1977, the boom collapsed. Inuvik's population dropped by 10% within a year, some businesses went bankrupt and the Town found that it had serviced land and facilities in excess of its requirements.

The economic and social circumstances of the region might have become even worse had not some oil and gas exploration activity continued. Dome Petroleum Limited's offshore exploration program in the Beaufort Sea, begun in 1976, continued and expanded. Esso Resources Canada Limited continued to build artificial islands to explore for oil in the shallow, nearshore waters of the Beaufort Sea. Although not as an operator until recently, Gulf has continued to participate in exploration through its partners. The Industry's activities and policies gave rise to considerable local employment and business during the 1976-1981 period. Much of this benefited Inuvik and Tuktoyaktuk, but other communities such as Aklavik, Coppermine and Fort McPherson also participated.

3. BEAUFORT REGION - THE ROLE OF OIL AND GAS

Chapter 3 continues the discussion of the role of the oil and gas industry at the regional and community levels. It is pointed out that at the regional level the presence of the oil and gas industry has led to:

- the broadening of the economic possibilities, making people less dependent on government and social assistance;

- a renewed concern that hydrocarbon development will make it difficult for native people to remain active in the renewable resources sector;

- concern on the part of elected officials and businessmen that early and detailed information about Industry's plans be provided;

- a much better level of understanding of hydrocarbon development related issues by both the Industry and regional residents;

- the emergence of a new lifestyle option for the region's residents via rotational employment arrangements, which allow residents to work at oil and gas exploration sites, and return home at regular intervals to rest or hunt, trap and fish;

- an ongoing concern on the part of native people and the Industry alike, that the region's residents must benefit from hydrocarbon development;

- a belief by local people that development may not proceed as rapidly as some expect and, thus, a reluctance to invest in community and corporate facilities and services;

- at the same time, a realization that unless fundamental problems such as undereducation and a lack of training are better addressed, particularly by government, development will quickly exhaust the available pool of qualified or semi-qualified manpower;

- notwithstanding the above, a region whose residents and institutions are better prepared now for development than they were in the mid-1970's.

4. THE BEAUFORT COMMUNITIES

For the purpose of analysis, it is proposed that the Beaufort region contains three basic types of communities, although distinctions among these are not, for the most part, strong. The impact of the oil and gas industry has been different in the case of each:

Traditional Communities: Except for Inuvik and Tuktoyaktuk, the other eight communities in the region (Old Crow, Aklavik, Fort McPherson, Arctic Red River, Paulatuk, Sachs Harbour, Coppermine and Holman Island) are still traditional in many respects. Their economic base is a mix of renewable resource harvesting, short-term wage employment, small business, and social assistance. Many aspects of community life such as housing, health and education are heavily subsidized. Expectations and wants are continuing to rise, however, and, consequently, the need for cash income is growing. The Industry's rotational employment arrangements and business purchases have opened up new possibilities for cash income, new markets for local goods and services, and new lifestyle possibilities. At the same time, local concerns about the continuation of native culture have grown.

A Transitional Community — Tuktoyaktuk: While retaining many facets of traditional native culture, Tuktoyaktuk is in rapid transition because of its involvement with the Industry during recent years. The Industry's presence adjacent to the community has brought increased employment, business and training opportunities. The Industry currently accounts for over half of the cash income of the community, and its purchases are the basis for a local business sector that has quadrupled in number of establishments in the past few years. Nevertheless, there is an ambivalence about the future role of the

- Capital shortages could lead to a decline in the productivity of the traditional economy. Cash needed for items such as skidoos, boats, and rifles could become increasingly difficult to obtain.

- There would probably be a decline in the kinds of skills needed for wage employment, through lack of use, and reduced incentives for young people to stay in school or complete training. If and when industrial activity eventually occurred, people in the region would probably be less ready for it, in terms of skills, than they are now.

Overall, the economic situation would be akin to that of the early 1960's, when the trapping economy had declined and there was little that the region's semi-skilled and unskilled labour force could turn to. The social stresses and strains inherent in the situation would be those arising out of prolonged economic stagnation. While they would be different from the stresses arising out of the boom conditions of oil and gas development, they would not be inconsequential in their effect on the Beaufort population.

In view of existing expectations in the region, a long term deferral of hydrocarbon development could lead to even more skepticism about non-renewable resource developments than already exists. The value of long-term planning for development could become discredited, as might the reputations of community leaders who have attempted a more far-sighted approach.

These aspects of the current situation, and a future not based on hydrocarbon development, are sketched out in general terms in Chapter 6. Attention is given to the socio-economic characteristics and consequences of a future that seems more probable, one based on hydrocarbon development in Chapters 7, 8 and 9. In assessing this future, the Industry is concerned that a particularly important principle prevails; namely, that of keeping the growth of regional activity and population within manageable limits, and ensuring that people, communities and businesses are able to benefit from development.

7. BEAUFORT REGION - DEVELOPMENT SCENARIOS

Chapter 7 introduces the discussion of the Beaufort region's future with oil and gas development. The specifics of such development over the next two decades are still uncertain but several different development plans, based both on marine tanker and pipeline transportation, have now been defined and modelled by the Industry, and are described in Volume 2.

From the development plans, it as apparent that a large number of people would be required to build and operate the various production and transportation facilities needed for oil and gas development. Some insights into the magnitude and type of personnel needed can be derived from an examination of three of the development plans, one involving the transportation of oil by pipeline, the other two by tanker.* The pipeline plan and one of the marine plans are high production cases**; the other tanker plan is an intermediate production case. In all three plans, the transportation of gas is assumed to be by pipeline.

- In all three cases the amount of labour required on site during the next two decades would be large. The pipeline plan would require some 16,000 on-site personnel in 1985, about 16,500 on-site personnel in 1991, and over 11,500 on-site personnel in the year 2000. The high tanker plan would require almost 3,000 on-site personnel in 1985, a peak of about 16,500 on-site personnel in 1990, and over 12,000 on-site personnel in the year 2000. The intermediate tanker plan would require some 3,000 on-site personnel in 1985, 15,000 in 1990, and 9,000 in the year 2000. Personnel requirements in the pipeline case would peak both in 1985 and 1991. The first peak is associated with building the main oil pipeline, the second with construction of a gas pipeline.

- In all three development plans, a significant proportion of the labour demand will arise from pipeline construction. In the pipeline plan, construction of the oil pipeline would account for 85% of total on-site personnel in 1985. In both of the marine plans, construction of the gas pipeline would account for around 60% of the total on-site personnel in 1990. Much of the pipeline labour would be employed along rights-of-way well removed from the Beaufort communities. (The right-of-way for the oil pipeline and perhaps the gas pipeline would close to several Mackenzie Valley communities, however.)

- A wide range of labour skills would be required in all of the development plans. The demand for professional, administrative and trades personnel would be high, and people from all over Canada would be involved in such employment. The demand for unskilled people could be limited, however, a matter which lends urgency to improving northern educational attainment standards.

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* In the support documents, these are entitled High Reserves, 1987 Pipeline, 42 Inch Case (2); High Reserves, Delayed Marine Scenario (2); and High Reserves, Expected Marine Case (2).

** These are referred to as "technically achievable" cases in Volume 2.

The potential exists for a large and rapid increase in the region's population over the next two decades as hydrocarbon development proceeds, and people from elsewhere in the north and various points in the south fill construction and operations positions that cannot be filled locally. It is estimated that some 2,000 Industry personnel could reside in the Beaufort region by 1990 and that about 3,000 to 4,000 personnel could live in the region by the year 2000. However, the majority of personnel required under both the pipeline and marine development plans would rotate between their homes outside the region and regional work sites. Their numbers could range from 17,000 to 21,000 in 1990, and from 15,000 to 20,000 in 2000. Total personnel in 1990 would range from 19,000 to 23,000, and by 2000 from 18,000 to 24,000.

These estimates, with certain assumptions about the marital status and number of dependents of personnel living in the Beaufort region, and the indirect and induced employment and population arising from the presence of industry personnel, provide a basis for estimating future population increments that could arise out of oil and gas development. Depending on the development plan, incremental population could hypothetically vary from about 3,000 to 10,000 in 1985, from 12,000 to 15,000 in 1990, and from 16,000 to 23,000 in the year 2000. Taking account of the "normal" population that would live in the region, whether or not oil and gas development took place, would indicate that the upper limit to total regional population by the year 2000 could be about 30,000 people.

To minimize the impact of regional population growth, the Industry believes that a target range or zone should be established, within which such growth would occur as Beaufort development moved forward. This zone should be broad enough to reflect the uncertainty that will always characterize efforts to forecast future population levels in a developing region. Industry's work to date suggests that it should be possible to develop a zone that would allow for relatively smooth growth in the Beaufort's population to a level somewhere in the 20,00 to 30,000 range by the year 2000. This zone would include both the incremental population induced by oil and gas development and the population that would live in the region without such development.

Industry is prepared to work closely with government planners and local people to keep the region's population within whatever target zone is deemed appropriate. Potentially excessive population growth could be moderated by rotating a larger proportion of industry personnel between points outside the region and work sites.

There appear to be two options with respect to where Industry personnel who take up residence in the region might live. They could either move into existing communities or into new communities built especially for them. Inuvik already has a well developed infrastructure and considerable available land for new housing and other buildings, and could accommodate much of the influx of industry personnel and their dependents. Tuktoyaktuk could also experience some further growth.

8. BEAUFORT REGION - EFFECTS OF DEVELOPMENT

Chapter 8 discusses the effects of Beaufort development. The changes that would occur in the region over the next two decades are discussed on a topic by topic basis. The following are considered:

- Increases in community capital and human resources;
- Effects on regional employment and income;
- Growth of the business sector;
- Transportation impacts;
- Community level problems;
- Potential conflicts with native harvesting; and
- Government responsibilities;

The principal points made in the discussion are summarized in the following paragraphs:

8.1 INCREASES IN COMMUNITY CAPITAL AND HUMAN RESOURCES

Population growth of the magnitude indicated would require a major expansion of community capital (such as houses, schools, churches, roads and utilities) and increased human resources (such as more doctors, lawyers, accountants, planners and tradespeople). Estimates reflect three assumptions:

- Population growth can and would be kept within limits deemed acceptable and feasible by all parties;
- Inuvik would be the focus for most of the population growth;
- Tuktoyaktuk would experience some growth in population but this would be very modest in comparison with Inuvik.

The expansion that could be required in Inuvik are briefly summarized below:

- Assuming the type of population growth described earlier the community's population could exceed 10,000 by 1990, and be in the order of 18,000 to 24,000 by the year 2000. A figure of 21,000 for the year 2000 has been used for present purposes.

- The character of Inuvik's population would change, and this would have important implications for community capital and human resource requirements. The proportion of people aged 20 to 34 would increase substantially and, in the early years of hydrocarbon development, the number of men would exceed women by a considerable margin. More women would be working than at present. It is also probable that there would be more transients.

- A substantial increase in Inuvik's housing stock would be required. The current 1,000 plus units of accommodation would have to be increased to 7,500 by the year 2000. Some 270 hectares of serviced land in addition to that already available would be required by the year 2000 to accommodate single family dwellings, multiple family units, owned houses and trailers.

- Inuvik's current commercial facilities can accommodate a local population of 6,000. This level would be attained before the end of the 1980's, and additional retail, trade and commercial facilities would have to be built.

- The community's present water and sewer facilities have excess capacity, and should be able to accommodate almost a doubling of the current population. However, by the late 1980's they would have to be expanded, and additional provision would have to be made for population growth in the 1990's.

- The community's airport can accommodate a considerable increase in arrivals and departures. No need for large scale expansion of its facilities is foreseen. Expansions in air traffic control services could be required as traffic increased, however.

- There would be a need to expand the school system in the community. The spare capacity that now exists would soon be filled by an increased number of school-aged children.

- There is currently considerable spare capacity in the Inuvik hospital, but facilities may need expansion in the next ten years.

- Rapid population growth, an increased number of transients, and change in the community and region would place heavy pressures on social services, although a larger community is likely to have more voluntary organizations whose activities could help to alleviate pressures on such services.

- Rapid population growth would create the need for additional law enforcement personnel.

Proposed expansion at Tuktoyaktuk is foreseen to be of a different nature than that at Inuvik. As a matter of policy, the Industry believes that the growth of its personnel and that of support and service companies should proceed slowly, and that more Industry personnel and their families could become permanent residents of the community.

The changes predicted for Tuktoyaktuk are summarized below:

- The community's population could increase from its present level of about 800 to about 2,000 by the year 2000.

- Housing units would have to be increased to over 400 by the year 2000.

- Additional serviced land would have to be provided in or near to the hamlet. The new housing would need about 27 hectares of serviced land. Other land would have to be serviced and made available for commercial and institutional growth.

- Sewage facilities would have to be expanded and upgraded. Work is already nearing completion on a new water supply reservoir, which is being built with assistance from the Industry. This facility should be adequate to meet foreseeable needs.

- The local road network would also have to be expanded and upgraded.

- The Tuktoyaktuk airport is currently operating at or above its rated capacity, and an early expansion seems warranted.

- Tuktoyaktuk has spare capacity in its elementary school. Some expansion would be required later in the decade to accommodate a growing number of students. There is no high school in the community and consideration should be given to offering high school courses locally.

- The existing three bed nursing station can service a population of 1000. By the mid-1980's it would have to be expanded.

- Some increases would be required in community social services, although voluntary organiza-

tions in the community should become increasingly capable of looking after local needs.

- The four man RCMP detachment would have to be expanded.

Major population growth should not occur in the other communities in the region. Their residents would be able to participate in hydrocarbon development by rotational employment, and by working for local firms providing goods and services to the Industry. Even so, some individuals and families would probably leave the communities and move to Inuvik or Tuktoyaktuk, to take advantage of increased opportunities. It may be possible to partially offset this by expanding local renewable resource based enterprises and other small scale activities and by increasing Industry purchases of goods and services from local firms.

8.2 EFFECTS ON REGIONAL WAGE INCOME

Hydrocarbon development would have a marked effect on regional employment and income levels. Both the indigenous labour force* and the proportion of it employed by the Industry will likely grow rapidly over the next 20 years. The wages paid to Industry personnel would be high. It clearly would be advantageous for people now living in the region to undertake training to qualify for skilled employment. In terms of 1981 dollars, crane operators would command over $40,000 per year and cooks, cooks helpers and supply personnel would average about $30,000, as two examples. Including employees indigenous to the region. Beaufort residents could earn up to $60 million in wages from Industry employment in 1990, and over $150 million in the year 2000. These earnings could have significant multiplier effects.

8.3 GROWTH OF BUSINESS

Hydrocarbon development would have a pronounced effect on the growth and development of firms that are already in the Beaufort region, and on the introduction of additional business capital. Many firms could make the supply of goods and services to the Industry their principal line of business. Others might be mainly involved in retail trade and in residential and commercial construction.

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* The indigenous labour force consists of people who are born and raised in the Beaufort region. It would consist mainly, though not exclusively, of native people.

The Industry already purchases considerable volumes of goods and services from regional firms, and purchases would increase as oil and gas development progressed. The number of regional suppliers would continue to grow but there are trends, evident in recent years, toward larger average purchases per supplier, and an increasing concentration or purchases with a relatively small number of firms.

Population growth of the order suggested by the various development plans would lead to an enlarged and more diversified regional market for goods and services. The business community would undoubtedly expand in pursuit of growing opportunities. The expansion of retailing and the service industries, and the growth of small scale manufacturing, might resemble growth that occurred in centres such as Fort McMurray, Yellowknife and Thompson during earlier periods of northern development.

The market created by hydrocarbon development activities, in itself, would be a major stimulus to business. Three types of businesses could develop or become located in the region in response to the Industry:

- Businesses offering sophisticated, high technology services to the Industry. These services are usually provided through local branch offices of national and international companies. The potential for joint ventures with regional companies or groups is not large. However, these businesses would require offices, warehouse facilities and various services, needs which could be met by local firms.

- Businesses that offer a somewhat less sophisticated service to the industry, often a range of specialized construction, materials handling and management skills, or certain specialized equipment such as supply boats and heavy machinery. The potential for joint ventures with non-regional companies is good.

- Businesses that offer basic construction, hauling, expediting, maintenance and repair services. Non-resident firms often move into a developing area to supply such services, but there is no reason why local companies could not compete for Industry contracts.

If local groups, government and Industry took the initiative, additional businesses could be established or induced to locate in the region. Businesses that offer specialized repair and maintenance services to a wide range of industries, including the oil and gas industry, are an example. A business that repairs large turbines and compressors is such a firm. Special efforts might be required to induce this type of business to establish a facility in the region. The payoff would be significant in terms of a more diversified

business sector and increased opportunities for skilled employment and on-the-job training.

A strong, local entrepreneurial class is a critical element in the development of a more diversified economy in any region. The Beaufort region is no exception. Entrepreneurship would have to be encouraged because not everyone is an entrepreneur, particularly in native communities, where experience with running businesses is limited.

The region has a small but vigorous entrepreneurial class. However, regional businessmen operate in a difficult market and there is much that government and Industry can do to assist them. Industry is already helping through positive policies by providing small contract packages, advice on how to bid, and advance notice of contractual opportunities. Government is assisting in a variety of ways including making loan funds available. The limits on the size of loans may have to be raised to keep pace with the increased scale of enterprises needed during hydrocarbon development.

The small number of entrepreneurs in the region working on their own may not be able to expand existing companies or put together enough new ones to take full advantage of the wide range of opportunities that would accompany hydrocarbon development. Additional development vehicles, with a decidely entrepreneurial slant, could be required. Some are already being put in place or discussed. Others may also be desireable, so as to spread the risks and benefits widely, and to ensure that several points of view are brought to bear on potential investment opportunities.

The buildup of exploration, production and transportation capital in the region by the Industry could meet some regional as well as industry requirements. It is uncertain if specific possibilities would prove economic, but as Beaufort development proceeds, various ways might be found to dovetail Industry and community needs.

8.4 TRANSPORTATION REQUIREMENTS

Hydrocarbon development would involve the transportation of large volumes of cargo to the region and to other points in the north. The Mackenzie River tug and barge system would be able to carry a large portion of the materials required. Additional freight would be carried by truck along the Dempster highway by air, and by sea routes via the Northwest Passage and around Alaska.

The growing population in the region could strain existing transportation facilities and services. While some of the demands for better freight and passenger service might be met by more frequent and higher quality air service, there would be increasing pressure to upgrade the Dempster highway, complete the Mackenzie highway and construct all weather road links between Inuvik and Tuktoyaktuk.

8.5 PROBLEMS AT THE COMMUNITY LEVEL

The principal types of problems that the more rapidly growing of the region's communities are likely to encounter during hydrocarbon development are local shortages and inflation; social problems arising from population change; and alcohol abuse and anti-social behavior.

Local Shortages and Inflation: The region is not as well served by transportation as areas further south. In view of the volume of material that would be brought in during hydrocarbon development, it seems inevitable that occasional shortages of goods would occur. Although the Industry would ensure that the needs of its personnel were met, it may not always be possible to build enough accomodation for everyone moving into the region, which could result in rising rents and accomodation shortages.

Inflationary effects could also be apparent in local prices and costs, particularly in the wages that small businesses would have to pay to attract and keep workers. Public servants on relatively fixed or limited incomes could find it increasingly hard to meet rising costs. If their earnings fell behind those of Industry personnel, some could seek employment in the private sector. There could thus be a drain on public resources at the time when they were most needed. There might also be more women working and more moonlighting, as families not only took advantages of new opportunities but attempted to keep ahead of rising costs. Moonlighting was common in Fairbanks and Anchorage during the Alyeska pipeline's construction.

Those members of the region's labour force who are reasonably adept, competent and experienced should not suffer much from local inflation because they could demand higher wages or take other jobs. The indigent and the unemployed, many of whom are native people, would be less able to do so, and special measures might be needed to ensure that their real incomes would not decline too severely.

Community Social Adjustments: Hydrocarbon development would produce increased opportunities and options for productive employment, skill upgrading, and financial security. At the same time, development would bring strains on the quality and availability of local services and stresses in personal, family and community relationships. The capacity of

communities to mobilize resources to handle rapid social change, the level of resources available, and the attitudes of local residents, would be key factors in their ability to adjust and adapt to the effects of hydrocarbon development.

Communities would have to adjust to changes such as more transients; more new faces in the population; and more residents working long hours or on shifts with less time, perhaps, for community affairs. There would undoubtedly be different opinions about the range and quality of services and facilities that should be available in the community. All in all, many residents, and especially longer-term residents, could find it difficult to adjust to changing circumstances.

While there is much that the Industry and government could do to make resources available, community residents would have to take leadership in many matters. Informal social networks and voluntary associations could do much to overcome delays and shortfalls in local services. The key factor is for local people to bring their own judgement to bear at an early date and to plan ways to avoid or overcome potential difficulties.

Communities would have to address alcohol abuse and anti-social behavior problems, which rapid community change could heighten, at least in the short-run. The degree to which growth would intensify such problems would depend, in some measure, on how carefully the social aspects of such growth were planned and conducted. Above all, the region's native people must feel that they have a genuine and legitimate place in the growing communities. Approaches to handling community change must involve both native and non-native people and must be based on mutual respect and strength. For this to occur, both native and non-native people, and must be based have access to comparable housing, political and economic power, and opportunities for personal and professional development. If communities were divided and various groups could not work together to meet the challenges of rapid growth and change, problems such as alcohol abuse and anti-social behavior would likely increase. These problems would occur largely in the group that felt itself to be disadvantaged, and in the north this has always been the native population.

8.6 POTENTIAL CONFLICTS WITH NATIVE HARVESTING

Fishing, hunting and trapping are of cultural and economic importance to the people of the Beaufort region. An increase in participation in the wage economy generated by Beaufort development is not in itself expected to undermine the value or meaning of using the land. Industry will continue to offer rotational employment that allows time to hunt, trap or fish.

Nevertheless, people are individuals in their inclinations. It is important that northern renewable resources are maintained so that people of regions such as the Beaufort have a choice about how they make a living. With an increase in wage employment opportunities, new expectations and goals will evolve, and many people may come to use the land less frequently than at present. People living in the Delta communities will experience the most change in job opportunities, and may come to rely less heavily on hunting for meat than those living further away from the centre of developmental activity. People living in the Beaufort coastal communities will likely continue to hunt, fish and trap, as long as the resource base is healthy and there are markets for furs and products not used domestically.

As participation in harvesting continues to become more of a leisure activity, there will be more harvesting pressures on the limited resource base that lies near communities. These resources may need to be closely managed to prevent their depletion or local destruction.

The Industry is keenly aware of the need to preserve the integrity of the land and marine ecosystems on which native harvesting depends, and will exercise attention, care, and responsibility in its construction and operational activities. As a matter of policy, the Industry will ensure that hunting and trapping regulations are strictly adhered to by its employees while on the job. However, while the Industry will be able to control the activities of its own personnel and contractors, it will be able to do little about the growing population that is not within its control.

Locations where land use conflicts may be encountered in the Beaufort region are assessed under the following groups: (1) Shorebases and offshore; (2) Road connections to shore bases; (3) the pipeline corridor; and (4) the hinterlands of urban centres which will become growth points; that is, Inuvik and Tuktoyaktuk. The greatest impacts are likely to occur in the hinterlands of Inuvik and Tuktoyaktuk. These would occur more from population pressures than from the specific activities of the Industry.

Hydrocarbon development will spearhead industrial growth in the Beaufort region, but will not be the only growth sector. With population increases, demands for recreational lands will grow. Land use conflicts and competition for the native resource base will undoubtedly arise. Priorities will have to be set with respect to access to game by native and non-native people. There will also be a need to regulate general recreational activities, and to control harvesting competition, if there is to be minimal interference

with traditional activities such as ratting, fishing and hunting.

8.7 GOVERNMENT RESPONSIBILITIES

It is noted that the potential exists for a mismatch between the level of government that would derive most of the revenue from hydrocarbon development, the federal government, and the levels of government that would have to deal with most of the problems. It is suggested that territorial governments will require substantial additional funds to administer effectively the programs for which they are responsible.

The financial needs of community level governments must also not be overlooked. Community budgets would have to be increased to cope with hydrocarbon development. Current territorial fiscal practices may have to be revised, to enable communities such as Inuvik to enlarge their revenue base.

The resources and economy of the region's native people would have to be strengthened if they are to play an effective role in the broader regional economy. It is suggested that government make sufficient funds available to native economic development corporations to enable them to develop native businesses, expertise and skills.

Land claims settlement could have important implications for Beaufort region development, particularly with respect to socio-economic matters; however the Government has instituted a procedure to deal specifically with the topic.

9. BEAUFORT REGION - POLICIES FOR DEVELOPMENT

Chapter 9 outlines present and proposed socio-economic policies for the Beaufort region. Proposed policies are based on the belief that a broader, more total, approach to development in the region is needed. The following paragraphs summarize the most important points made.

9.1 CURRENT INDUSTRY POLICIES AND THEIR IMPLEMENTATION

The Industry has many years of experience in the Beaufort and elsewhere in the north. It has incorporated this experience into the various policies that govern its day to day and year to year relations with northern communities and peoples.

Industry has developed ways to allow northerners as well as government to participate in its planning and decision making, particularly with respect to environmental and socio-economic matters. Important links with the communities have been established via various locally and regionally representative groups. Industry is working to ensure that information about its current operations and future plans is available to all concerned, that it is presented in a manner easy to understand, and that communities are not overloaded with information.

Industry's policies with respect to employment seek to involve a wide range of qualified northerners, particularly in career positions. Emphasis is placed on hiring Beaufort residents, but priority is also given to other northerners.

Industry already has a rotational employment system in effect. The schedules in use enable northerners to take part in wage employment, without having to abandon their resource harvesting activities. Expediters have been hired in communities with a reasonable number of Industry employees, to assist with rotational programs. Employment officers have also been assigned to groupings of communities throughout the north. The Industry has made regular counselling services available to native employees.

The Industry has developed and will continue to develop appropriate orientation programs for all employees to better prepare them for their work experience and to increase their sensitivity to northern social and environmental issues.

The general practice of the Industry is to maintain dry camps. Employees are advised of the laws and penalties governing the possession or use of illegal drugs. Full cooperation is given to the R.C.M.P. in their work to enforce these laws.

The Industry is working to develop a larger pool of northerners with the skills and knowledge that will enable them to work in a wide range of exploration and development activities at all levels of responsibility. It provides information on training and employment opportunities throughout the north, assists northern residents to identify their vocational interests and skill levels, and gives first consideration to qualified northerners in filling positions. It facilitates job progression by conducting training programs during the off-season and by assisting northerners to take courses at educational institutions.

Industry is supporting the expansion and diversification of the northern business sector. It is working closely with northern firms, development corporations and government on this matter. It is spending several million dollars on local purchases each year. It maintains current lists of potential northern supp-

liers and is bringing opportunities to their attention.

Industry believes that it has a good record in matters of social and cultural support in the region. It is working closely with residents, governments and native organizations to identify, avoid, or minimize impacts on key resource harvesting and cultural areas. A close rein is kept on employees and contractors to ensure that they remain aware of regional values and lifestyles.

Over the years, and as warranted, the Industry has given financial support to community services such as day care, broadcasting, and alcohol education.

9.2 LONG TERM COMMUNITY AND RESOURCE DEVELOPMENT

Industry is willing to work with others to achieve objectives important to the long-term development of the people and communities of the Beaufort region. It believes that it can do this by providing the basic impetus for development, helping to establish the machinery required for planning, contributing to the education, skills and experience of residents, employing local people, and buying goods and services from local businesses. Proposals pertaining to such objectives are being developed and discussed by Industry:

9.2.1 COMMUNITIES AND CAMPS

The Industry recognizes that Inuvik is the main centre in the Beaufort. A certain proportion of its personnel would become resident in the community. Some accommodation for crews in transit to and from Industry camps and offshore facilities might be provided, perhaps near the airport, away from the community.

The integration of Industry staff with the community would require a number of considerations and actions. Examples are: Ensuring that adequate housing is available for Industry employees; assisting in the development of required infrastructure and services in sufficient advance time so as not to impede community growth; meeting Industry health, education, cultural and recreational requirements along with those of the community, all in accordance with an evolving town plan; and encouraging Industry personnel to participate in community affairs and activities. The Industry would adhere to the principle that the provision of social services is the general responsibility of government and the community, although it would assist in planning such services. It recognizes that there may be a need for facilities such as an impact monitoring office, crisis centres and special facilities for transients. It will study possibilities of meeting community needs while it is developing services to meet its own requirements.

Residents of Tuktoyaktuk favor industrial development, but there would appear to be limits to how much of it they want to see at their community. Accordingly, the Industry proposes to limit the expansion of facilities at Tuktoyaktuk in accordance with the wishes of the community, and to locate most additional facilities elsewhere in the region. It will work toward the achievement of a greater sense of identification between the community and industrial activities, by continuing to employ and train local people and by locating personnel from the south and their families in the community, if this is agreeable to local residents. Accommodating persons on single status at base facilities in Tuktoyaktuk will not be phased out, but increasing numbers of the people in shore base roles may actually reside in the community. The cooperation of government as well as the community will be important in the achievement of such objectives.

The Industry's proposals with respect to accommodation, infrastructure, recreation, cultural, health, education and social facilities and services in Tuktoyaktuk are essentially the same as those listed above for Inuvik, although specific actions would be of a smaller scale and tailored to the special needs of the community.

In the case of McKinley Bay, King Point and other permanent camps, the Industry proposes to locate and design its onshore camps so as to minimize adverse environmental effects and interference with traditional harvesting activities. Access from communities would be controlled and Industry personnel would be discouraged from visiting communities. Accommodation, recreation and medical facilities would be of high standard, similar in most respects to those which now exist at Dome's Tuk base.

9.2.2 BUSINESS DEVELOPMENT

Industry would continue to encourage the growth and development of the business sector in the region by measures such as continuing the current policy of giving first consideration to competitive regional suppliers, encouraging joint ventures between regional and outside firms, and encouraging the training and development of young regional residents with managerial or entrepreneurial abilities.

9.2.3 EDUCATION AND HUMAN RESOURCE PLANNING

Many residents would have to upgrade their education and skills before they would be able to take advantage of the full range of opportunities created by hydrocarbon development. Regional education

problems are difficult in nature, but the Industry believes that with effort and determination, it should be possible to make good progress in remedying some of them over the next ten years. Industry proposes to contribute to their resolution by measures such as cooperating in regional education initiatives and supporting the creation and implementation of industrial training programs.

9.3 INTERACTION WITH TRADITIONAL HARVESTING

Industry recognizes the importance of traditional harvesting activities to native people, and is aware that its activities and the activities of a larger regional population could raise problems for such harvesting. The Industry would therefore, insofar as possible, avoid locating its facilities or carrying out activities in places where there is considerable risk of decreasing the productivity of harvested lands; consult with native organizations and hunters and trappers prior to locating connecting roads and pipelines; continue to carry out research and work with hunters and trappers with a view to minimizing any interference with traditional activities; continue to monitor the effects of ship traffic on whale movements with a view to minimizing adverse effects; continue a wide range of studies so as to further understand the effects of industrial development; ban harvesting by camp personnel; encourage government to control the harvesting and recreational activities of the growing regional population; and encourage the careful control of the tourist and commercial hunting and fishing industries.

Country foods have already been purchased and made available at Tuk base. Industry could assist in expanding or developing markets for these and other commercial resource harvest products. The potential exists for local, small scale enterprises to supply such products, but the size of the fish and game populations available for exploitation is uncertain and more research on utilization levels seems warranted. The reindeer industry centred on Tuktoyaktuk is an outstanding example of a regional industry based on the natural productivity of the land and good husbandry. It may soon be possible to establish additional reindeer herds.

9.4 LAND USE PLANNING AND COORDINATION

The Industry has closely followed government's work on this aspect of development planning. The Industry is prepared to assist in the land use planning process by identifying its long-term land requirements, and by discussing potential conflicting land uses and possible solutions with all parties. Industry hopes that work underway by the Department of Indian Affairs and Northern Development will result in an effective framework within which Industry plans and proposals can be given fair consideration along with other regional needs.

10. NORTHERN SUPPLY REGIONS

Chapter 10 considers northern regions that could play supply roles to Beaufort hydrocarbon development. It is noted that Yukon and the Great Slave Lake region, especially Whitehorse, Yellowknife and Hay River, could play especially significant roles. The central Arctic, eastern Arctic and Keewatin areas of the Northwest Territories could also supply manpower and provide some business services and supplies.

10.1 YUKON

Beaufort hydrocarbon development may not have an immediate impact on Yukon. Nevertheless, it will produce changes in the territory over a twenty year period. The cumulative effect of these changes could result in a greater degree of economic stability and a more diversified territorial economy.

Yukoners would be well advised to encourage the growth and development of a business sector that will mesh effectively with the longer term opportunities that hydrocarbon development will generate. The following opportunities have been identified:

- Increased Revenues for the Yukon Government: It is likely that the Government of Yukon will receive increased revenues as a result of the increased economic activity in the territory over the longer term as hydrocarbon development proceeds.

- Mineral Exploration and Mining: Over the long term, Beaufort hydrocarbon development could have some effect on mineral exploration and development activity in northern Yukon as a result of the easier access provided by improved transportation systems in the Beaufort. Known deposits elsewhere in Yukon and current mines are unlikely to be effected by Beaufort development. Barite production may be an exception. There are a number of deposits in Yukon which the Industry has been examining as possible sources for Beaufort drilling.

- Tourism: The Yukon tourist industry has considerable potential for expansion, but capacity is already limited in the summer months, and, in the short-term, truck traffic associated with Beaufort development could interfere with tourist traffic. Over the longer term, as Inuvik's population grows, Delta area people would likely drive to Yukon centres for short or extended holidays. Even if they were only passing through to a more southerly destination, distances are such that they would have to spend some time in the Territory.

- Construction: Beaufort hydrocarbon development could have a major impact on Yukon's construction industries. Some firms could obtain work with the Industry. Others may find opportunities in the expansion of Inuvik and Tuktoyaktuk.

- Transportation: The Dempster highway is already being used to move some materials and equipment to the Mackenzie Delta. There are less expensive ways of moving most goods such as by tug and barge down the Mackenzie River or by ship or tug-barge around Alaska. The Dempster's role is likely to remain specialized and limited with respect to the Industry's requirements. However, its use could increase if Whitehorse businesses are successful in obtaining Beaufort-related work.

- Forestry: Hydrocarbon development could provide a larger market for various Yukon forest products, although it may remain less costly to bring in wood from the south via sea or river barge. It is probable that a small and specialized market for Yukon forest products could be developed because of population growth in the Beaufort Sea region.

- Business Sector: This sector of the Yukon economy could benefit appreciably from Beaufort hydrocarbon development. Most firms are located in Whitehorse, which would benefit most. Some firms may find it advantageous to open branches in Inuvik or Tuktoyaktuk.

- Electric Power: It is not clear whether the electrical power generating capacity that will have to be installed to support Beaufort hydrocarbon development could also provide some of Yukon's power requirements at a lower price than existing means. Several studies have been undertaken concerning the prospects of using Mackenzie Delta or Beaufort natural gas as a generating fuel. At present, these studies have indicated that this fuel is uneconomic compared to current sources.

The Industry will do all it can to work cooperatively with the Government of Yukon to ensure that Yukoners benefit from Beaufort Sea hydrocarbon development. In addition, it will undertake the following with respect to Yukon:

- The Industry will employ qualified residents who are willing to work in Beaufort development;

- The Industry will discuss with the Government of Yukon how it may assist in training Yukoners for Beaufort employment;

- The Industry will either originate flights at Whitehorse to rotate work crews to and from northern work sites or arrange alternatives to service rotational crews in Whitehorse.

- The Industry will use Yukon contractors, trades and service personnel insofar as economically possible;

- The Industry will purchase part of its supplies from Yukon's wholesalers and retailers who are competitive;

- To the extent possible, the Industry will encourage initiatives for the development of material sources.

Implementation of these Industry policies will be phased in gradually as Beaufort development proceeds. Although the development of a specific timetable is premature at this point, the Industry is prepared to work out an agreement with the Yukon government on the principles that would apply to the various policies.

10.2 GREAT SLAVE LAKE COMMUNITIES

The Great Slave Lake region, especially the communities of Hay River and Yellowknife, will also play an important role in supplying Beaufort hydrocarbon development. **Chapter 10** highlights the capabilities of various communities relative to Beaufort supply requirements.

There will be opportunities for the residents of every community in the region to work in the Beaufort should they wish to do so, but most positive impacts will occur in communities with the largest and most developed business sectors in the region: Hay River and Yellowknife.

Hay River is already a key transportation centre for Beaufort supply activities. It will play a major transshipment role as Beaufort development proceeds. Moreover, when a pipeline is built along the Mackenzie River, the community will be the scene of con-

siderable additional transport related activities. Hay River already has a diversified local business sector and this too will benefit.

Although Yellowknife is not directly linked by road to the Delta, its road connection with the south, major airport facilities, position as a key government centre, and diversified business sector would make the community important in Beaufort development. Yellowknife construction companies, and various firms engaged in service activities, would experience increased business.

The Industry makes the following proposals to ensure that Great Slave Lake communities share in the benefits of Beaufort hydrocarbon development:

- The Industry will employ as many Great Slave Lake area residents as possible, provided they are able to qualify for such employment;

- The Industry will work with the GNWT to train residents and to arrange suitable rotation schemes;

- Wherever economically possible, the Industry will use regional contractors and personnel;

- The Industry will purchase a portion of its supply needs from regional wholesalers and retailers; and

- The Industry will increase its use of Hay River transportation and transshipment facilities, bearing in mind the critical role that they play in the supply of goods to communities in the region and elsewhere in the north.

10.3 CENTRAL ARCTIC, EASTERN ARCTIC AND KEEWATIN

Communities in the central and eastern Arctic and in the Keewatin could also be affected by Beaufort Sea hydrocarbon development. There effects could arise in three different ways:

- Communities could supply goods and services to the Industry. The prospects for doing so are believed to be limited, in view of distances to the Beaufort Sea region and the small size of their local business sectors, but the Industry will consider all possibilities on their merit;

- Residents could work in Beaufort hydrocarbon development via rotational employment arrangements. The Industry will attempt to establish suitable rotation schemes if there is sufficient interest; and

- Residents could move to the Beaufort Sea Region to be closer to their place of work, although the Industry will not generally encourage this.

11. INLAND CORRIDOR COMMUNITIES

Chapter 11 summarizes the work that has been carried out to date on the socio-economic impacts of constructing and operating oil and/or natural gas pipelines along various inland corridors from the Beaufort Sea region to the 60th parallel. Three inland corridors are discussed: the Mackenzie Valley, the Dempster Highway, and the Polar Gas Project's Y-line corridor.

Industry has studied the feasibility of an oil pipeline along the Mackenzie Corridor. Foothills Pipe Line (North Yukon) Ltd. has made application for a gas pipeline along the Dempster highway as a lateral to the Alaska Highway Gas pipeline. Polar Gas Project is studying a possible Y-line route, linking gas reserves in the Mackenzie Delta and the Arctic Islands to southern markets via a junction near Coppermine.

In general, if a pipeline is built along any of the inland corridors, Inuvik and Hay River (because of its importance as a transport centre) will experience socio-economic impacts over and above those arising from Beaufort Sea field development. Most impacts will be concentrated in a three or four year period of pre-construction and construction activity. In contrast, operations and maintenance activities will take place on a much reduced scale.

The communities along or adjacent to an inland corridor will experience an upsurge in employment and business as pipeline construction proceeds and, to a lesser extent, during operations and maintenance. However, most construction activities will move past a community quickly. Some conflicts with existing land uses are anticipated but every effort will be made to avoid or mitigate such impacts.

There should be sufficient opportunities for any interested and qualified resident of the Northwest Territories or Yukon to obtain construction work.

It is anticipated that Inuvik will be a key centre for pipeline operations, and that the community will also play a key support role during construction. During operations, staff would be drawn from the local population to the extent possible, or would be encouraged to take up permanent residence in the community.

Esso is currently studying the possibility of building a

30 cm (12 inch) pipeline that would connect onshore or near-shore oil reserves in or near the Mackenzie Delta with the soon to be built Norman Wells pipeline. Such a pipeline would have impacts similar to those of the larger pipelines discussed above.

12. PARRY CHANNEL COMMUNITIES

Chapter 12 considers the likely socio-economic consequences of shipping hydrocarbons through Parry Channel. The communities in the vicinity of Parry Channel are Resolute, Arctic Bay, Pond Inlet and Grise Fiord. Their total population in 1981 was estimated to be 1,400, some 90% of this being Inuit.

Socio-economic profiles are presented for each community. Many elements are similar to the western Arctic situation: a movement from the camps to settlements within the past two decades; a large proportion of young people; continuing commitment to hunting, trapping and fishing; a willingness to incorporate modern technology into resource harvesting; a high cost of living; and the need for most men to take at least part-time wage employment to make ends meet and provide for larger purchases.

The experience that many Inuit in Pond Inlet and Arctic Bay have had with rotational wage employment with Panarctic Oils Limited in the Arctic Islands is discussed. Several studies have shown that the experience has been generally positive in both communities although some social problems have occurred. Mention is also made of the Inuit who have worked at the Nanisivik mine near Arctic Bay.

The importance of resource harvesting in the economy of each community and the areas used for harvesting various species are discussed. Only Resolute residents make use of Parry Channel (in the Barrow Strait area) for resource harvesting or to travel to harvesting areas. The other communities harvest species that migrate through parts of Parry Channel. Some residents of these communities have used the Lancaster Sound area in the past. None do so now and their main concern is to ensure that nothing happens that will interfere with the migration of seals, narwhal and beluga to hunting areas near the communities.

Resolute Inuit are concerned that frequent ship passage through Barrow Strait will disrupt the ice cracks that are the focus of much of their winter hunting activities, and will make it difficult to travel to hunting areas on Somerset and Prince of Wales islands. Along with the residents of the other three communities, they are concerned about possible oil spills in Parry Channel.

The Industry has studied the effects that ship traffic could have on the residents of Parry Channel communities and is prepared to work with residents to minimize the potential for adverse impacts. Research to date in the Beaufort region that ship tracks would freeze over quickly in winter and should not pose any particular problems to hunters. However, work is continuing.

The Industry has worked hard to design the safest possible oil tankers and it is very unlikely that a major spill will occur. Nevertheless, the Industry will ensure that Parry Channel communities are fully aware of the design features of the ships and of planned oil spill contingency measures.

Parry Channel residents are concerned about the possible detrimental effect of ship noise on marine mammals. Industry recognizes this concern and is carrying out a variety of research in this field. Industry experience and research to date has not demonstrated any significant detrimental effects.

The Industry supports the concept of a Marine Authority to control Arctic shipping. Creation and operation of such an authority is in progress and would go far towards satisfying the concerns that residents have about the possible cumulative effects of increased shipping through Parry Channel.

The Industry is exploring ways by which the residents of Parry Channel communities could benefit from Beaufort hydrocarbon development. Some possibilities are rotational work at Beaufort facilities and on ships which use the Northwest Passage. Other ways are also being considered; for example, the provision of liquid fuels for local use and assistance with community resupply activities.

Other Industry policies with respect to the Parry Channel communities include:

- Already underway is the provision of part of the funding for the Baffin Region Inuit Association's resource harvesting study. The study will provide additional information on Inuit harvesting levels and locations;

- Development of appropriate employment, training, business development and social programs for the Parry Channel region similar to those developed for the Beaufort Sea region;

- In cooperation with government, Industry will assist Parry Channel communities to research and monitor the local impact of employment and other forms of involvement with oil and gas based development;

- The Industry will examine methods to compensate northerners, including Parry Channel residents, for losses of property or livelihood that occur as a result of hydrocarbon development and transport activities; and

- The Industry will ensure that eastern Arctic communities, particularly Parry Channel communities, are fully informed of its plans and intentions. A regional information office has been established and is staffed by resident personnel fluent in Inuktitut.

13. BAFFIN BAY - DAVIS STRAIT COMMUNITIES

Chapter 13 discusses the socio-economic aspects of using Baffin Bay and Davis Strait for shipping hydrocarbons to market. It is noted that tanker passage is of concern both to Baffin coastal communities and to Greenlandic communities.

The Arctic Pilot Project has studied the use which Baffin Island residents, particularly the residents of Clyde, Broughton Island and Pangnirtung make of offshore areas. None of their resource harvesting activities extend much beyond the immediate coast.

The Industry is confident that the year round passage of tankers well offshore of Baffin Island will have virtually no effect on the communities. There will be no direct interference with hunting. It is also believed that ship passages will not give rise to indirect impacts on resource harvesting through interference with marine mammal migrations.

The Industry is examining ways through which Baffin residents could benefit from Beaufort hydrocarbon development and related shipping activity. The possibility of people from the area working in exploration and production positions in the Beaufort region has already been noted. There is also the potential for them to be employed in ship's crews and in environmental monitoring activities along the shipping routes.

Chapter 13 also presents a brief socio-economic profile of Greenland's economy and society. The resource harvesting activities of Greenlanders in the Baffin Bay-Davis Strait area are discussed at length, using documentation assembled by the Arctic Pilot Project. Arctic Pilot Project material indicates that increased shipping will have no impact on the harvesting of marine mammals by Greenlanders; bird harvesting along the west coast of Greenland; or the inshore commercial fishery. The fishery takes place within 22 km of the shore, well away from the tanker routes.

The material also makes it clear that vessels will have to be careful to avoid interference with offshore trawling activities activity that occurs in Davis Strait.

14. ALASKA

Chapter 14 discusses the socio-economic aspects of tanker traffic off the north coast of Alaska and in the Chukchi Sea and Bering Strait. No proposals have been made for specific routes, but tankers would likely operate well offshore and there would be little or no effect on coastal harvesting activities.

Significant volumes of hydrocarbons have already been carried along the Alaska north coast to support industrial and government activities. With respect to operations the Industry might undertake in future, tanker design and construction and carefully worked out oil spill contingency measures would endure safe, high-standard operations.

CHAPTER 1
INTRODUCTION

During forthcoming decades the Beaufort Sea region will be the scene of large-scale oil and gas developments. There will be a shift from the current pioneering, seasonal drilling program to year-round exploration, production and transportation of hydrocarbons. Such developments will have an important bearing on the development of the northern territories.

Major changes will occur in the Beaufort region, particularly in the vicinity of the Mackenzie Delta, where onshore facilities will be constructed or expanded to support offshore operations. But the effect on other regions will also be considerable. The Northwest Passage could become an important tanker transportation route by 1990. A pipeline corridor, containing both oil and gas pipelines, could be developed along the Mackenzie Valley or another inland route. Substantial volumes of freight could move to the western Arctic by a variety of transport routes and modes. New investment opportunities will arise, communities will grow, and new economic options will open up.

The objectives of this volume are, in brief, to clarify and predict the magnitude and nature of oil and gas generated growth and development in the northern territories; to demonstrate how such growth may affect northern populations, economic structures and social institutions; and to recommend policies that would enhance the positive and beneficial aspects of oil and gas development and minimize or mitigate the negative aspects.

Like the other volumes of this Environmental Impact Statement, this volume is the joint product of Dome Petroleum Limited, Esso Resources Canada Limited, and Gulf Canada Resources Inc. It represents the experience, interests, projections and policies of all of the companies active in the Beaufort Sea region. Unless particular companies require specific reference, the companies in total will be referred to as "the Industry" throughout the volume. The material presented was prepared by the Industry with the assistance of several consulting firms. Major external contributors included:

Aresco Ltd. -
archaeology

Externality Associates Ltd. -
northern business
community profiles
regional analysis
general editing
overview

Fedirchuk McCullough & Associates Ltd. -
archaeology
historic resources

Manforce Research Associates Ltd. -
statistical support
community profiles
forecasting
general editing

Resource Management Consultants (Alberta) Ltd. -
community profiles
regional analysis
literature survey
general editing

Strong Hall & Associates -
social analysis
general editing

Whole Note Contract Services Ltd. -
traditional economy
maps and figures
general editing

In-house expertise and project co-ordination was provided by specialists from Dome Petroleum Limited, Esso Resources Canada Limited, and Gulf Canada Resources Inc.

1.1 SCOPE

This volume deals with the whole of the Canadian Arctic, as well as coastal areas of Alaska and Greenland. Much of it is devoted to the region in which the hydrocarbons that are at issue will be produced, namely the Beaufort Sea region. However, regions that will perform a supply function to the Beaufort Sea region and regions in which oil and gas transportation routes are located also receive considerable attention. (Figure 1.1-1)

The time frame, as is the case with other volumes of the EIS, is about twenty years - that is, the period from the present to the year 2000. Where such divisions are relevant, this time frame is divided into three periods: 1) the "short-term," roughly the present to about 1985; the "medium-term," extending to about 1990; and 3) the "long-term," extending to about 2000.

1.2 METHODOLOGICAL CONSIDERATIONS

1.2.1 FOCUS ON COMMUNITIES

This volume is focussed on regional groupings of communities, with individual communities being

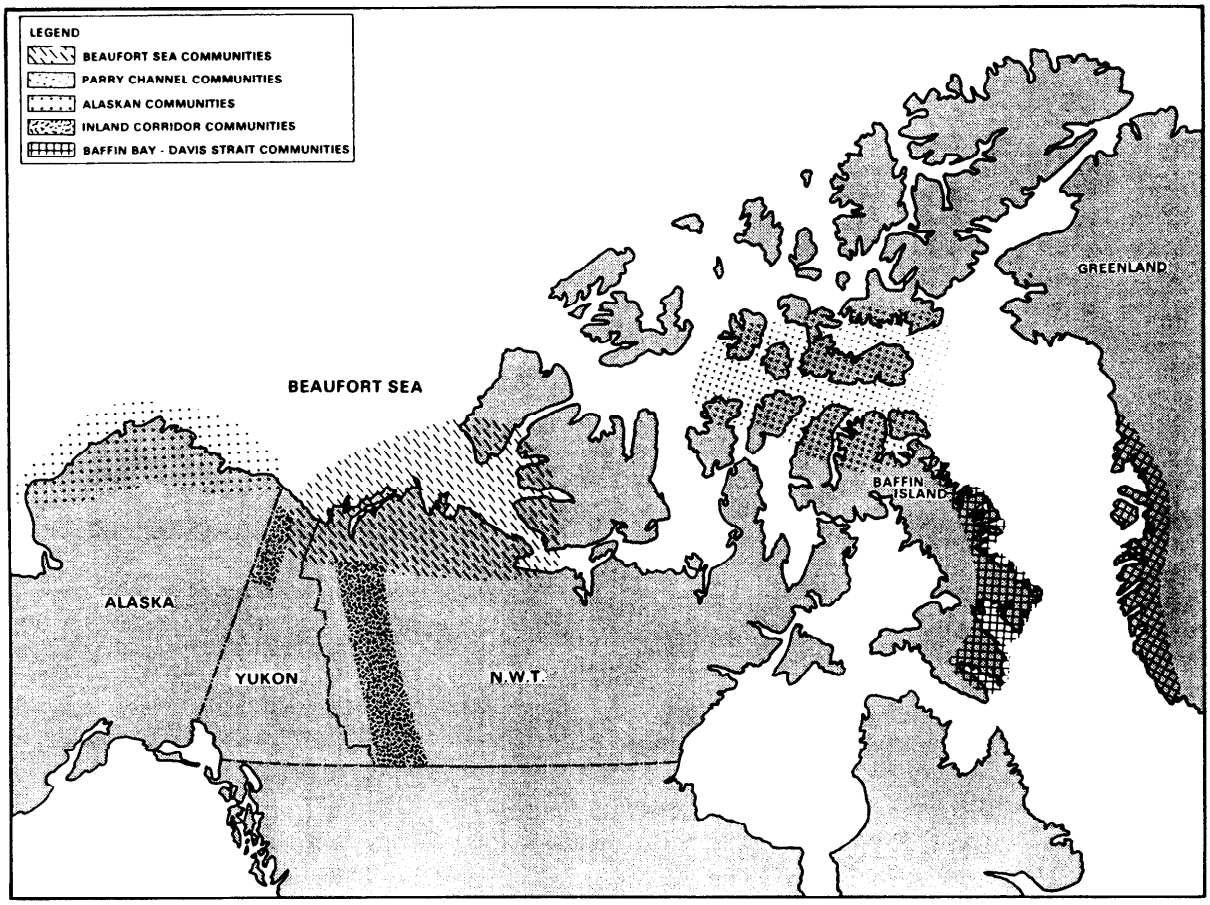


FIGURE 1.1-1 *Regions dealt with in Volume 5.*

considered as the primary unit for impact assessment.

All communities, even the smallest, are complex systems. All have as their basic units: individuals; families and activities which occupy these families and provide them with goods and services; social capital, including facilities such as schools, churches, roads; methods of caring for the ill or the indigent; and means of enforcing the law. Communities are held together by beliefs, values, norms and laws which regulate how ordinary residents, firms, and the various components of community government behave toward each other.

There are many differences in how communities are organized to provide for the needs of their members and their continuity. A distinction important in the north is the degree to which communities have a built-in orientation toward growth and change. Communities which have a predominantly non-native population tend to be strongly oriented toward growth; indeed, many of their residents moved to them in the expectation of such growth. Native communities, on the other hand, tend to be more conservative regarding change that could significantly alter their size or character.

This volume attempts to be sensitive to the range of opinions and points of view found in northern communities. It does not pretend that oil and gas development will make everyone better off and that such development will not have adverse impacts. The policies and programs it proposes are intended to enhance positive effects of development and, insofar as possible, reduce adverse effects.

1.2.2 CONSULTATION

Many of the communities were visited at various times and several Industry representatives were in attendance at the hearings on the EARP panel's draft guidelines. Special care was taken to consult Beaufort residents on matters such as the geographic extent, location and intensity of traditional hunting, trapping and fishing; the business sector of the principal Beaufort communities; the nature of social problems and the services that deal with these; and community plans and future options. Matters of concern to the Governments of the Northwest Territories and the

Yukon Territory were discussed with them, and the Department of Indian Affairs and Northern Development was kept informed on progress and the general substance of the volume throughout.

Consultation on the volume has also been an integral part of a larger public liaison process. Throughout the development of the volume, specialists who were responsible for its preparation worked closely with the Industry Group, which was responsible for ensuring that members of the northern public were fully informed on matters related to Beaufort development and the Environmental Impact Statement. At an early stage of the project, a northern resident fluent in languages of the Western Arctic was engaged to convey information on the EIS and obtain feedback from communities of the Beaufort region. At a later stage, an Inuktitut-speaking information officer was engaged for the eastern Arctic and, somewhat later still, an officer was engaged for the Mackenzie Valley. In addition to such dedicated personnel, Dome, Esso and Gulf have each operated ongoing community liaison programs, as well as more specialized programs dealing with matters such as business development and employment. Every opportunity was taken to inform and consult with regionally representative groups in the north during the preparation of this volume and the EIS as a whole.

Despite all such efforts, the Industry recognizes that it can only go so far in attempting to reflect regional and community concerns and positions in a document that it prepares as the proponent of a major industrial development program. It is up to the Industry to state its position, but up to the people that development will affect to state theirs. In this regard, it is understood that, in cooperation with the Beaufort Sea Community Advisory Committee, the communities of the Beaufort region are now undertaking their own consultative process, and that local field workers are working with the communities to encourage their participation in the EAR process.

1.2.3 IMPORTANCE OF THE TRADITIONAL ECONOMY

The analysis of this volume is based on a recognition that native people have a prior, unresolved claim on northern lands, and that their economic, social and cultural objectives may be quite different from those of non-native northerners. The Industry is convinced that native people can benefit from oil and gas development but it acknowledges the deep concern these people have expressed about the continuity of their way of life. In recognition of this concern, this volume contains extensive material on the possible effects of oil and gas development on the traditional harvesting activity of native people. This material is most extensive for the Beaufort Sea region, where industrial activity will be especially concentrated.

1.2.4 HISTORIC APPROACH

The view taken in this volume is that the life of a community or a people is a continuity in which the past events are an important determinant of present attitudes and behaviour, and in which current events will have an important bearing on the future. A thorough understanding of the past and present is required if projections and predictions are to be valid. The material in this volume therefore attempts to develop an understanding of the history and current circumstances of the communities that Beaufort Sea development will affect, and thus to provide a proper groundwork for future policies and programs.

1.2.5 TECHNOLOGICAL/ENGINEERING AND SOCIO-ECONOMIC SCENARIOS

In this volume, a distinction is made between two types of "scenarios" or descriptions of development. A "technological/engineering scenario" refers to plans and possibilities concerning pipelines, exploration and production islands, drillships, processing plants and shorebases; that is, to the plant, equipment and manpower needed to explore for oil and gas, and to produce and transport it. A "socio-economic scenario," by comparison, refers to the human, community based or regionally based effects of assembling and utilizing exploration, production and transportation capital and manpower.

Social and economic effects of industrial or resource development are usually indirectly dependent on the individual "hardware" components of industrial development. In the case of Beaufort Sea development, important effects would not derive obviously or directly from the construction or operation of artificial islands and drillships, but from movements of labour and income flows. Yet, there could also be direct effects of some consequence such as those created by tanker tracks through sea ice crossed by hunters, or by pipeline gathering systems in trapping lands.

The indirect nature of much of the relationship between exploration and production facilities and socio-economic effects requires a translation of the technological/engineering scenario into a socio-economic scenario, especially for the major impact region, the Beaufort Sea. This is done in Chapter 7, which estimates the growth of permanent Beaufort Sea residents that could result from the buildup of exploration, production, transportation, and shorebase support facilities.

Where appropriate, direct effects are also taken into

account. For example, considerable attention is given to the location and intensity of native harvesting in order to avoid potential conflicts between such harvesting and industrial land use.

1.3 POINTS OF DEPARTURE

The development of the hydrocarbon resources of the Beaufort Sea region has major national and regional implications which are discussed in Volume 2 of this Environmental Impact Statement. The production and transportation of Beaufort Sea oil and gas would be of very large consequence to national and regional output and employment, to the balance of payments, and to government revenues. Proposed production from the Beaufort Sea region represents a substantial proportion of potential Canadian production and consumption of hydrocarbon fuels. Well before the year 2000, oil from the Beaufort Sea region could displace imports and could provide a growing surplus in terms of domestic needs. Gas from the Beaufort Sea region could provide Canada with large additional export volumes.

The developmental possibilities of the Beaufort Sea region are known in general, and, as is outlined in Volume 2, planning for initial facilities is underway. However, there remain uncertainties about the form that the buildup of activity will take, especially beyond the initial years of production. Projections of variables such as population contained in this volume are therefore intended as no more than an indicative statement of the pattern and future effects of oil and gas development. In general terms, the major features of Beaufort Sea development would include the following elements:

- A very large investment, by the petroleum industry, in oil and gas exploration and production capital during the next 20 years (onshore and offshore facilities, pipelines, tankers and support vessels).

- A corresponding large growth in Beaufort Sea labour demand. Currently, the Industry provides the equivalent of some 1,800 man-years of employment in the Beaufort operations. By the year 2000 there will be a several-fold increase in employment levels.

- A shift from continuing exploratory activity to a mix of exploration and large-scale production.

- A shift from activity which is distinctly seasonal to activity which is largely year-round and which would exhibit only a moderate seasonal component.

- A shift from emphasis on shallow water activity to a mix of both shallow and deep water activity. A continuation of onshore oil and gas development in the Mackenzie Delta.

- Continuing reliance on floating drillships, but much greater emphasis on fixed exploration and production platforms.

- The development of large-scale transport systems (tankers and pipelines) to remove hydrocarbons to southern markets.

- The development of more extensive shorebase facilities to support offshore activity.

- Rapid and relatively large growth in some Beaufort Sea communities.

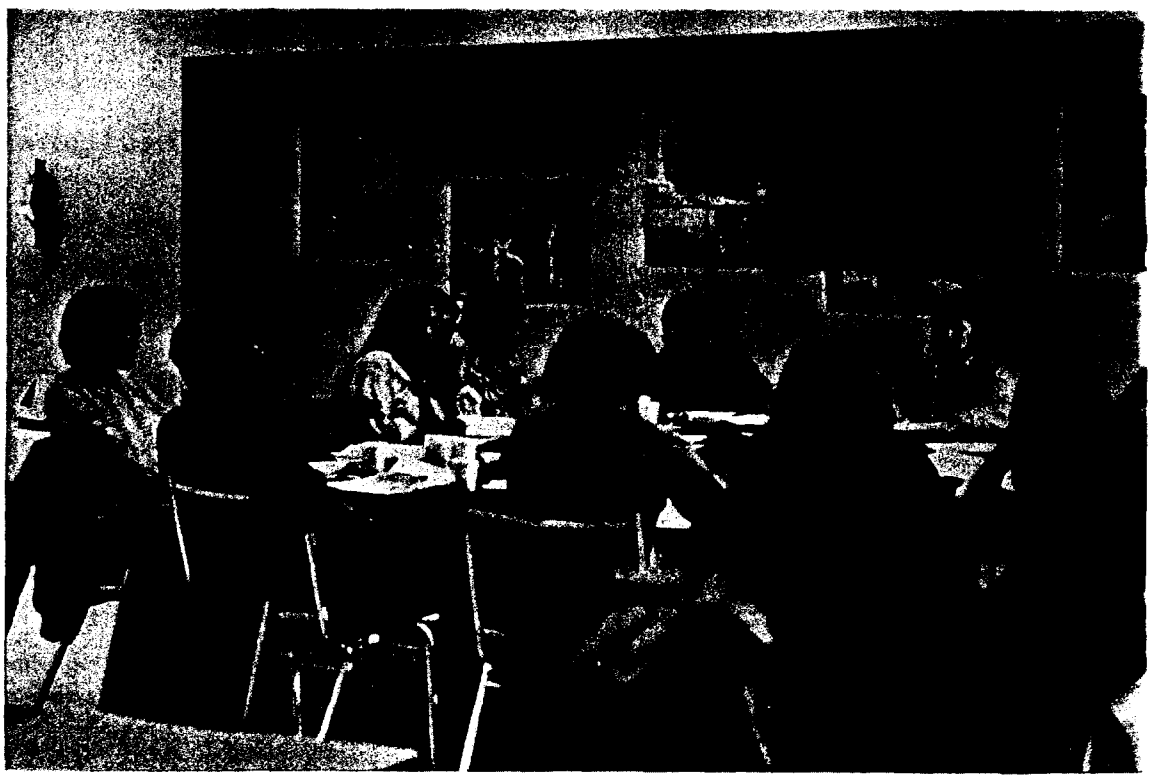
In combination, developments such as the foregoing will represent a major quantitative and qualitative change in Beaufort Sea activity. Such change will, in turn, have important consequences for communities, the local economy, and regional infrastructure. It could, for example, shift the economics of personnel logistics from a situation in which it is reasonable to shuttle nearly all personnel between homes in the south and northern work places to a situation in which it could make sense to house a growing number of personnel and their families in northern communities the year-round. Given such shifts, there is a possibility of corresponding changes in the economic and social development of some Beaufort Sea communities.

1.4 ORGANIZATION OF THE VOLUME

Two points are important with respect to the organization of this volume. Firstly, its chapters are organized in terms of broad regional groupings of communities. Secondly, the regions themselves can be further grouped in terms of function, that is, as oil and gas production regions, regions which will provide supply inputs to production, or regions through which major transportation facilities for the outhaul of oil and gas could pass.

Chapters 2 through 9 deal with the Beaufort Sea region, whose communities and people will be in the general vicinity of oil and gas production development, and will therefore bear the principal impact of development, both positive and negative. Ten communities are included in the discussion of the Beaufort Sea region. It will become clear in subsequent discussion that not all of these communities will feel the effects of oil and gas development equally and

PLATE 1.2-1 *Consultation has been an important aspect of the preparation of the Environmental Impact Statement and related activities. Above: Holman Island children look at resource harvesting map. Below: Field workers meet to discuss community response to the EARP panel.*



that some will scarcely experience any effects at all. Some, such as Tuktoyaktuk and Inuvik, have already experienced considerable impact. Others like Holman Island and Old Crow have only had marginal contact with oil and gas development. Despite varying past and possible future experiences, the communities have tended to behave as a region with respect to oil and gas development, working toward a common point of view via regionally representative bodies such as the Beaufort Sea Community Advisory Committee.

Chapter 10 deals with "Northern Supply Regions" whose principal function with respect to Beaufort development will likely be the supply of labour and goods and services. These regions include Yukon, communities in the vicinity of Great Slave Lake, and communities in the central and eastern Arctic and the Keewatin. In a few cases, the major communities within some of these regions will function both as primary suppliers in their own right and as important transshipment points for goods originating further south. Whitehorse, Hay River, Fort Simpson and Yellowknife could play significant transshipment roles as well as being prominant in direct supply.

The remaining chapters of the volume focus on regions that would contain major hydrocarbon transportation routes. Two of these chapters, one dealing mainly with the Mackenzie Valley and the other with the Northwest Passage, are especially important. Chapter 11, "Inland Corridor Communities" deals with pipeline routes that could be used to transport Beaufort oil and gas to southern markets. It includes a discussion of impacts on all the communities that are usually considered as part of the Mackenzie Valley - about 25 communities in total. While the focus is mainly on an oil line that could be built along the Mackenzie Valley, the possibility of a gas line and the Polar Gas Y line are given some consideration. Mention is also made of the possibility of connecting on-shore and near-shore Mackenzie Delta reserves of oil with the prospective Norman Wells pipeline via a small diameter pipeline that would be built well in advance of any major pipelines. Chapter 12, "Parry Channel Communities," is concerned with tanker transportation via the Northwest Passage or, as it is termed in this EIS, the "Eastern Shipping Corridor." Attention is focused on four communities - Resolute, Arctic Bay, Pond Inlet and Grise Fiord. These are the main communities tha could experience some effect from the passage of oil tankers. The final two chapters of the volume deal with communities along the eastern seaboard of Baffin Island and in Greenland ("Baffin Bay - Davis Strait Communities") and with Alaskan communities ("Alaska").

It will be noted that there is considerable geographic overlap among the regional divisions of this volume. Thus the chapter on Inland Corridors presents data on communities that are also included in "The Beaufort Sea Region" and "Northern Supply Regions." In part, this overlap is due to the fact that it really does make sense to include some communities in all three chapters. Arctic Red River, for example, is both part of the Beaufort Sea production region and would also lie near both the Mackenzie Valley and Dempster Pipeline corridors. Fort Simpson lies in the Mackenzie corridor, but would also function as a major supply point to Beaufort Sea development. In part, as well, the overlap reflects the fact that it was never the intention, throughout this project, that everything in the volume should totally cross-check or add-up, and that all boundaries should be neat and tidy. If a particular community, or any other factor, fits the discussion in several places, so be it.

The volume contains a large quantity of economic and other data derived from both field research and secondary sources, but there are, unfortunately, still some significant data gaps. It had originally been hoped to develop series on community incomes, expenditures, and activity patterns, especially for the Beaufort Sea region, but this did not prove feasible during the time available for the preparation of this EIS. Such data, if they were available for a period of several years, could show how the economy of a community or region is changing in response to new influences such as the greater availability of wage employment. It is hoped that appropriate time series can be developed in future and recommendations concerning this are contained in Volume 7.

In the absence of such data, a great deal can be said about the individual sectors of the northern economy, but not very much can be said about how these sectors fit together or are changing in relation to each other. In the Beaufort region, the role of the oil and gas sector is certainly increasing in absolute terms and probably also in relative terms. From data presented in Chapter 5, this would not, however, appear to mean that the role of hunting, trapping and fishing is declining in most regional communities.

As a final point, it will have been noticed that this volume is preceded by an "Overview". One purpose of the Overview is that of a summary. However, its more important purpose is that of highlighting the central arguments and recommendations made throughout the volume. It has been written for busy readers who, confronted with a massive pile of paper, ask themselves the question of "Now what does this thing really say?" Having read the Overview, some readers may want to examine parts of the volume as a whole, but to the maximum possible extent, an attempt has been made to spare them the need to do so.

CHAPTER 2

THE BEAUFORT REGION - GEOGRAPHIC AND HISTORIC BACKGROUND

The purpose of this chapter is to provide a broad understanding of the setting and origin of the Beaufort Sea communities. It can be considered as the foundation upon which the descriptive and analytical material of subsequent sections is placed. There are two parts to the chapter. The first briefly describes the region and its communities, and places them in a broader northern and national context. The second is a historic description of the evolution of the regional economy from the days of the early fur trade to the era of oil and gas exploration.

2.1 THE GEOGRAPHIC SETTING

For the purposes of this volume, the Beaufort Sea region extends from Demarcation Point on the Canada-Alaska Boundary in the west to the Coronation Gulf area in the east. It includes waters such as the Beaufort Sea (including Mackenzie Bay, Kugmallit Bay, and Liverpool Bay), Amundsen Gulf, Dolphin and Union Strait, Coronation Gulf and Prince of Wales Strait, and lands such as northern Yukon and Herschel Island, the Mackenzie Delta, coastal lands extending from the Delta eastward to the Coronation Gulf area, Banks Island, and the western parts of Victoria Island. The region and its communities are shown in Figure 2.1-1.

As defined, the region consists of approximately equal areas of land and water, both of which are important to its peoples. While the Indian population of the region has remained inland, the original Eskimo population and the present Inuvialuit*, have traditionally used both land and water areas for habitation, hunting and travel.

In human terms, the environment of the Beaufort Sea region has several dimensions. Physically, the

* In this volume, the term "Eskimo" is used in reference to historic or prehistoric populations. "Inuvialuit" and "Inuit" denote present populations.

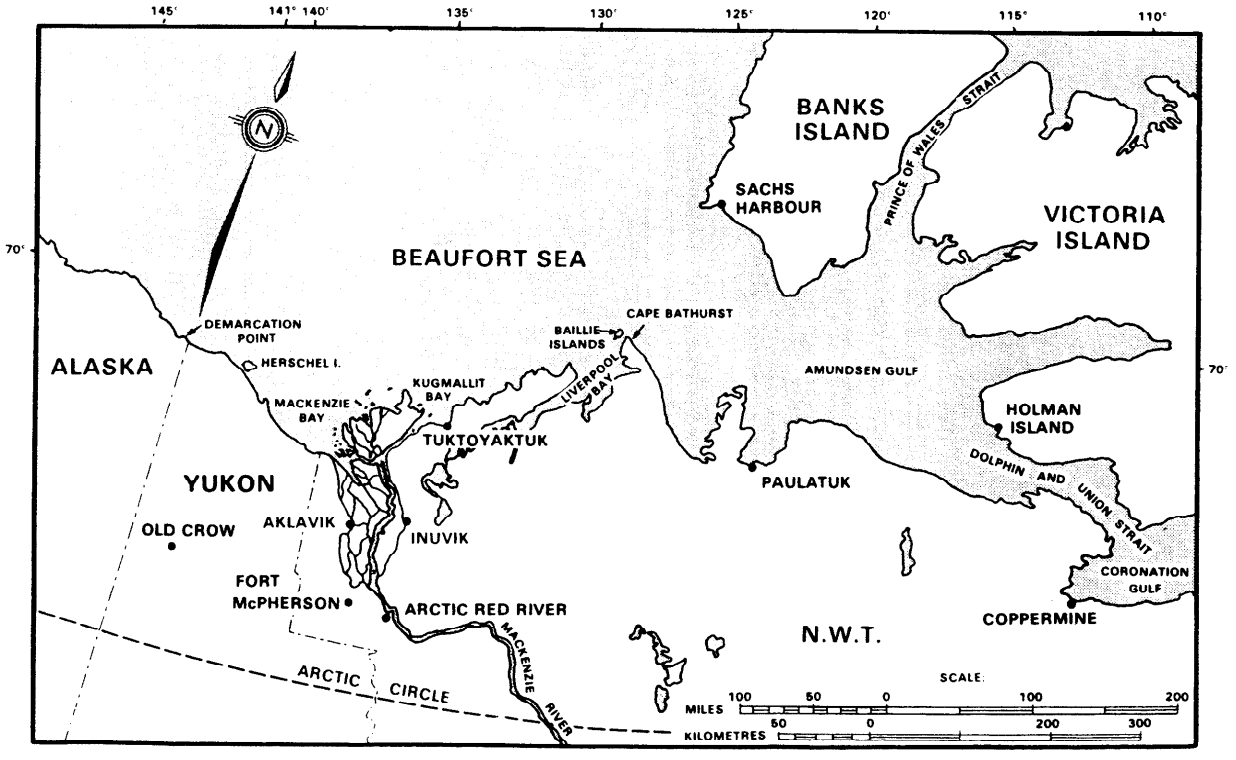


FIGURE 2.1-1 *Regional setting: Beaufort Sea communities.*

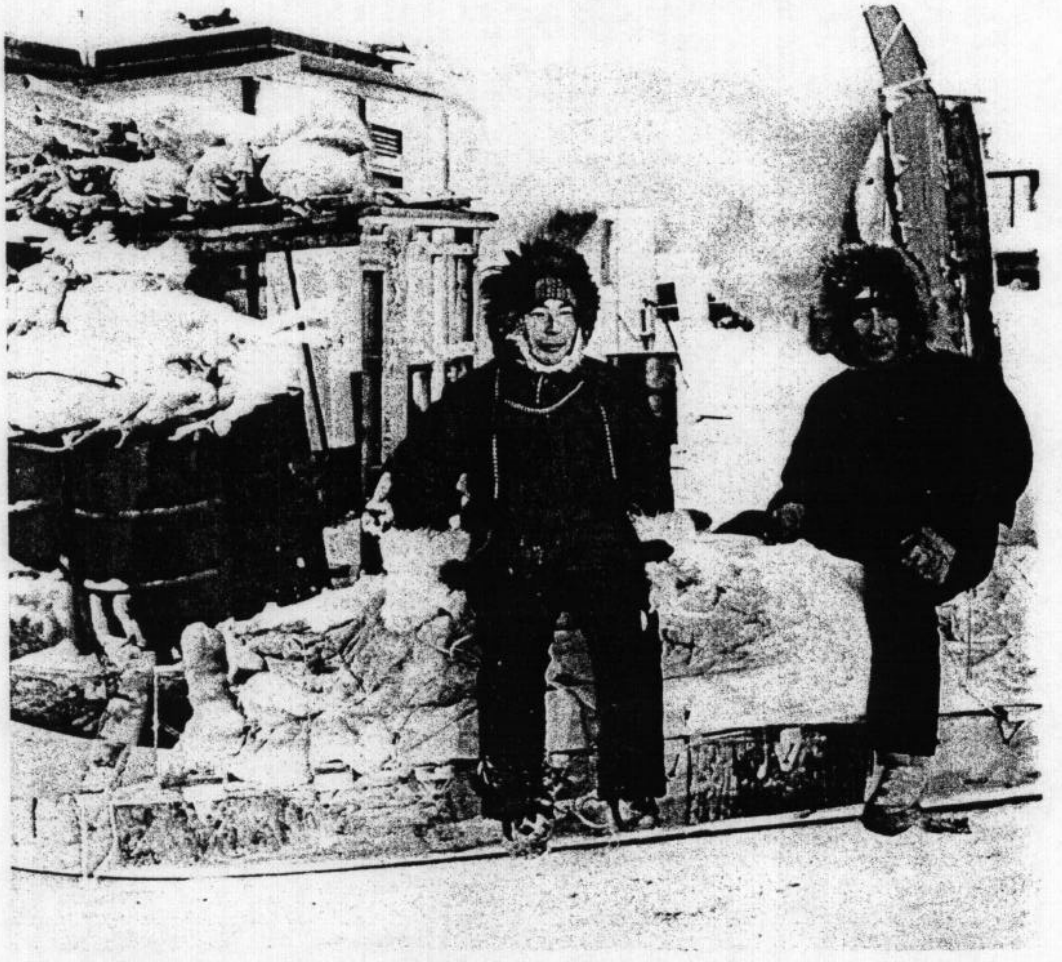
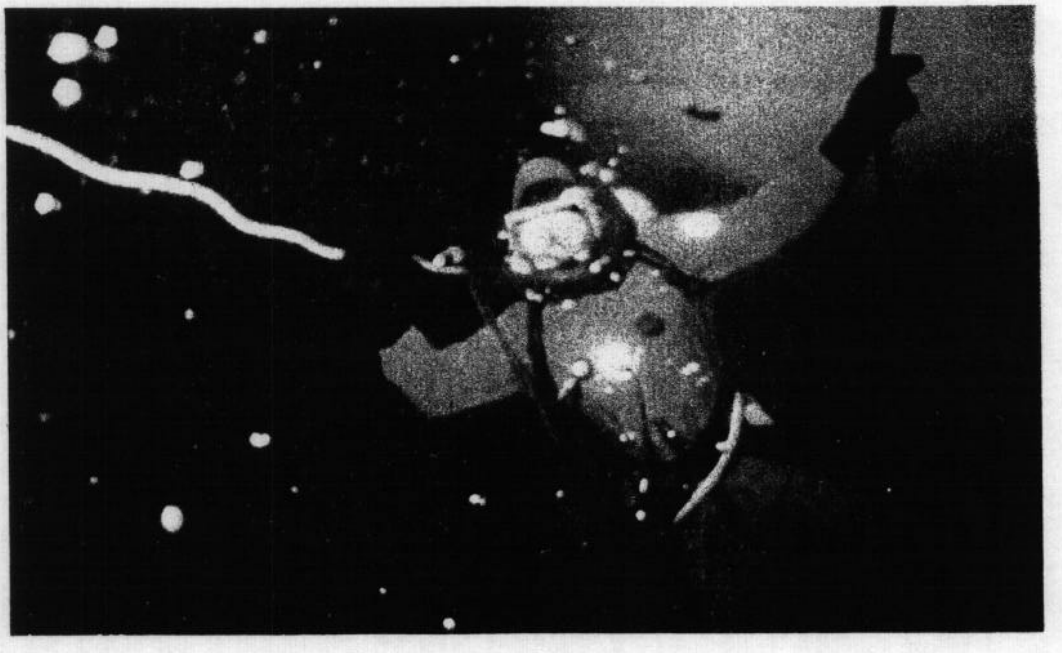


PLATE 2.1-1 *Prolonged, intense cold is a common factor in the Arctic and man must adapt to it. Above: Inuit hunters. Below: Professional diver.*



region is a harsh land which is frozen over for much of the year, a characteristic which constrains and determines the region's biological environment. It is capable of supporting limited plant and animal life, and regenerative cycles are often long. Historically, the physical and biological environments have restricted the activities which man has been able to undertake, have conditioned his social and institutional patterns, and have coloured his outlook. Some ways in which this has happened are obvious. As one example, the environment provided little basis for the development of an indigenous agriculture and the accumulation of surplus foodstuffs beyond short-term caches.

Environmental factors also shaped and conditioned human behaviour in more subtle ways. Socially, these factors had a bearing on the way in which native society developed a small group orientation, and valued and emphasized kinship ties. Geographically, the low density and sporadic occurrence of animal populations required that people live in small, semi-nomadic clusters distant from each other. The seasonality of the physical environment, and the migratory and fluctuating nature of animal populations, determined the timing and frequency with which small groups of people could aggregate into larger tribal units. By and large, they prevented more than a minimal amount of banding together, which was of significance in fostering a strongly individualistic outlook and in inhibiting the development of more comprehensive social, political and economic institutions.

In general then, a striking aspect of how native people adapted to the environment in aboriginal times is the extent to which such adaptation grew organically out of that environment. To some considerable degree, early European and North American adaption to the Arctic was similar. Explorers, whalers and traders had to accept the region on its own terms. More recent adaptation is very different, and here what strikes the observer is how much of it arises from technology and support systems that are external to the Arctic.

Also remarkable is the degree to which non-native people can modify the Arctic environment to suit their purposes. As three examples, they can span its distances by aircraft, build islands in its oceans, and break its mid-winter ice. To native people, whose cultural foundations rest on the belief that the environment is immutable and that man must adjust to it, what people from the south can do must be perplexing and perhaps frightening. Their perception of the powers of the newcomers and their technology must have been, and may still be, a major factor in explaining some of the difficulties native people have had in adjusting to the northward extension of modern industrial development.

2.1.1 COMMUNITIES

Ten communities are considered part of the region: Old Crow in the northern Yukon; Aklavik, Fort McPherson, Arctic Red River and Inuvik in the Mackenzie Delta; Tuktoyaktuk, on Kugmallit Bay immediately to the east of the Delta; Paulatuk on Darnley Bay off Amundsen Gulf; Coppermine on Coronation Gulf; Holman Island at the tip of the Diamond Jenness Peninsula of Victoria Island; and Sachs Harbour on the south coast of Banks Island (Figure 2.1-1). The combined population of these communities is about 7,100, as compared with the total northern territories population of about 70,000. (Preliminary Census Data, 1982 and Statistics Quarterly, 1981).

A detailed description of each community is given in later material. It need merely be said here that they differ greatly in size, ethnic composition, history and economic character.

Inuvik, with a 1980 population of about 3,000, is the largest of the communities, and was built during the 1950's by the federal government as an administrative and commercial centre. It is the most "southern" of the Beaufort communities in character and appearance. Aklavik and Fort McPherson owe their origins to the fur trade. Tuktoyaktuk originated in part, as a result of the fur trade, but its economy has become greatly altered by the oil and gas industry during recent years. Because of its harbour, it is an important transportation and transshipment centre, and is the principle northern operations base of Dome, Esso, Gulf, Northern Transportation Ltd., and other companies. Communities such as Arctic Red River, Old Crow, Paulatuk, and Holman Island, each of which have small populations ranging from 100 to about 300, pursue a hunting, trapping and fishing lifestyle, although there is also dependence on wage employment.

2.1.2 THE REGION AS A HINTERLAND

The most central fact about the history of the Beaufort Sea region is that economic growth and change in the region has been strongly responsive to external influences - to the demand for baleen and furs, to continental defence and the extension of Canadian sovereignty and administration, and most recently, to the demand for oil and gas resources.

In some cases, such as whaling, an external stimulus worked its way through the regional economy, such as it was at the time, and left little behind except problems of a major, even disastrous, kind. In other

cases, the results of stimuli were more positive than negative. While a slump may have followed after a boom period was over, the region was nonetheless better off because the boom had occurred. The construction of Inuvik and oil and gas exploration in the 1960's and 1970's are examples of the latter kind.

One long-run result of continuing development based on the oil and gas sector could be to make regional growth increasingly independent of this sector. Thus the skills and experience that local people might pick up by working on dredges and drillships could be transferable to other industries. Purchases of local foodstuffs could perhaps result in a situation in which larger quantities of such foodstuffs were exported to the south, and in which considerable intersettlement trade in foods and other goods took place. Earnings derived by local businessmen from transactions with the oil and gas industry could be invested in other industries with a long-term potential, for example, tourism.

It is important not to build false illusions around what is possible, however. The region is very distant from major markets and its resource base, other than oil and gas, is limited. The renewable resource based traditional economy of the native people is not accidental, but a purposely developed economic response to an environment which allows few options. It is now the main alternative native people have to jobs in industry and government, and it should continue to be an alternative after the era of oil and gas exploration has ended. It is important that the traditional economy, and the resource base on which it depends, should not only be preserved and protected, but strengthened, during the next several decades.

2.1.3 THE REGION IN A NATIONAL CONTEXT

The following briefly describes the historic events by which the region's complete isolation from the rest of the world became transformed to a substantial inclusion in modern social, economic and political processes. Historic statistics of any real value are scarce, and would give only a most imprecise picture of how this transformation took place in previous eras. However, there is reason to believe that during whaling and trapping days, the value of exports from the region greatly exceeded the value of imports; that far more was taken from the region than was put into it.

After the Second World War, this became reversed, and the region has now been in a deficit position with respect to the broader economy for about four decades. There are several reasons for this:

- Since the collapse of the fur trade during the 1940's, the Beaufort Sea region has not produced commodities for export to other parts of Canada or internationally in significant quantity and value. There have been extensive government efforts to develop local commodities for export, such as handicrafts and reindeer meat, but because of light demand and high transport costs, such efforts have not generally been very successful.

- Major government and private programs, such as the construction of Inuvik and the DEW line, and oil and gas exploration, have been of a kind that yielded either no measurable pay-off in terms of the production of commodities for export, or that would yield pay-offs only well into the future.

- Projects like the construction of Inuvik and the extension of government services brought people into the region who had no links with the land, and who could not live by harvesting local resources as the native people did and as earlier non-native migrants often had. As well, native people have gradually shifted away from the land. The new northern people and lifestyle had to be supported by growing inflows of goods and services.

- Since the Second World War, government has striven to provide social services throughout the north of a standard comparable to the rest of Canada. The very small tax base of regions like the Beaufort have required that such services, and the government employees that have been moved north to provide them, have had to be highly subsidized by the national economy.

Some indication of the present position of the region may be obtained from data on the Northwest Territories as a whole, contained in Economic Accounts for the territories that have been developed by DIAND. These data reveal that, for the Northwest Territories, the deficit in current transactions with non-residents was approximately $300 million or roughly $7,000 per capita in 1974, the most recent year covered by the Accounts. This figure is the net of imports which were valued at $423 million and exports valued at $123 million. Transfers from the federal government to the government of the Northwest Territories accounted for roughly 40% of the deficit. (Northern Economic Planning Branch, DIAND).

The Mackenzie Delta-Beaufort Sea region has been the scene of a considerable inflow of capital and labour connected with oil and gas exploration and its deficit position with respect to the south would likely be stronger than that of the Northwest Territories as a whole. The extensive facilities that will be required to move the region into accelerated exploration and into large-scale production will increase this deficit by several orders of magnitude in the next decade.

However, at some time, perhaps the early 1990's, the total value of the hydrocarbons exported from the region should begin to equal the values of capital and labour inflows. Once this breakeven point has been reached, the region's surplus position should grow rapidly.

2.2 ECONOMIC AND SOCIAL HISTORY

People have been living in the Beaufort Sea region for at least 4,000 years. The past 100 years, perhaps one-fortieth of the total span of human habitation, has been a period of intensive contact between native and non-native people, a process which has required tremendous adjustments and adaptations. This process has led to the growth of communities with unique remembrances of the past and perceptions of the present. It is out of their past and present that these communities now face a future that will increasingly be shared with large-scale oil and gas development.

There have been several eras of major change in the post-contact history of the western Arctic. The present era, in which the search for oil and gas has been dominant, was preceded by periods in which fur and baleen were major staples, and later, by others in which government and continental defence were extended into the Arctic. Each such era has had a major effect on the people of the region, changing their culture, customs and economic base. Each has brought new people, many of whom stayed as permanent residents, adding to the ethnic complexity of the region.

Before the Second World War, the western Arctic was considered remote and inhospitable, a place for northern Indians and Eskimos, for reclusive white trappers and traders, and for bush pilots. Since the war, the national and continental economy has increasingly drawn the region into its ambit. Technology has collapsed distances and greatly altered southern, as well as northern, perceptions.

There is now no disentangling north from south, or northern people from southern people. Northern resources have become vital to southern survival and the south will increasingly pose the conditions under which the north must evolve. This relationship is not something that has come overnight, nor is it something that can be simplistically laid at the doorstep of any particular interest, such as the oil companies. It is the outcome of the region's history, and, as in any history, once certain outcomes have become realized, they cannot then be undone.

2.2.1 PREHISTORY

Some of the oldest human artifacts ever located in North America were found near Old Crow, Yukon. These consist of bone artifacts, dated variously from Early Wisconsin to late Middle Wisconsin times. Other northern Yukon material is much more recent, although still comparatively ancient. The British Mountain Complex includes a site at Engigstciak on the Firth River and a site near the Babbage River. Questions remain around the significance and age of this complex.

Representatives of the Northern Plano Tradition, which featured the hunting of large mammals, especially bison, entered the Mackenzie Basin about 9,000 years ago and may have spread northward as far as the northern Yukon. By 7,000 years ago, these people had achieved a transition to caribou hunting north of the tree line.

About 11,000 to 9,000 years ago, while the Plano hunting tradition was becoming established in the southern interior of North America, a distinctive inland mammal hunting tradition was developing in the Beringian platform and northern intermontaine parts of the Cordillera. Often termed the "Northern Archaic," this tradition appears to have moved both east and southeast into the northern Mackenzie Basin and southern British Columbia.

The earliest evidence of a coastally oriented and adapted occupation of the Beaufort Sea region is seen in the Arctic Small Tool Tradition, which developed in the Bering Straits region about 5,000 years ago, and which occupied much of the Arctic between 4,500 and 2,800 years ago. Sites from this tradition have been found on the lower Firth River, at Trout Lake near the Babbage River, and at Point Atkinson. The Dorset Tradition, which is believed to have evolved from the Arctic Small Tool Tradition in the eastern Arctic, does not appear to have been present west of Victoria Island, or at the farthest, Cape Barrow.

While the Dorset culture was developing in the east, the Arctic Whaling Tradition was emerging in the Bering Straits and northwestern Alaska. This tradition, which emphasized sea mammal hunting, developed through a series of stages beginning about 2,500 years ago. Its culmination is the modern Eskimo, whose numbers extend from the Bering Sea through Arctic Canada to Greenland. An important part of the Arctic Whaling Tradition in the Canadian Arctic was the Thule culture, which developed late in the first millenium A.D. in northwestern Alaska and diffused eastward through a series of rapid migrations. In the Beaufort Sea region, evidence of the Thule culture is found from the Firth River east to

Coronation Gulf. There are indications that the most recent prehistoric Eskimo occupants of the Mackenzie Delta may have arrived from Alaska in relatively recent times.

2.2.2 EARLY CONTACT

The earliest contact between the native population of the Mackenzie Delta-Beaufort Sea region and the outside world occurred as a result of expeditions led by men like Hearne (to Coppermine in 1760), Mackenzie (to Garry Island in the Mackenzie Delta in 1789), and Franklin (1825). Such voyages had a major bearing on the subsequent history of the Arctic, but they had little impact on the native people at the time.

The original Mackenzie Eskimo population, which occupied the western Arctic coast until early in the 20th century, was divided into groups which centred on Herschel Island, Kittigazuit in the outer Mackenzie Delta, the Tuktoyaktuk Peninsula, the lower reaches of the Anderson River, and Cape Bathurst. In total, this population may have numbered about 2,500, with about 1,000 people living around Kittigazuit.

Inland from the coast lived Kutchin (or Loucheaux) Indians, who inhabited the upper Mackenzie Delta, the Peel Plateau, and the Porcupine River country of the Yukon.

Early attempts to introduce the fur trade to the Mackenzie Delta were based at Fort Good Hope, but these proved unsuccessful. The establishment of Fort McPherson, or Peel River Post, in 1840, brought significant change to the Delta people, especially the Kutchin. It was a factor in drawing Kutchin from west of the Richardson Mountains, including people from the Old Crow area, into the fur trade. By 1850, the trade was relatively well established at Fort McPherson, although Eskimos had not generally been drawn into the harvest of furs. A post established on the Anderson River in 1861 to trade with the Eskimos also proved unsuccessful.

The first missions followed quickly behind the fur trade, with the Roman Catholic and Anglican faiths competing to establish posts. The Mackenzie Delta and northern Yukon still reflect these early religious differences, with Anglicans being more numerous than Roman Catholics.

Before the fur trade, the seasonal location of families or small bands of native people was, in general, determined by the annual migration and location of the animals, caribou, marine mammals and fish, which they harvested for food, clothing and a variety of other products. With the fur trade, seasonal and locational patterns became less dependent on the need for food and clothing than on the production of fur as a commodity. Many factors combined to convert the semi-nomadism of aboriginal times into the more specialized, more trade focussed mobility of the trapper, whose family now spent considerable periods of the year in permanent dwellings at the trading post.

The missions also had a bearing on the mobility and activities of native hunters and trappers. Once the Christian faith was entrenched, hunters and trappers would put aside their harvesting activities and return to their settlements to celebrate the major events of the Christian Calendar.

By the 1890's, both the fur trade and Christianity were well established among the Kutchin people, and at least partially established among the Eskimos. At this time, two further influences entered the lives of the native people. The Klondike Gold Rush, which began in 1896, brought a flurry of activity to the Kutchin lands, while among the Eskimos, the arrival of whaling ships from American ports in the Pacific introduced nearly two decades of relative prosperity and intense change.

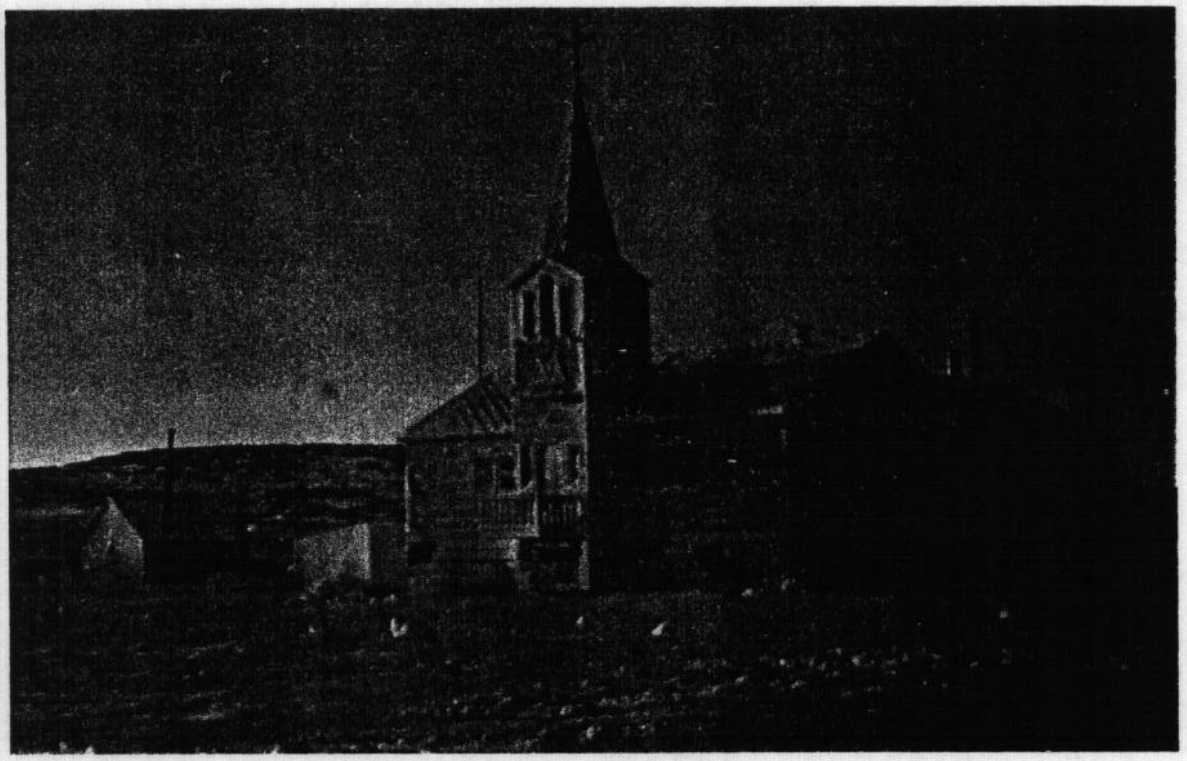
During the Gold Rush, gold seekers travelled mainly down the Mackenzie River and used an overland route to the Yukon via the Peel and Wind rivers, thence over a divide into the upper tributaries of the Yukon itself. As many as 600 goldseekers may have camped at Fort McPherson during the winter of 1898-99, and there may have been another 200 in small camps in the mountains.

It is believed that the goldseekers introduced the use of cash among the Kutchin. They also appear to have oriented them economically toward Dawson City and away from Fort McPherson and Rampart House, a trading post in the western Yukon. Many Kutchin accompanied the goldseekers to Dawson as guides, and others went there on their own to undertake work such as providing the goldseekers with meat.

2.2.3 WHALING

Just as the influence of the Gold Rush fell entirely on the Kutchin, the influence of whaling fell wholly on the Eskimos. Whaling proved a much stronger, more enduring and, in the end, more tragic influence.

Pacific whalers had gradually moved northward during the latter part of the 19th century, and had entered the Beaufort Sea by about 1890. Because of



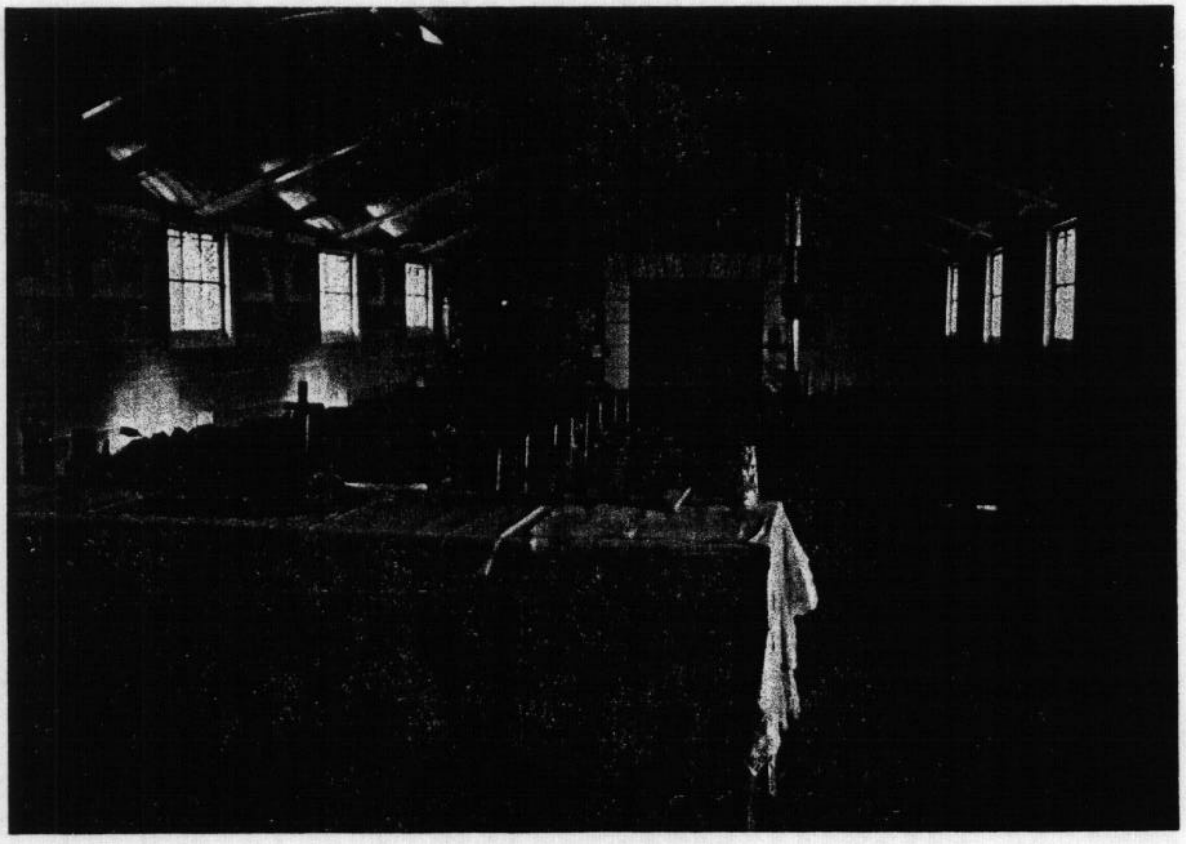


PLATE 2.2-1 *The missions have played an important role in the Beaufort region and throughout the north during the past century. Above: Church at Coppermine. Below: Church interior, Tuktoyaktuk.*

harbour characteristics, Herschel Island and Baillie Island became the two focal points of whaling activity. The commodity of interest to the whaling fleets was baleen, which was obtained from the bowhead whale. Estimates indicate that a season's take may have averaged $1 million, a large sum at the time. The whaling era lasted nearly 20 years, and when it ended, the Arctic bowhead population was on the verge of extinction.

An important indirect effect of whaling was a large reduction of the once abundant caribou herds of the Tuktoyaktuk Peninsula. Eskimo populations that had been attracted to the whalers' ports of Herschel and Baillie islands were encouraged to provide large quantities of caribou meat for overwintering crews. The resultant depletion had serious consequences for native populations who subsequently lived in the region, and was a major factor in prompting the federal government to introduce reindeer from Alaska to the region in the mid 1930's. The Mackenzie Delta reindeer herd, now under local management, is still an important source of protein in Tuktoyaktuk and Inuvik.

The whalers quickly introduced the Eskimos to the fur trade, succeeding where previous inland trading posts had failed. In return for furs and caribou meat, Eskimo families received goods from San Francisco that were much cheaper and more varied than the goods that Hudson Bay traders brought to Fort McPherson via the Mackenzie River.

While it lasted, the whaling era was a period of prosperity, learning, and change. For about 15 years, Eskimo families were in continuous contact with American whalers and Americanized Eskimos that had accompanied them from Alaska. They learned the English language, acquired new customs and technology, and learned much about the non-native values.

Yet, contact with the whalers ultimately proved disastrous. The introduction of liquor by the whalers led to physical violence and loss of life. Much more important was the effect of diseases to which Eskimos had not previously been exposed. Smallpox killed many people, but an outbreak of measles in 1900 and 1902 proved even more serious. By the time the whaling era ended in 1909, there were only about 250 Mackenzie Eskimos, or some 10% of the original population left between Barter Island and the Bathurst Peninsula.

2.2.4 FUR TRADE

The collapse of whaling had serious economic consequences for all coastal Eskimo populations, including those of Alaska. With the caribou and bowhead populations greatly depleted, and with the new dependence on non-native goods and technology, the only recourse left to these peoples was to develop the fur trade which the whalers had introduced. Disease had depopulated the lands of the northern Yukon and the Mackenzie Delta, and Eskimos from Point Barrow and other parts of northern and western Alaska moved eastward to occupy these fur-rich lands. Population along the Beaufort coasts of Canada began to rise again so that, by 1923, an estimated 400 people occupied the Mackenzie Delta and adjacent coastal regions. Some three quarters of these people were from Alaska.

Fur prices rose during the 1920's, and Eskimo life became organized around two principal trading centres. The coastal people gravitated toward the post at Herschel Island, where the principal fur traded was white fox. Other people trapped muskrat in the Delta and traded at Aklavik, which was established in 1912 to exploit this fur. Kutchin people also trapped from Aklavik. In addition, Kutchin in the southern Delta contributed to the fur trade with winter catches of mink and marten from the surrounding drainage basin.

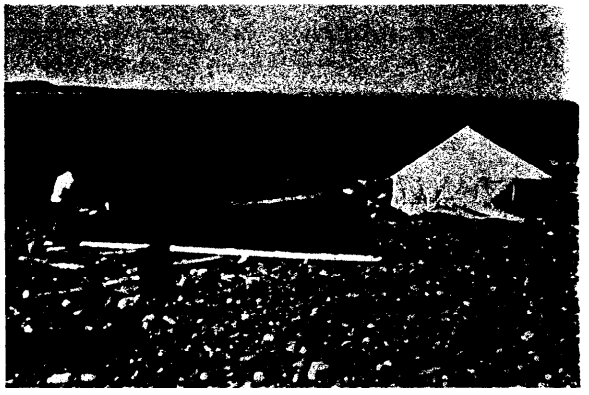


PLATE 2.2-2 *People have harvested the lands and seas of the north since time immemorial. It is the Industry's conviction that they must not be hindered in their desire to continue to do so.*

During the 1920's, the trappers of the Delta and the coasts prospered. By the end of the decade, muskrats brought a dollar a pelt, a very good price at the time, and white fox brought $40 to $50 a skin, a price exceeded only during recent years. While the Hudson's Bay Company remained a factor in the trade, it was an era of keen competition as other traders, including free or unaligned traders, moved into the area. There was a surge of credit, and the material wealth of the people increased as they bought more and better rifles, traps, boats, and other goods. One

study indicates that, from 1928 to 1936, there were over 15 schooners owned by native people in operation along the coast (Usher, 1971). This would have represented an investment possible only under conditions of considerable prosperity.

Partly because of the depression, fur prices declined during the 1930's. Trading at both Herschel Island and Aklavik became slow. Herschel Island declined in importance as the fur trade focussed on Aklavik and increasingly, on Tuktoyaktuk, to which people from Herschel Island and other coastal points such as Baillie Island had moved.

The era in which fur was the main staple, roughly 1910 to 1950, witnessed a substantial increase in the Eskimo population of the Delta and adjacent coasts, though only in more recent times has it again compared with aboriginal populations. The 1941 census showed over 700 Eskimos in the area, over half of whom lived in the Delta. By 1951, the total population had risen to over 1,000. The population had now become two distinct groups, one located in the Delta, mainly at Aklavik, the other at or near Tuktoyaktuk. The Delta people tended to trap the lower Delta and the Arctic coast westward to the Alaska border, while the Tuktoyaktuk group trapped the outer Delta, including Richards Island, and the Tuktoyaktuk Peninsula to the east of Baillie Island.

The fur era came to an end shortly after the Second World War. Fur prices had fallen to levels which could sustain neither the expectations that the native people had developed out of prolonged exposure to non-native goods, nor the basically sedentary way of life that had developed at communities like Aklavik and Tuktoyaktuk.

A return to a more nomadic, hunting way of life, which may still have been possible at the time of the whalers, or even at the beginning of the fur era, was no longer a serious possibility. In terms of material culture and their knowledge of the outside world, the trappers of the Delta and Tuktoyaktuk had now moved too far from their aboriginal past. Matters had also become complex socially and culturally, as all of the major groups of the region, Kutchin, Eskimo and White, had intermarried. Intellectual origins were equally complex, deriving not only from native northern cultures but from many parts of Europe and the North American continent. Missionaries had come from France, Belgium and England, traders from the Hebrides and Shetlands, and whalers turned traders from California.

By the end of the fur era, then, the people of the Mackenzie Delta-Beaufort Sea region had, in considerable measure, become part of the larger North American culture and economy. They had prospered out of this linkage but their externally-driven monoculture economy had ground to a standstill. They were now in desperate need of new sources of income and employment.

2.2.5 GOVERNMENT AND DEFENCE

Shortly after the decline of the fur trade two very large projects firmly introduced the wage economy to the people of the region. These were the construction of Inuvik, which especially affected the Mackenzie Delta, and the building of the DEW line, which markedly influenced native populations from Alaska to Baffin Island.

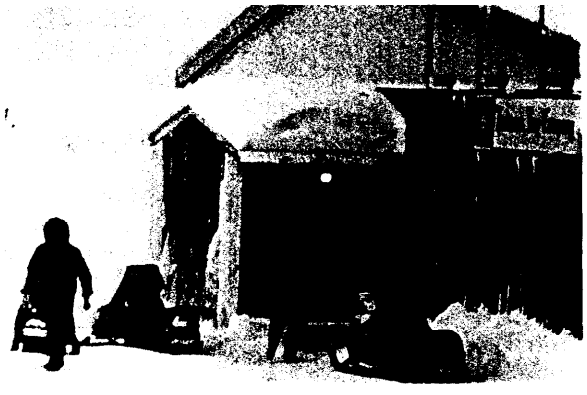


PLATE 2.2-3 *"The Bay" and the skidoo are important to northern life. Both have had a profound effect on the North and its people.*

The years immediately following the Second World War saw a major expansion of government services throughout the Arctic, including the Beaufort Sea region. In December 1953, the federal government decided to build Inuvik as its western Arctic administrative centre because Aklavik, which had served as the principal centre to that time, was considered inadequate for future needs and allowed little scope for expansion. By the summer of 1954, the present site of Inuvik (then known as "East Three") had been chosen. Construction began in earnest in 1957. Local people who had received considerable vocational training during the preceding three years provided the core of the construction labour force, working as carpenters, painters, mechanics and drivers. By the time construction was completed in 1960 some native people had moved into the wage economy permanently. Others had come to depend on wages from casual and seasonal labour to purchase goods that the traditional economy could no longer provide.

Construction of the DEW line proceeded concurrently with the building of Inuvik. While, unlike Inuvik, native people were given neither employment preference nor more than minimal training with

respect to DEW line jobs, the sheer scale of the project meant that many native people, from all regions of the Arctic coast and even from inland areas, became employed. Most worked as casual labour, but some had jobs that required higher levels of skill, such as the operation of heavy equipment. Families relocated and lived in tents near DEW line stations so that they could be close to the job site. When construction finished, many of these families did not return to where they had come from but either remained near the site, where family members continued to work, or moved to one of the larger and then rapidly growing Arctic communities.

With the completion of Inuvik and the DEW line, there was a large reduction in capital expenditures in the Beaufort Sea region, and in the whole of the western Arctic. In the depressed years that followed, the native people had little use for the wage-oriented skills and attitudes they had acquired. Use of these skills and attitudes did not cease entirely however. With little happening within the region, many native people relocated seasonally to work on the construction of the Great Slave Lake Railway, which took place between 1964 and 1969. These people came from virtually all of the communities of the western Arctic, and performed a wide variety of jobs, including the operation of locomotives. Native involvement with the Great Slave Lake Railway ceased when construction ended and the line was declared an operating railroad. At this time, railroad operating workers replaced construction personnel. Natives who performed operating roles during construction, when unions were not a major factor, now found themselves far down the seniority lists.

In combination, employment in building Inuvik and the DEW line, and in projects such as the Great Slave Lake Railway, had a profound impact on the native people of the western Arctic. People had learned new skills and attitudes, had relocated to take jobs, and had in some cases, earned enough money to set themselves up in trapping or business after the wage jobs were over. Social status systems based on hunting and trapping were displaced by systems organized around wages and employment, and around an increasingly urban life style. Had wage employment of the levels experienced in the late 1950's continued to the present, it is possible that the native people of the larger communities of the region would by now have been almost fully integrated into the wage economy. That this has not occurred is not due to any deep seated aversion to wage work, but rather to the failure of the regional economy to provide such work on a sufficiently sustained basis.

2.2.6 OIL AND NATURAL GAS

Much of the change that has occurred in the socio-economic situation, particularly the economic situation, in the Beaufort Sea region during the past decade, has been associated in one way or another with the activities of the oil and gas industry.

Although the oil and gas industry has been active in the area since the early 1960's, the first real boom in exploration did not begin until 1970. Early exploration results had tended to suggest that the Delta areas were more likely to contain large amounts of natural gas than oil and, with natural gas supplies in southern Canada thought to be more than adequate, there seemed little reason to mount a major exploration program in the region. The discovery of a major oil field at Prudhoe Bay on Alaska's North Slope in 1969 changed the way in which the oil and gas industry viewed the oil potential of the Mackenzie Delta area. The prospects of making a major oil discovery in the Delta were further heightened in 1970 when Imperial Oil Limited announced that it had struck oil with a well at Atkinson Point, northeast of Tuktoyaktuk. The discovery was not deemed commerical but it did suggest that there was a good chance of making a major oil discovery in the Delta with additional exploration.

The additional exploration was soon underway. The initial, longer term exploration programs begun by several of the major integrated oil and gas companies in the 1960's were quickly expanded and accelerated. Other oil and gas companies moved into the area and began active exploration programs. Initially wells were drilled on land. However, as time went on, companies engaged in exploration began to believe that the greatest potential for finding oil in the area was offshore beneath the waters of the Beaufort Sea. Esso pioneered the technique of utilizing artificial islands in the Beaufort Sea as temporary drilling platforms beginning in 1973. In 1976 Dome, through its subsidiary Canadian Marine Drilling Limited (Canmar), carried the exploration effort into deeper offshore waters by bringing two drillships into the Beaufort Sea. The Dome-Canmar fleet has since expanded to include two additional drillships.

The increased exploration activity that began in 1970 had a variable effect on the communities of the Beaufort Sea region. Inuvik quickly took on the appearance of a mini-boom town as geophysical and drilling service companies, headquartered in southern Canada, expanded their northern facilities or opened new ones. Most located in or near Inuvik because of the community's transportation, communications and service facilities. Some oil and gas companies leased office space in the community and moved additional administrative and supervisory personnel northward. Aklavik, Tuktoyaktuk and Fort McPherson also experienced some effects as some residents sought and obtained work with oil and gas companies or companies servicing well sites in the Delta.

Simple proximity to the Delta drill sites was often not the main determinant of the extent to which local residents were involved in oil and gas exploration activities. One important factor affecting the degree to which the community was involved was the attitude of the residents. A second major factor was the extent to which a particular oil and gas company was willing to assist local residents to travel back and forth between the work site and home community. Most companies made some efforts to help and their policies and programs tended to improve with each drilling season. Gulf made a considerable effort to facilitate the employment of residents in its exploration program.

Thus, when a community in which many residents were willing to work (even if the work was at a site a considerable distance from home) came together with a company, such as Gulf, that was willing to work out employment, training, supervision, rotation and transportation arrangements appropriate to both community and corporate concerns, the results were usually satisfactory to all concerned. Coppermine's relationship with Gulf over the period 1972-1978 showed what could be done if both local residents and a company were willing to put real effort into making sure that the overall effect on the community of employment in the oil and gas industry was positive. Kupfer and Hobart (1978) have carefully monitored the Coppermine situation and their findings tend to support the view that the Gulf-Coppermine experience was beneficial both economically and socially for Coppermine residents.

The early 1970's was also a period of much planning, anticipation and debate about pipelines in the region. The Arctic Gas project is the best known of the pipeline proposals and was certainly the one that was the most discussed and debated. It is important to note, however, that although various pipeline proposals came and went over the years, the prospect of a pipeline was a continuing concern to many residents from 1970 to 1977.

In the years immediately following the 1969 Prudhoe Bay oil discovery there was much in the national and regional news media about a possible overland oil pipeline via the Mackenzie Valley to link the North Slope with midwestern market areas in the United States. As this possibility faded following American Congressional approval for a Trans Alaskan oil pipeline (Alyeska) and exploration in the Delta area continued to yield more gas than oil, attention, including the attention of the Government of Canada, turned instead to the prospects for a large diameter pipeline to link North Slope and Delta area gas reserves to southern markets via the Mackenzie Valley. Two consortia soon had competing pipeline proposals under development and a host of engineering, environmental and socio-economic consultants were active in the Delta, Mackenzie Valley and on the Yukon North Slope carrying out studies for industry and government.

The consortia soon merged to form Canadian Arctic Gas Study Limited and the research effort in the region accelerated in response to federal government guidelines as to the information that would be required as part of a formal application to build a pipeline. All of the research and planning activity on the part of industry and government, and the heightened concern in both Canada and the United States about the adequacy of indigenous North American energy supplies following the Arab oil embargo of late 1973, led many people in the Beaufort Sea region and elsewhere in Canada to believe that a pipeline along the Mackenzie Valley in the near future was highly likely.

Thus, by the time Arctic Gas submitted the initial parts of its formal application for permission to build and operate a gas pipeline linking Alaskan and Delta gas reserves with southern markets via the Mackenzie Valley in early 1974, many Beaufort Sea region residents had already made commitments in the expectation that the pipeline would be built. Native organizations were growing increasingly opposed to its construction and were preparing arguments that its construction should only be allowed after land claims were settled. Many people, including native people, were preparing for positions in the pipeline industry by participating in training courses and trainee employment at various points in southern Canada. A small number of residents, primarily a mix of long-term residents and recent arrivals in the Inuvik business community, were making investments in facilities and services that would only pay off if the pipeline were constructed.

The Mackenzie Valley Pipeline Inquiry (the Berger Commission) was established in 1974 in response to the Arctic Gas application and submitted its report to government three years later. In the interim, many Beaufort residents were caught up in a running debate among various groups concerning the potential environmental, economic and social effects of the proposed pipeline. Community hearings were held in settlements from Old Crow in the Yukon east to Holman Island and southward along the Mackenzie Valley through Aklavik, Inuvik and Fort McPherson.

The concerns expressed at the various hearings did not go unnoticed or unheeded in the oil and gas industry. Sympathetic, but necessarily guarded, corporate positions were taken with respect to the need to reach an early resolution of land claim matters. Efforts were made by various companies to expand and improve local employment and training pro-

grams, Increased emphasis was placed on assisting local business to participate in contract opportunities arising from exploration activities, and on developing policies and programs to help local businessmen identify, assess and prepare to act upon business opportunities likely to be associated with pipeline construction, operations and maintenance.

As the Mackenzie Valley Pipeline Inquiry continued and hearings became further complicated with the entry of Foothills' separate application (The Maple Leaf Line), corporate promises tended to grow. One of the proponents promised to move its construction headquarters north if it was successful; both proponents indicated that they were working hard to provide special assistance to local businessmen and one had already taken the step of sponsoring a Mackenzie Valley Pipeline Business Opportunities Board with offices in Inuvik. In general, both proponents tried to make it clear that they were committed to working to develop a healthy, long-term employment and business situation in the Mackenzie Delta-Mackenzie Valley area and would work with all parties to avoid creating a boom-bust situation.

As is well known and well documented, events turned out differently. Government's acceptance of the Berger Commission and National Energy Board reports, which were, in essence, unsupportive of the pipeline proposals, precipitated the dissolution of the Arctic Gas consortium and many socio-economic adjustments in the Mackenzie Delta-Beaufort Sea region. Native groups in the Mackenzie Delta and Valley lost one of their main levers for extracting an early land claim agreement out of government. Residents employed by the oil and gas industry or participating in oil and gas industry sponsored training programs suddenly found their future employment prospects much less certain and, in a number of cases, non-existent unless they were willing to move elsewhere with the industry.

The impacts of the "no pipeline" decision were particularly acute in Inuvik. As various oil and gas companies pulled out of the Delta area or sharply reduced their northern exploration programs in the months following the pipeline decision, employment and business activity in Inuvik slumped. Some businessmen went bankrupt, others sold out at a loss and some simply pulled out, moving trucks and equipment moved south at the earliest opportunity. The community's population dropped nearly 10% within a year (Outcrop, 1981).

The impact could have been even worse in Inuvik and other Delta area communities. Some oil and gas companies did not pull out. Imperial reduced its activities in the region but remained committed to a long-term program of offshore exploration via artificial islands. This program, first initiated in 1971, resulted in some 20 artificial islands being constructed in the Beaufort Sea southwest of Tuktoyaktuk between 1973 and 1981. Esso's island building and drilling activities provided continuing employment for a few Delta residents and on-going business for Inuvik food, transportation and construction enterprises.

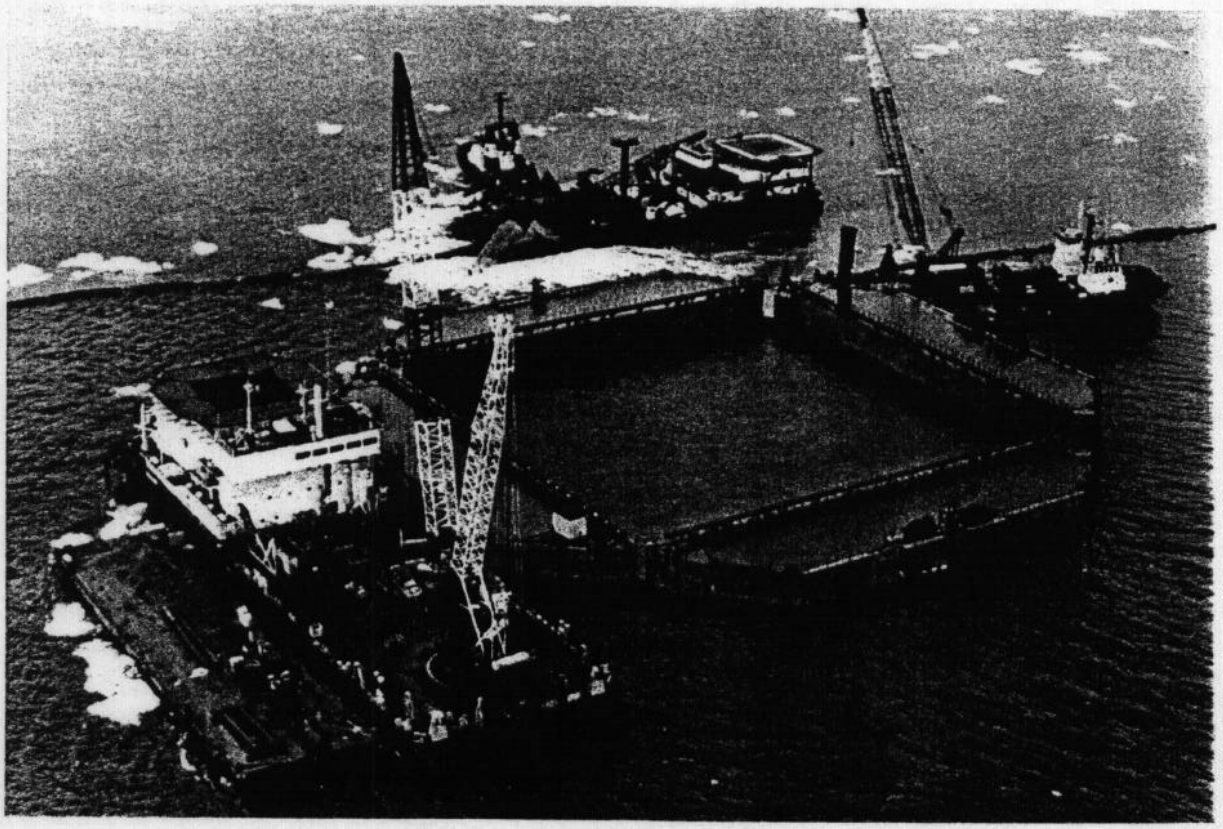
Dome's exploration program in the deeper waters of the Beaufort Sea was also maintained. Dome's drilling subsidiary, Canmar, continued to expand its drilling support base at Tuktoyaktuk and to respond to community and regional requests for employment, training and local business opportunities. Canmar's activities in the period 1976 through 1981 provided a considerable stimulus to the economies of Tuktoyaktuk and Inuvik and, to a lesser extent, the economies of communities such as Aklavik, Paulatuk, Sachs Harbour, Holman Island and Coppermine.

By the late 1970's the prospect of hydrocarbon development and associated transportation systems was again becoming a matter of increased discussion in many Beaufort Sea communities. The Polar Gas Project announced in 1979 that it was considering a possible "Y-line" that would link both the Delta and Arctic islands' gas supplies to southern markets via a junction point southwest of Coppermine. The Polar Gas line was seen by some as a competitor to the Dempster Lateral that had been proposed as part of the Alaska Highway Gas Pipeline scheme that government had approved in 1977.

The late 1970's also brought Esso's proposal to expand oil production at Norman Wells, and to construct a 12-inch oil pipeline southward up the Mackenzie Valley between Norman Wells and the Zama area of northwestern Alberta. Both proposals were the subject of government hearings and were approved in 1981, subject to a two year delay in the proposed construction schedule to allow for a Dene land claim settlement and additional planning and preparation. Esso is currently investigating a small diameter (300 to 400 mm) buried pipeline from the Mackenzie Delta to connect with the Norman Wells pipeline which could accommodate up to 3,500 m^3/day of oil production from onshore and near shore Beaufort oil discoveries (see Volume 2).

Dome's continuing exploration program in the Beaufort Sea was the focus of much attention in the region through the late 1970's and into the 1980's. The early oil discoveries and the subsequent indications in other exploratory wells that additional oil-bearing structures were present beneath the Beaufort Sea were accompanied by speculation about, and then increasingly firm proposals for, oil production and

PLATE 2.2-4 *Dome, Esso and Gulf have pioneered the search for oil and gas in the Beaufort Sea. Issungnak, an Esso near-shore artificial island. Below: Construction of Tarsiut, an artificial island operated by Gulf.*



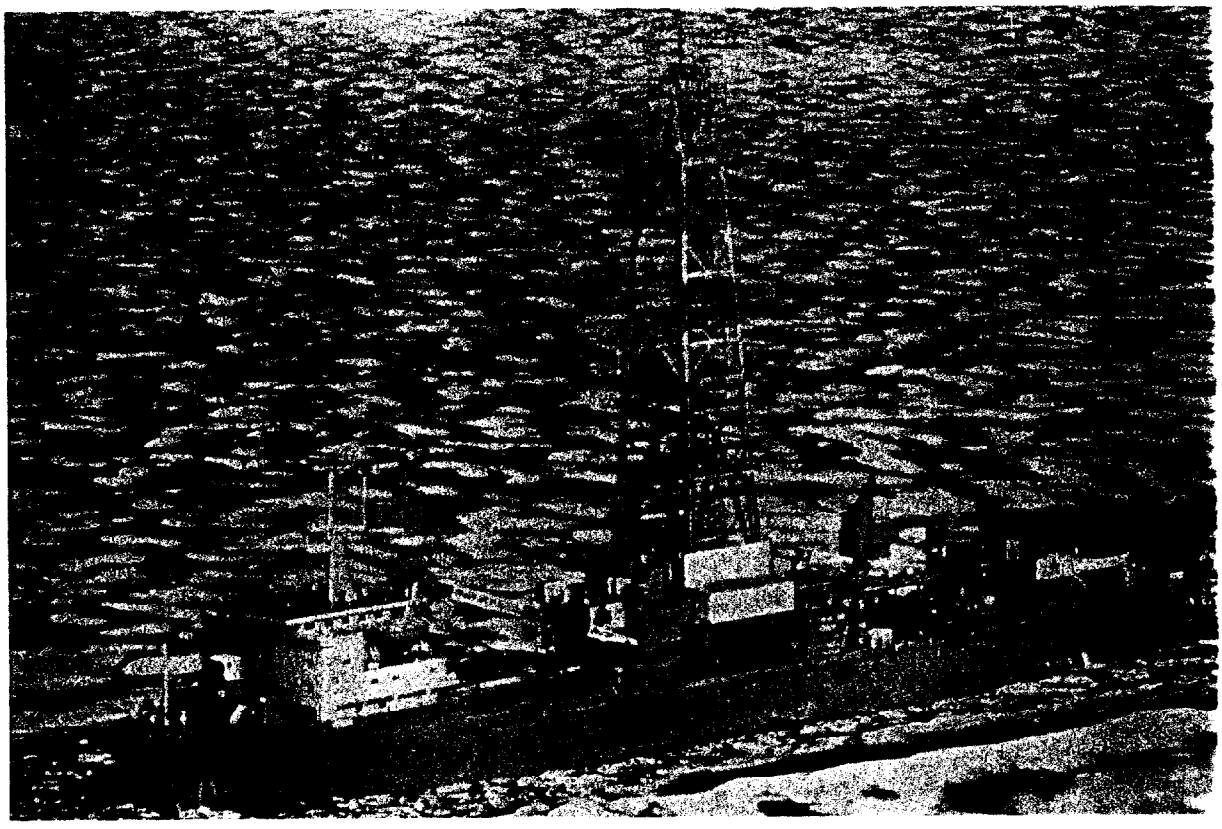


PLATE 2.2-5 *Dome's Explorer III. Using drillships and support vessels, Dome has conducted an extensive exploration program well offshore in the Beaufort.*

transportation systems. The development of additional drilling support facilities at McKinley Bay and Industry's announcements of important oil discoveries and exploration programs further fueled national and local speculation about oil development in the region. The National Energy Program announced by the Government of Canada in October 1980, has helped to boost Industry-wide interest in the region as an exploration area.

CHAPTER 3

BEAUFORT REGION - THE ROLE OF OIL AND GAS

The role of the oil and gas industry, particularly its rapid expansion, sudden contraction and subsequent re-expansion during the past ten years, and the growing prospects of its even greater expansion in this decade and beyond, is an important element of the current socio-economic situation in the Mackenzie Delta-Beaufort Sea region. This chapter focuses on the role of the Industry at both the regional and community levels and discusses the various effects that the Industry's presence and potential future growth are having at each level.

3.1 THE INDUSTRY'S ROLE AT THE REGIONAL LEVEL

3.1.1 THE INDUSTRY AND THE CURRENT SITUATION

The current role of the oil and gas industry in the Beaufort Sea region accounts for a number of aspects of the existing socio-economic situation. The Industry's move into the area and its activities, mainly those of Dome and Esso in more recent years, but also those of Gulf and other companies earlier, have changed the structure of the Beaufort Sea region's economy, which is no longer based simply on resource harvesting and government. The oil and gas industry has become a third basis for much of the economic activity in the region.

The oil and gas industry has now been active in the Beaufort Sea region for some two decades. However, data on employment and income generated by industry activities are not generally available for earlier years and only partly available for more recent years. The now defunct Petroleum Industry Committee on the Employment of Northern Residents published data series on employment by community and job category between 1973 and 1978, but it is not possible to tell from the data whether individuals were employed in the Beaufort region or elsewhere.

Tables 3.1-1 and 3.1-2, which apply to the northern territories as a whole, are taken from the final volume (1977-78) of the Petroleum Industry Committee's annual publications. The tables show a rapid buildup of northern employment, especially during the earlier years. Between 1971-72 and 1977-78 there was a large increase in the number of job categories northerners were able to fill. Other aspects of the data tend to remain more constant. The average number of months worked by northern residents varied between three and a little over four, a consistency which would reflect seasonal limitations imposed on work in the Arctic and perhaps also a disinclination on the part of northern employees to work for wages longer than was needed to fulfill particular cash income objectives.

Table 3.1-2, on turnover experience shows that, of all the northerners employed between 1974 and 1978, less than half worked to the end of the season during each year. Of those that did not complete the season, the overwhelming majority quit (or in the language of the Petroleum Industry Committee, were "self-terminated"). While there is no way of knowing this from the data, it is probable that many of the workers who quit before the end of one season were again employed the next season, perhaps again working to relatively limited cash income objectives. The implication of such employment behavior is that while northern residents have not, in the recent past, sought continuous or sustained employment with the oil industry, the Industry has nevertheless become an important source of cash income in many northern communities.

As was mentioned, the foregoing data apply to the whole of the northern territories and it is now necessary to examine the more particular experience of the Beaufort Sea region. Three companies are currently active in the region: Dome, Esso and, as of 1981, Gulf. Both Esso and Dome have policies and programs in place to hire northerners and to purchase various goods and services locally wherever possible.

A study prepared for the Government of the Northwest Territories has, for example, estimated that the economic impact of Dome's Beaufort Sea operations on the Northwest Territories over the period 1976 to 1980 had been appreciable (Outcrop, 1981). Several of the points raised by the study are worth highlighting, bearing in mind that much of Dome's impact occurred in the Beaufort Sea region and especially in the Mackenzie Delta. Over the period 1976 to 1980 Dome directly accounted for some 390 man years of employment and $8 million in wages and salaries for Northwest Territories residents. A large number of indirect employment and income opportunities were also created in the same period, principally in Tuktoyaktuk, Inuvik and Aklavik, many with locally owned businesses. During the 1976 to 1980 period Dome purchased some $65 million worth of goods and services in the Northwest Territories, largely in the Beaufort Sea region but with appreciable amounts also being spent in Hay River and Yellowknife. Dome purchases gave rise to approximately 600 man years of indirect employment and nearly $12 million in wages and salaries for territorial residents.

In aggregate terms, when induced as well as direct

TABLE 3.1-1

EMPLOYMENT OF NORTHERN RESIDENTS PETROLEUM INDUSTRY[1] 1971-1978

Seasons	Number of Northerners	Number of Settlements	Job Categories	Man Months
1971-1972[2*]	414	28	22	1,686.00
1972-1973[2*]	637	26	27	2,189.00
1973-1974[2*]	709	29	31	2,104.00
1974-1975	761	26	45	2,350.00
1975-1976	828	27	59	3,762.00
1976-1977	802	30	67	3,352.50
1977-1978	803	30	74	2,967.75

[1] Oil and gas industry and its contractors.
[2*]Represents Seasons: mid-November to mid-April.

Source: Petroleum Industry Committee on the Employment of Northern Residents, Northern Resident Employment by the Oil Industry Working in the Yukon and Northwest Territories, 1977-1978.

TABLE 3.1-2

TURNOVER EXPERIENCE - NORTHERN RESIDENTS EMPLOYED BY THE PETROLEUM INDUSTRY[1] 1974-1977

	1974-1975	1975-1976	1976-1977	1977-1978
Number of Northerners	761	828	802	803
Working to Completion	354	374	314	394
Self Terminated	242	220	290	275
Released by Employer	41	53	38	31
Still Employed - April 30	124	181	160	103

[1]Oil and gas industry and its contractors.

[2*]Represents Seasons: mid-November to mid-April.

Source: Petroleum Industry Committee on the Employment of Northern Residents, Northern Resident Employment by the Oil Industry Working in the Yukon and Northwest Territories, 1977-1978.

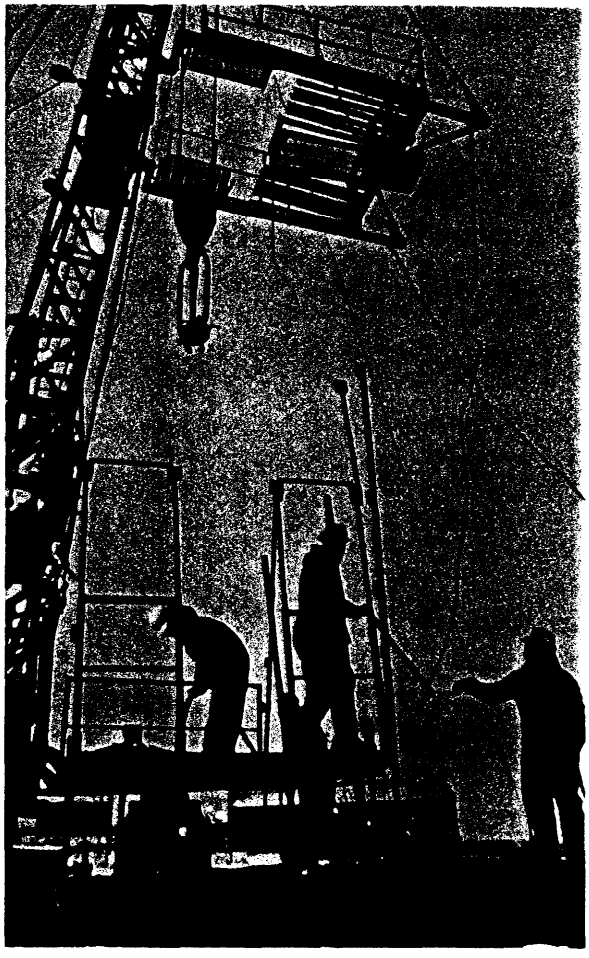


PLATE 3.1-1 *Over the years, the oil and gas industry has had a large effect on northern employment and income.*

and indirect employment effects are taken into account, Dome's activities gave rise to some 1,150 man years of employment for Northwest Territories residents and $24 million in wages and salaries. Businesses owned by Northwest Territories residents further benefited as a result of Dome placing some $65 million worth of purchase orders and contracts with them over the same period.

While they have not been included in the Outcrop analysis, ESSO's employment and regional purchase programs have also had a major effect on the Beaufort region. They are summarized in Table 3.1-3.

The Industry's activities in the region during the past decade, particularly the efforts of various companies to respond to community and interest group concerns about such matters as more employment for northerners, increased training opportunities and assistance to local business, has contributed to several other aspects of the current socio-economic situation. One effect that has been quite marked is the emergence of a new, as yet uncertain, lifestyle option for Beaufort residents based on rotational employment. Another is the increased level of understanding that some residents and interest group spokesmen have about the Industry as compared to a decade ago.

Rotational employment opportunities at Industry work sites have now been a factor in the region for several years. As Coppermine residents are well aware out of their experience with Gulf's employ-

TABLE 3.1-3

ESSO RESOURCES LTD. - BEAUFORT SEA PROGRAM

	Employment of Northerners				Local Business Expenditures		
	Permanent	Casual	Total	Payroll ($000)	Local Services ($000)	Local Purchases ($000)	Total ($000)
1978	29	30	59	1,300	4,500	2,400	8,200
1979	30	33	63	1,400	3,900	1,700	7,000
1980	25	56	81	2,000	2,400	1,700	6,100
1981	29	48	77	1,700	2,800	2,900	7,400
Average	28	42	70	1,600	3,400	2,200	7,200

Notes:
(1) Average tenure of employment:
Permanent 4 years;
Casual 6 months.
(2) 1981 figures include estimates for November and December.
(3) Local Services 1981 total includes $1.8 million from an NTCL total of $5.3 million.

Source: Esso Resources Ltd.

ment programs in the mid 1970's, long-term employment is not guaranteed as yet. Beaufort Sea residents have continued to respond to rotational employment opportunities in recent years. Many have been attracted by the opportunity to develop a lifestyle combining alternating periods of wage employment and free time for resource harvesting and other community-based activities. Industry has shown that it is possible to work out appropriate work periods and transport arrangements; a growing number of residents have come to realize that employment with the oil and gas industry need not mean that they have to either permanently leave their communities or abandon traditional pursuits. Many have found that earnings from rotational employment facilitate more effective resource harvesting activity by enabling the purchase of better equipment.

Increased exposure to the oil and gas industry through employment, participation in training programs, the activities of various study groups, inquiries and panels at the community and regional levels over the past decade, and the on-going information and communication activities of the Beaufort Sea Community Advisory Committee, have helped to improve the level of understanding that many Beaufort Sea residents have about oil and gas exploration and development issues. The level of understanding varies markedly throughout the region, but generally speaking it is much better today than it was even five years ago and, without doubt, often exceeds the level of understanding evident in other areas of the Northwest Territories. One consequence of this is that meetings between the Industry and residents or government and residents, on Industry-related matters tend to get down to specific issues more quickly than they did in the past. People seem more aware of what is happening and what could happen in the region. They have had the opportunity to observe the effects of oil and gas development in places such as Alaska and the North Sea via tours undertaken by the Beaufort Sea Community Advisory Committee.

The Industry has brought benefits to the Beaufort region, but it has also confronted people with change that many have found difficult to understand and deal with. Northern native people are still not used to handling substantial sums of money, and most have not until quite recently had reason to do so. Saving money for longer term needs is not yet widely prevalent in native society. Cash tends to be viewed simply as a commodity that is exchangeable for more useful things like skidoos, rifles and household goods, and not as a store of wealth or something that imparts status. If someone has more money than is needed for the acquisition of useful items, there are few moral or social sanctions against spending it on liquor or gambling it away. Continuous streams of money of the amounts that have entered Tuktoyaktuk during recent years have led to a situation in which there is more than enough cash to go around -enough to buy things of value and enough to have a good time.

Unquestionably, attitudes among native people are changing rapidly. Yet it is uncertain whether the attitudes and behavior surrounding cash income can

change quickly enough to ensure that income from oil and gas development will be used to contribute to community and individual development rather than to gambling, alcoholism and other already prevalent problems.

Much debate has taken place around the relationship, in a native community, between industrial development and the income derived from wage employment on the one hand and drinking and social, mental and physical health on the other. Gemini North (1974), in its study for Canadian Arctic Gas Pipelines Limited, maintained that alcohol abuse and related problems would be greater in native communities experiencing industrial development than in communities with little development. Although increases in cash may be used to improve nutrition and other positive aspects of people's lives, cash is usually associated with increased drinking, the researchers said. However, they stressed it is the cash, not the source of the cash, that is important. "The northerner who receives cash for fur is just as likely to buy liquor as the man with the oil company's cheque in his pocket." (Gemini North, 1974).

While Hugh Brody (1971, 1976) agreed there was a connection between cash and alcohol abuse, he did not feel that the source of cash was an unimportant factor. He argued before Mr. Justice Berger that a change in the local economy from trapping and hunting to wage employment contributes directly to alcohol use. He suggested that, as neither hunters nor full-time wage-earners, native people were often confronted with having little place in a changing world. Drinking parties offered companionship. People displaced from the land, but offered no economic alternative that more than partially occupied them, had no reason not to pursue the pleasure of drinking with companions in similar positions. Their friends did not discourage drinking and it did not affect their chances to get ahead at work, since whatever jobs they held were largely seasonal and they would be the first to be laid off.

Speaking from his experiences in Pond Inlet, Dr. Brody said convictions in Magistrate's Court and drinking increased after a work rotation program started in 1972. Before wage employment was available, convictions ranged from one to four per year, but increased to 24 in 1972-1973 and to 30 in 1973-1974. Before 1972, only members of about five families drank and liquor was not a cause for community concern. By 1975, the hamlet had built a jail to house drunks, the hamlet council was attempting to regulate liquor purchases, and alcohol had become part of the way of life in the hamlet.

A differing point of view was taken by Charles Hobart (1976, 1979), who maintained that while increases in drinking are likely to occur at the outset of an employment period, drinking will decline following a period of adjustment. Drawing on studies of Coppermine, Dr. Hobart found the value of liquor imports increased by 29% in the first employment season in 1972-1973 but declined 12% the second year and 15% the third year, to slightly below pre-employment levels. When the program was terminated, however, drinking increased again. In a study of expenditures in the first employment season in Coppermine, Hobart and Kupfer (1978) found money was spent on skidoos, tents and other hunting equipment, food and clothing as well as on liquor.

There is also considerable debate about the effect of industrial development on the incidence of crime, violence, and other socially unacceptable behavior in northern communities. Testifying before Mr. Justice Berger in 1976, Dr. Otto Schaeffer said the leading cause of death in the previous ten years among Indians and Inuit in the Northwest Territories was homicide, suicide, and other violence and accidents, (and that most such deaths were alcohol related). In other evidence, the Berger inquiry heard that in 1974, 82% of people in the correctional system of the Northwest Territories were jailed as a direct cause of an alcohol-related offence (Mackenzie Valley Pipeline Inquiry Proceedings, Vol. 185).

It is a widely held tenet that alcohol plays a significant role in a sequence that runs: more cash income leads to more drinking and drinking leads to a higher incidence of crime and violence. The fact that much of the crime among native people is related to alcohol abuse and is of an impulsive and often violent kind suggests the sequence has some validity. However, the experiences of different communities is not conclusive, and there is reason to believe that factors in addition to sudden infusions of cash and resultant drinking are important in declining community well being.

Certainly, a community need not play a passive role during periods of change that place stress on community members, their relationships with others and their sense of identity. A community can, for example, plan for the stresses that occur with change, strengthen social support systems available to its members, and ultimately increase members' ability to cope with change (Lantz, Sackett and Eaton, 1980). Although there are no easy solutions, industry, government and northern native people are aware of the potential that industrial development and a wage economy have for engendering change in northern lifestyles. Consultation, and jointly planning ways of ensuring that people are not placed in stressful situations they cannot handle, could do much to ensure that cash income local residents earn from oil and gas development would be of benefit to themselves and their communities.

3.1.2 CONCERNS ABOUT THE SHORT TO MEDIUM-TERM FUTURE

The oil and gas industry's presence in the region and the results of recent exploration programs have had a marked effect on the way politicians, planners, interest groups, businessmen and ordinary citizens view the future.

One major effect has been to expand the range of possibilities that people consider when thinking about the future economic base of the region. Many people recognize that the short to medium-term could bring with it a substantial transformation of the regional economy. Development and transportation of the oil and gas resources of the region could provide the basis for considerable economic growth and development. Within a relatively short period the region's economy could be almost completely transformed, with oil and gas emerging as the driving sector and the position of government and traditional activities becoming less significant.

Residents are aware that this rapid transformation would entail numerous economic and social adjustments and outright changes. Elected leaders and interest group spokesmen in the region are nearly unanimous in urging government and the Industry to ensure that such a transformation is initiated with their involvement and with thorough pre-planning.

Concomitant with this sense of concern about the impact that an expanded oil and gas industry could bring in the short to medium-term, there is also a recognition that events could turn out differently. The Arctic Gas episode has convinced many people, particularly Inuvik businessmen and elected officials, that oil and gas development is more likely to be characterized by sudden starts and stops than by smooth, accelerating change. Events in other parts of the country in recent years have added to the sense of hesitation evident in the region. Increased Alberta oil sands production, once thought to be near certainty in the immediate future, has been delayed. The Alaska Highway Gas Pipeline is still struggling to get off the ground despite perennial hopes that construction was just around the corner. The Norman Wells oilfield expansion, and the Interprovincial Pipeline project southwards from Norman Wells to Zama, Alberta, have been approved but not on the timetable originally proposed by the Industry.

PLATE 3.1-2 *The oil and gas industry has brought opportunities for learning and working at skilled trades.*

PLATE 3.1-3 *While there are many employment opportunities with the Industry for northerners, many of these jobs can only be obtained if the employee has a good education.*

Thus, while many residents believe that Beaufort Sea region oil and gas development will occur at some point in the future, some are much less certain that it will occur in the near future. Given this uncertainty, various leaders in the region, when faced with the need to choose between conflicting demands on their time, often choose to attend to more concrete, present day matters. They want as many hard facts and timetables from oil and gas companies as they can get, and they want to set the stage for community-based planning, but they seldom fail to forget that irrespective of what they may want or prefer, the world is unlikely to unfold as it should.

Some residents in the Beaufort Sea region are not even sure that they like the way that oil and gas and government people believe events should unfold. Oil and gas exploration activity and the prospect of hydrocarbon development have been a source of concern to native people in the Beaufort Sea region since at least the late 1960's. The Inuvialuit, Inuit and Dene, and to a lesser extent the Metis, have been fearful that rapid, large-scale oil and gas development will leave them in a marginal position, economically, socially and culturally.

Thus, when native people view the short to medium-term future, many wonder whether or not there will be time for their land claims to be settled and implemented before oil and gas development begins. From statements made by native leaders, it is evident that the various native groups want to settle their claims in a way that will give them the rights and resources needed to develop lifestyles incorporating elements of both the traditional and modern economy. When they think of the future they often think in terms of special rights or resources: some control over the timing and direction of development; right of first refusal on employment; training and business opportunities; continued access to hunting, trapping and fishing; and a share of the wealth that will emerge from developing Beaufort Sea oil and gas. A lack of resolution to questions around these and others matters could raise problems with respect to the timing and extent of oil and gas development. As long as native people feel they have no stake in such development they would have no important reason for not delaying and frustrating it.

It is, however, a source of concern to native, government and industry planners alike that the average

functional education level of the native people in the Beaufort Sea labour force is so low that only a small number of people are able to make use of the employment and training opportunities currently available. If a land claim settlement brought with it special rights in employment, training or local business, or if the Industry instituted programs with respect to such matters, it is questionable whether native people would be able to fully benefit from such developments in the short to medium-term. In simple terms, government, industry and local businesses are already employing most of the native people who are interested in, and able to, fill wage employment positions.

As it has evolved to date, northern education is an example of supply and demand interacting at a low, sub-optimal, level. Because the system has not worked very well and because parents have not insisted that their children attend school, the students will not come. Because the students will not come, it is difficult to make persuasive arguments for improvements to the system. Clearly something has to happen to break this circle if better things are to be in store for the people of the Beaufort Sea region.

Efforts must be made to encourage native students to stay in school longer and, in some communities, to attend on a more regular basis. These efforts will have to come from parents or from parents working in cooperation with their local education committee. No amount of additional facilities, teachers and programs will overcome a lack of parental encouragement and support. Government can help by making school more relevant to the aspirations of students. Yet, programs must be carefully planned and long lead-times are typically required. In view of the many uncertainties associated with the outcome of the various land claim negotiations, government is understandably hesitant to begin revamping existing programs and policies without considerable native input. This input is not often available, however. Native spokesmen presently prefer to emphasize the need to settle land claims first and then begin to make the necessary program and policy changes in keeping with the letter and spirit of the settlement agreement. In view of the length of time it may still take to resolve land claims, this does not bode well for positive and aggressively pursued educational policies.

3.1.3 CONCERNS ABOUT THE LONG-TERM FUTURE

Discussions with Beaufort Sea region residents will often reveal that many people are more at ease about the long-term future of the region than about the next five to ten years. Given the complexity of the current socio-economic situation and the uncertainties associated with potential developments over the short to medium-term, their decreased concern when speculating about the long-term is understandable. Many do not think about it to any great extent and only the most general scenarios are typically addressed. Native people often say something to the effect that "no one will hunt or trap anymore because they will be working in the oil and gas industry"; native and white residents alike conjecture that "it will be all oil and gas by then."

The long-term tends to mean different time periods to different people. For many it is the time when their own life's work will be drawing to a close; that is, anywhere from 20 to 40 years in the future. For some residents, it is a much shorter period, often akin to the 1990 - 2000 period used in this volume. Even with this variation in definitions, there is little disagreement among residents that at some point over the long-term, if not sooner, the oil and gas industry will become the dominant factor in the region's economy.

Differences in viewpoint become more apparent when the discussion turns to what should be done in the near future to prepare for the future role of the Industry. Some residents, mainly native people and their advisors, point to the existing structure of the Beaufort Sea economy and compare it with areas such as Alberta and Middle East countries that have become dependent on oil and gas production for their economic prosperity. They question whether it will be possible to develop oil and gas production without, at the same time, destroying the basis for traditional activities. Many also question whether oil and gas development will do much more than produce industrial growth that is over-orientated to one primary industry.

There is continued discussion of the need to strengthen the traditional portion of the economy so that it will have a better chance of surviving the expansion of the oil and gas sector. Native development corporations are placing high priority on identifying ways of more firmly entrenching existing renewable resource harvesting and on the creation of new, more commercially oriented harvesting enterprises. The Inuvialuit Development Corporation, for example, is working to expand the sale of country food products in Inuvik and the creation of an intersettlement trade network in country food products. It also has launched a program of commercial fisheries development.

Expansion of the oil and gas industry could, of course, bring with it a larger market for country foods. The concern of native leaders is how to develop a wider range of markets without becoming overly dependent on any one market. They believe that a diversified approach to market development will provide a better basis for the long-term survival of renewable resource harvesting activities.

Native and non-native residents alike are also concerned about other opportunities and problems that the expansion of the oil and gas sector could bring. Most are aware that such expansion will bring an increased number of business opportunities in the service sector and, to a much lesser extent, the chance to expand the manufacturing sector. Some wonder what can be done to capitalize on possible opportunities in fields that would lead to the long-term diversification of the regional economy away from an overly dependent relationship with the oil and gas industry. At the same time, there is a growing level of interest in matters such as the formation of community and regional development corporations that would supply materials and services to the oil and gas industry. These corporations could, however, invest a portion of their profits in endeavours such as tourism and other activities that would continue on beyond the time when oil and gas activities began to decline.

3.2 THE INDUSTRY'S ROLE AT THE COMMUNITY LEVEL

Detailed descriptions of each of the communities in the region and more specific information on interactions between oil and gas companies and particular communities are provided in later chapters. This detail can, however, easily mask the more important general aspects of Industry's role at the community level. This section endeavors to highlight the overall patterns and effects of the Industry's role.

The oil and gas industry's presence and activities are important elements in the daily life of every community of the Beaufort Sea region. However, the role that the Industry plays in community life, and the way in which it may affect particular communities, varies quite widely.

A convenient way of structuring the discussion is in terms of the three basic types of communities which are evident in the region today:

- traditional,
- transitional and,
- modern frontier.

This typology is admittedly general, there being a fair amount of variation in the extent to which different communities could be considered "traditional." It is, however, adequate for the present purposes.

3.2.1 THE INDUSTRY'S ROLE IN TRADITIONAL COMMUNITIES

Most communities in the Beaufort Sea region still contain strong traditional elements, but they are changing. Their economic base has, for the past two or three decades, been a mix of renewable resource harvesting, short-term or seasonal wage employment, some permanent wage employment and small business endeavours, and social assistance. Many aspects of life, such as housing, health and education, are heavily subsidized. Expectations and wants in such communities are, however, rising, which poses an increasing requirement for cash income. The technology of renewable resource harvesting has also changed greatly, with the adoption of skidoos, rifles, manufactured boats and motors, tents, non-native clothing, and even aircraft. This has also posed a large new cash requirement, especially because equipment wears out quickly in the harsh climate and terrain of the Arctic. The cash requirements of most traditional communities are now well in excess of the cash incomes that could be acquired by trapping or casual employment or social assistance.

The cash requirements of traditional communities -indeed of many northern communities - are met in four basic ways: renewable resource harvesting (generally trapping, although commercial fishing and hunting may also be important); wage employment; business activity; and transfer payments of various types.

Dependence on resource harvesting for a large percentage of his cash places the harvester in the position of considerable risk and insecurity. Earnings from trapping or commercial fishing can be high in years when the harvest is large and prices are good. In other years, such earnings can be too low to provide the bulk of the cash required to support a family. It is understandable, therefore, that resource harvesting has diminished in importance as a prime source of cash as more secure sources have become available.

Until recent years, most native people living in traditional communities in the Beaufort region found wage employment only a little more reliable than trapping as a source of cash income. Local wage employment with government agencies could provide full-time or continuing part-time employment for only a few people. Other employment opportunities tended to be short-lived. Some native people invested substantial time in learning new skills, only to find that the jobs for which they had been trained did not last long or failed to materialize.

The employment and training opportunities generated by the oil and gas industry, particularly the

rotational employment arrangements that various companies have worked out, have changed the way many residents of regional communities view wage employment as a source of cash income. A small but growing number of native people in communitites as widely dispersed as Fort McPherson, Paulatuk and Holman Island are coming to realize that the Industry can provide sufficient cash to meet a large portion of their annual needs and that resource harvesting activities need not be terminated to enjoy the monetary benefits of oil and gas employment.

This realization is also growing with respect to the local business opportunities. In recent years, the oil and gas industry has been able to work out arrangements with existing small businesses or individuals wanting to start small businesses. This extra-community business activity, as well as the increased expenditures locally of residents employed in the Industry, has produced significant flows of cash in several communities.

Even though it has proven beneficial and has not required a major change in lifestyle, residents of more traditional communities have some apprehensions about the oil and gas industry. The fear is that increased involvement will bring new values and attitudes still uncommon among native people and not entirely compatible with more traditional values. There is concern that there will be changes in attitudes toward work, time, leisure, family and community. There may be a more basic fear that the mixing of old and new values could result in a population without a sense of direction, one in which younger people no longer respected their elders and what they represented. It is fears of this kind that underly some of the skepticism northern native people express toward employment programs devised for them by well-meaning non-natives. The concerns are not groundless. For northern native people, the experience of being drawn into the industrial economy has often not been a good one.

From the foregoing, it is apparent that the role of the oil and gas industry in the region's traditional communities is a complex one at the present time. The Industry has opened up new opportunities for cash income, new lifestyle possibilities, and a new market for business products and services. At the same time, it has served to heighten local residents concerns

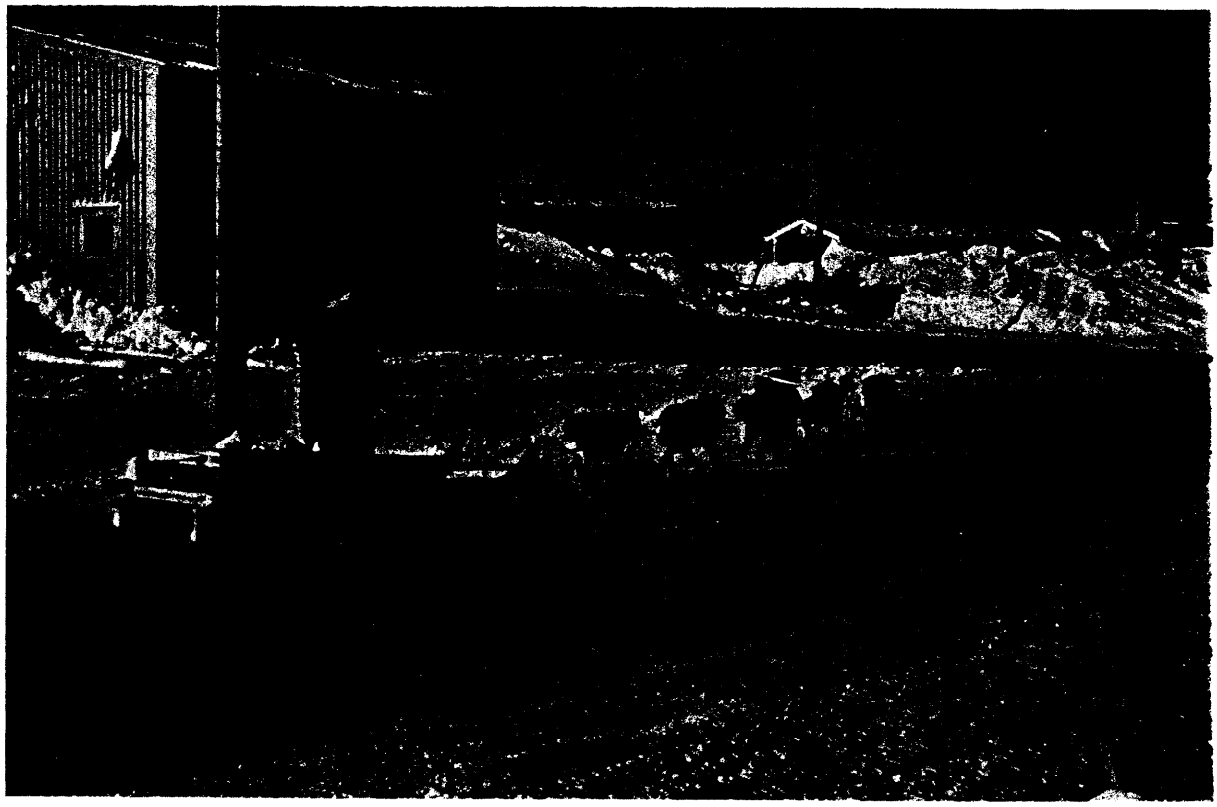


PLATE 3.2-1 *Dogs pulling komatik in Tuktoyaktuk. The old and new often appear side by side in Tuktoyaktuk.*

about the continuation of current lifestyles, values and attitudes over the longer term.

3.2.2 THE INDUSTRY'S ROLE IN A TRANSITIONAL COMMUNITY: TUKTOYAKTUK

The oil and gas industry plays a major role in the current socio-economic situation in Tuktoyaktuk. It currently accounts for well over half the cash income received in the community and is the basis of a business sector that has nearly quadrupled in terms of establishments in the past few years. The community has therefore come quite a long way along the path of change between the traditional and modern economies. It is still in a transitional stage but is clearly no longer a traditional community in the sense that communities such as Paulatuk and Holman Island are traditional.

The Industry's presence adjacent to the community has brought increased employment, training and business opportunities. This has presented the community with a range of both benefits and problems that few northern communities, if any, have yet had to confront. It has contributed in both positive and negative ways to what was already a complex, and not always healthy, socio-economic situation prior to Industry's arrival in the area.

The community is still in the process of adapting to the Industry's presence. Although much of the evidence is anecdotal in nature, there is much to indicate that the community is having a difficult time in meeting the pressures of change. There is a reported high incidence of partying, drinking, gambling and child neglect. School attendance is poor and drop-out rates are high.

There is considerable ambivalence about the future role of the oil and gas industry at Tuktoyaktuk. Few residents want to see the Industry go away but many would be happy if it did not expand much further. There are concerns about the ability of the next generation of native people to maintain their cultural heritage. There are similar concerns that young and old alike are already having too much done for them by others and that a growing "hand it to me on a silver platter" attitude will not serve anyone's long-term interest.

Thus, beneath the surface indications of well-being in Tuktoyaktuk - the material goods, the employment levels, the business activity, the attractive new facilities - there is anxiety about, and dissatisfaction with, some aspects of the current role of the oil and gas industry and, to some extent, with the community's continuing ability to deal with its own problems.

3.2.3 THE INDUSTRY'S ROLE IN A MODERN FRONTIER TOWN - INUVIK

Inuvik is different in most respects from the other communities in the Beaufort Sea region. It never was a traditional community and it never went through a transition in its outlook and orientation. It was built to be the key administrative and service centre in the western Arctic and it has been growth and development oriented from its earliest beginnings. The community is predominantly non-native and the standard of living is high.

What has changed over the years has been the actual and prospective sources of Inuvik's growth. Initially, government's responsibilities in matters such as defence, health, education and welfare were viewed as the main, long-term basis for the community's existence. The oil and gas industry's expansion into the Delta area in the 1970's brought a noticeable change to the character of the community and a sudden shift in outlook concerning where the future economic basis of the community would lie. In anticipation of the Mackenzie Valley Gas Pipeline and other projects the community geared up to become a major oil and gas administrative and service centre of the western Arctic. The local business community expanded rapidly. In some cases public servants resigned to start their own enterprises and in others entrepreneurs moved north from elsewhere in the Northwest Territories, Yukon and points further south. Plans were made for an expanded commercial shopping area; municipal funds were spent to develop sufficient land to accommodate a large increase in population.

The outcome of all this anticipation and effort is still well remembered in the community. Beaufort Sea oil and gas exploration has helped the business community in Inuvik recover from the downturn it experienced in 1977-78 as a result of the cancellation of the Mackenzie Valley Pipeline, and the population is now beginning to grow again. However, residents, elected officials and most businessmen, having been "burned" before, are reluctant to place too much reliance on the imminent development of the region's oil and gas resources. Nevertheless, some members of the business community are optimistic that development could, once more, be just around the corner and various investment group schemes are being discussed or promoted locally. Other residents are concerned that the community might not have a sufficiently strong role in planning for future oil and gas development. They are asking for hard facts and figures from both industry and government.

CHAPTER 4

THE BEAUFORT COMMUNITIES

This chapter describes the ten Beaufort Sea Region communities as they currently exist. No attempt has been made to present all available data for each community in the following profiles. Instead an effort has been made to characterize the current or recent situation in each community in more general terms, citing illustrative statistics as appropriate.

4.1 INUVIK

Inuvik is the largest community in the Beaufort Sea region and the main government and business centre in the western Arctic. It was built as a planned northern community in the mid 1950's, the original intent being to provide a replacement for Aklavik as the government centre in the area. The community was also envisioned as a possible forward base for the exploration and development of the north's non-renewable resources (Figure 4.1-1).

Much of the community's short history was discussed in Chapter 2 and need not be repeated here. The key point to note is that Inuvik is a community quite different from most of the others in the region (Table 4.1-1). It has a large, non-native population and many of its residents are employed in either civil service positions or in private businesses. The community has had experience with rapid population growth as a result of oil industry activity and with the rapid declination of population growth and economic activity associated with the decision to turn down the Mackenzie Valley pipeline proposal of the mid 1970's. The community is generally looking forward to Beaufort Sea oil and gas development but many residents and community leaders are uncertain about the timing of such development. Many see current problems that are not being fully addressed by government and ask why such matters are not being put right before large sums are spent on studies of possible, but still uncertain, future impacts on the community.

TABLE 4.1-1

TOTAL POPULATION BY 5 YEAR INTERVALS INUVIK AND THE NWT 1961-1980

	1961	1966	1971	1976	1980
INUVIK	1248	2040	2669	3170	2929
NWT	22,998	28,738	34,805	42,610	45,882

Source: Census of Canada 1961-1976; Government of the Northwest Territories, 1980.

4.1.1 THE PEOPLE

Inuvik is a new community, and its experience with the oil and gas industry is reflected in available population data. Its population grew at an average annual rate of 6.4% over the period 1961 to 1976. This rate of growth was considerably in excess of that for the Northwest Territories as a whole during the same period and gave the community a population of 3,170 by 1976. The community's population dropped by almost 10% in the year or two following the 1977 pipeline decision (Table 4.1-2) (Outcrop, 1981). This decline has been arrested in recent years largely beause of the local business and employment effect of Beaufort Sea exploration activity. The community's population as of 1981 was believed to have returned to about the 1976 level.

The only age specific data on Inuvik's population that are currently available are from the 1976 Census. These data may not be entirely indicative of the current situation given the out-migration and in-migration that have occurred since then. Nevertheless some generalizations still seem appropriate. The community's population is mainly young (Figure 4.1-2). Many residents are in the initial or early mid-stages of a government career, are still building up a business, or have recently arrived in the community from outlying settlements elsewhere in the north, or from points in the south, seeking a change of lifestyle and, perhaps, the chance to earn sufficient money to start a business. Although not evident in the 1976 data, quite a number of Inuvik residents have lived in the community for two decades or more and are strongly committed to seeing that the town's future growth and development are well-planned and reasonably controlled.

TABLE 4.1-2

BIRTH, DEATH, AND MIGRATION EVENTS INUVIK 1978, 1979, 1980

Year	Births	Deaths	Migration	Net Change
1978	78	9	-258	-189
1979	95	14	-127	- 46
1980	90	16	- 37	37

Source: Population Estimates Government of the Northwest Territories 1979, 1980 NWT Population Estimates for December 31, 1978, Methodological Report.

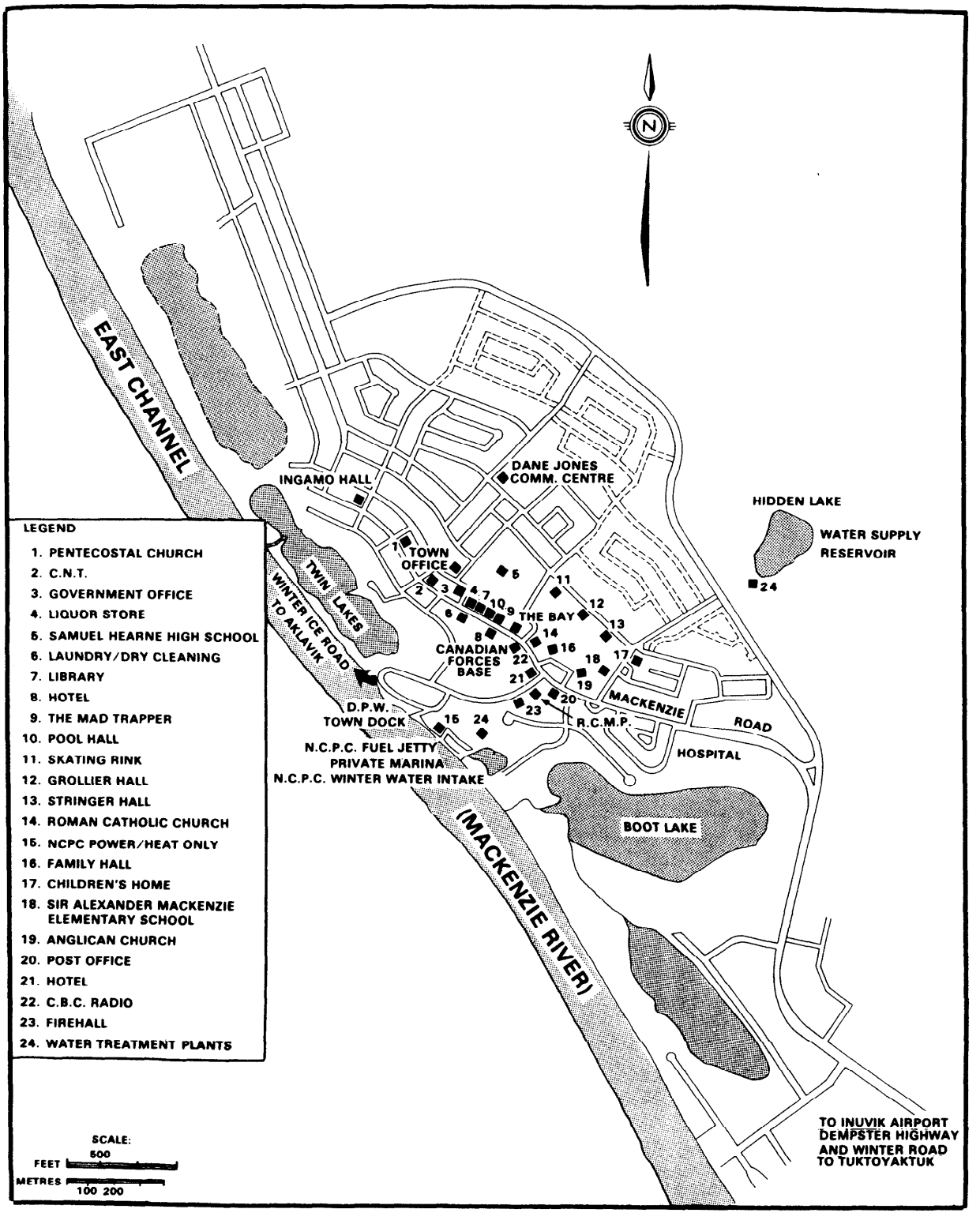


FIGURE 4.1-1 *Town of Inuvik*

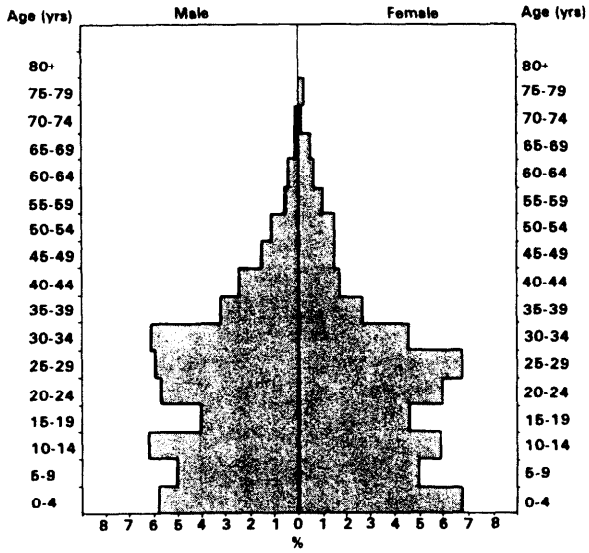


FIGURE 4.1-2 *Population by age & sex. Inuvik, 1976.*

4.1.2 COMMUNITY ORGANIZATION

Inuvik is a Town under the Northwest Territories Municipalities Ordinance. This means that it is an incorporated tax based municipality. Through its elected council, which includes a mayor and eight other councillors, the Town has the authority to set mill rates, collect property taxes, establish by-laws, and collect licenses and fees. Additional revenues are received by the municipality from the territorial government through the Equalized Municipal Grant Formula which, in 1981, replaced the Territorial Capital Grant Program. The Town has responsibilities for providing municipal services such as water, sanitation and garbage disposal, road maintenance, street lighting, fire protection and recreation. In cooperation with the Town Planning and Lands Division of the Territorial Department of Local Government, Inuvik also has authority to develop municipal plans and related zoning and development by-laws.

A significant issue to Inuvik, and the other Beaufort Sea area communities, is the degree to which people share a sense of community. As has been previously documented, settlement patterns in the area have shifted considerably during past generations and even during the last two decades. While residents share a geographic area, there are indications that a sense of a common, unified "community," (where people have common ideals, goals, beliefs, attitudes, values, and purposes) is not shared by all. Nevertheless, it can also be said that many residents have a feeling of commitment to Inuvik and its future, even if desires or expectations of what that future should be differ. Frustrations with the actions or inactions of agencies external to the community appear to be a major unifying force among the various community groups. Shared identities not developed at the community level appear to be based on family affiliations, racial origin, length of residence, and areas of previous family residence (eg. Aklavik, Fort McPherson, other northern communities, or "the south"), and attitudes toward economic development. These various groups and allegiances influence residents' patterns of social interaction on a day-to-day level.

4.1.2.1 Socialization and Education

Parents (and other family members) and professional educators share in the education and socialization of a community's residents. In Inuvik, the diverse backgrounds of its residents result in differences in the expected roles and influence of parents and other educators and in the direction of socialization. While they may be most evident between native and non-native segments of the population, changing values and demographic mix also result in "double socialization" and conflicting messages within segments of the population. For example, different generations of native residents consider different skills as being necessary for economic survival; so they differ in the value they place on formal school achievement versus renewable resource harvesting skills. Non-native residents also differ in the values they place on technical versus professional education, or practical experience versus academic learning. Conflicting messages about the importance of different types of education have been further aggravated by the uncertainties and instabilities of economic activity in the area. Differing levels of formal educational attainment have been noted by Inuvik residents as perhaps the single most important factor in the ability of town residents to participate in not only the area's economic activity, but also in leadership roles in the community.

The dominance of the non-native members of the community (Figure 4.1-3) in numbers, as well as in positions of influence in education and leadership systems in Inuvik, has meant an accelerated rate of transition from traditional systems to political structures of the larger society for the native people living in the town. Some native residents have off-set the discomfort of this rapid transition by alternating residence between Inuvik and more traditional communities such as Fort McPherson or Aklavik.

Inuvik residents have played a strong role in developing an Education Action Plan to address some of the changes in the education system made necessary by the increasing availability of wage employment. This plan supposedly would enable residents of the Inuvik region to successfully participate in the social and economic activities of their region, according to the terms of reference of the group that prepared it.

In regard to the effects of education on community

tensions, Inuvik residents have noted that family problems, social pressures and living conditions have resulted in dropouts from the formal education process among the town's native residents. Because many native children drop out of high school, adult education upgrading programs must help students to build self-confidence and to learn to follow directions, as well as to teach the more conventional course content.

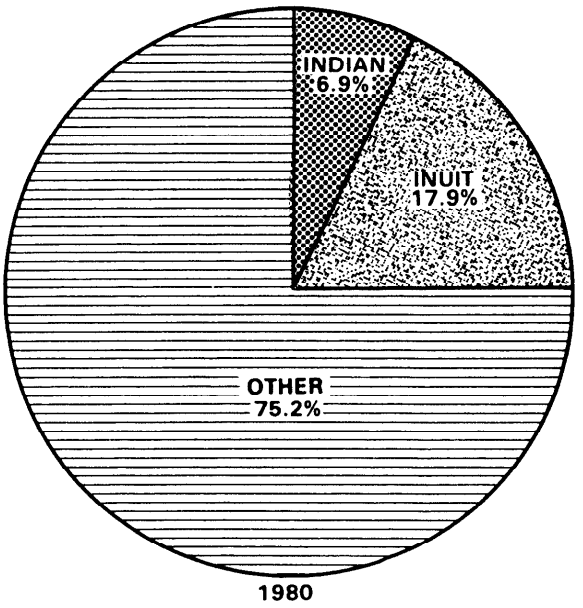


FIGURE 4.1-3 *Ethnic distribution. Inuvik, 1980.*

4.1.2.2 Social Problems

The definition of "social problems" in a town where residents hold a mix of values and expectations is itself problematic, and depends on the perspective of whoever defines the "problems." Researchers attempt to provide a systematic, unbiased perspective, but they themselves are often viewed as problems: uncommitted, uninvolved and unconcerned outsiders who interfere with regular patterns of community activity, taking residents' time and making them uncomfortable. Also, central governments often define social problems, usually through representatives who are "outsiders" from various departments pursuing fragmented, sometimes differing objectives. Government responses to social problems can themselves sometimes be troublesome to communities. Community residents' definitions of social problems can also be fragmented, differing among community factions. However, residents' definitions are at least supported by direct experience with the situation, and problems are defined in the context of local values and attitudes. The contextual perspective is particularly important in a changing environment. For example, local residents may view family or community changes as positive responses to the challenges of new situations; "outsiders" may define such changes as community or family "instability." Given the lack of generally accepted "standards" from which to evaluate the prevalence or existence of social problems, local perspectives provide a practical, community-based form of evaluation. Social problems identified by Inuvik residents include:

a) Alcohol and drug use: Opinions differ as to whether Inuvik's problems in this area are any different in magnitude from those of other communities, north and south. Perceived causes of alcohol abuse include affluence, the decline of the discipline of life on the land, separation from former home support systems, and the stress and uncertainties of rapid social changes. Inuvik residents are also conscious of the town's role as the regional outlet for the supply of alcohol to other communities, resulting in problems elsewhere. Sales of alcohol are now rationed in the Territorial Liquore Store in Inuvik.

b) Economic inequities and uncertainty: Inequalities in the distribution of wealth in the community; inequities in access to capital and wage employment; the seasonality and uncertainty of wages and income from various sources; money management problems; and new affluence among people already facing the difficulties of cultural adjustment are all noted locally as aspects of social problems.

c) Levels of subsidization: Inequities among residents in terms of access to subsidies have been a cause of divisions in the community, to some extent, and are a source of concern to some Inuvik residents. Some residents also noted that external agencies' allocations of subsidies do not necessarily reflect community priorities ang goals, and thus complicate locally-directed efforts in social and community planning.

- Local people expressed concern about large subsidies, particularly for housing and utilities, which result in poor housing maintenance and waste of energy in the form of heating and lighting. Inequities in access to housing and utility subsidies also generate some concern.

- Some residents said it was important to develop economic options in the community. Hunting, trapping and fishing activities should be supported as real alternatives to wage employment and to the welfare payments which now support the dominant cash economy.

- Residents said increased support of education and support systems is required to enable area residents with different levels of education and skills to participate in all levels of economic and

PLATE 4.1-1 *Inuvik. Built as a government administrative centre, this modern community has now become strongly dependent on the oil and gas industry.*

political activity in the community. Educational support systems discussed by town residents include income and family support, accommodations, and adaptation of programs developed in the south to meet local needs.

d) Social competition: Education, earning power, and associated social status influence individuals' self images and levels of social energy and activity. Differences in education, money and status between natives and non-natives can make it difficult for local native residents to compete socially, which in turn, may have consequences for self-image, confidence in family or community leadership roles and other social parameters. According to some community residents, such imbalances in social competition are aggravated by relatively transient male workers from the south, who earn high wages and are often attractive to younger local women.

e) Recreation and cultural activities: Limited development of opportunities for recreation and cultural pursuits was noted as a problem. In the absence of other opportunities, young people and adults turn to socially-undesirable activities (eg. alcohol and drug use, etc). Without sufficient amenities and facilities to offset difficult living conditions, family stability and the continuation of younger family members in educational programs is more difficult to sustain.

4.1.2.3 Political Organization

Social controls which sanction a pattern of interactions among community members, and interactions between the community and the "outside world," are a primary element of political organization. Other important elements include the community's power to produce desired effects, and public acknowledgement of the right of some community members to exercise power. The presence of some shared system of values, and a consensus about how these values should be exercised, is thus the basis for political organization.

Political cohesiveness in Inuvik is difficult to attain because, as was previously noted, the town includes people with rather widely differing values, expectations, and goals. These differences are reflected in the number of organizations represented in the community, including several churches, the Chamber of Commerce, Hunters and Trappers Association, the Inuvik Dene Band, Committee for Original Peoples' Entitlement, Dene Nation, Metis Association, Northwest Territories Native Women's Association, Beaufort Sea Community Advisory Committee, and the Beaufort - Delta Tourism Association. Many of these organizatons have regional or territorial mandates in addition to their local activities.

Power and authority with respect to various aspects of community life are exerted by the elected town council, its service units and sub-committees, such as the Petroleum Planning Committee; the Government of the Northwest Territories, with its numerous department and service arms; the federal government and its agencies and departments, most notably the Department of Indian Affairs and Northern Development, but also such federal agencies as the Northern Canada Power Commission, Royal Canadian Mounted Police, Canadian Armed Forces and Canada Mortgage and Housing Corporation.

4.1.2.4 Social Control

For the most part, social control in Inuvik is provided as it is in most Canadian towns of its size: the various social groupings exert pressure on their members to behave according to expectations of the group. In addition, the different groups within the town limit the range of behaviour of the other groups, creating some balance of power within the community. For example, while non-natives may have more voice at the level of the Town Council, or in representations to external agencies, the presence and activities of the native organizations encourage a degree of sensitivity to native concerns and aspirations.

4.1.2.5 Leadership and Government

Political organization can be hampered by any loss of respect for, or loss of communication with, local leaders. Respect may by undermined by a number of factors, including conflicting values, erosion of well defined values, occasional aspects of some leaders' behavior, or distancing between leaders and constituents due to the demands of leadership. In Inuvik, leaders' opportunities to talk to other residents are somewhat constrained by the considerable time demands of an apparently continuous series of meetings with outside agencies and organizations. Leadership is also weakened to some extent because the control of funding or implementation of many local programs, services, and other activities is in the hands of external bodies - whether federal or territorial governments, or southern-based industry. Local leaders frequently express frustration with the limited resources available to them to plan and establish priorities, make decisions, and implement plans for their own community or region, regardless of whether they are addressing the development of regional utilities networks or the timing and planning of an EIS.

As in many communities, much of the work of local leadership is done by a small number of people, who each play several roles in the community. Some people are concerned that the majority of community leaders are non-native, and that some represent the interests most likely to benefit from industrial development. Others are confident that most of these leaders are sensitive to the interests of the various segments of the community.

Probably to a greater extent than in most communities in Canada, external agencies dominate planning and allocation of resources and services in the community. This outward orientation makes it difficult for leaders to find opportunities to discuss issues with local people, monitor opinions, organize and motivate constituents toward achievement of common goals, and prepare the reports and research necessary to bring community interests to the attention of external bodies. The end result may be that preparation of goals and plans set by local residents is subverted by the need to respond repeatedly to plans and goals set by outsiders. In addition, the complexity and distance of governments in Yellowknife and Ottawa may restrict the number of community residents willing, or considered able by the electorate, to assume local leadership positions.

Despite these difficulties, Inuvik has taken a proactive role in planning: for example, the Petroleum Planning Committee is looking ahead to the requirements of petroleum development; the Town is planning toward community growth; and a regional education plan is under discussion.

4.1.3 LOCAL ECONOMY

Inuvik has the most diversified local economy of any of the Beaufort Sea communities. Government employment provides the economic base for the community but many residents are active in their own business, and the oil and gas industry's recent Beaufort Sea exploration activities have contributed significantly to employment and incomes in the community. Some indication of the relative importance of various sources of incomes as is given in Table 4.1-3.

Data on the occupations of many Inuvik residents and information about their educational attainments and skill levels have been compiled by the Government of the Northwest Territories in recent years and are available in their Territorial Employment Record and Information System computerized data retrieval system (hereinafter referred to as TERIS). The TERIS data reveal the wide range of occupations reported for Inuvik residents and the considerable diversity of skills available in the local population. Skills in such service industry categories as clerical, catering and lodging, construction, education, retail trade and medical services are especially prominent. With the increasing importance, regionally, of oil and gas activity, the skill range would likely shift from a service orientation to more of a production orientation. Table 4.1-4 summarizes employment skills for 1980.

Another aspect of the Inuvik economy that should not be overlooked is the food and cash income which many native residents of Inuvik derive from resource harvesting activities; Chapter 5 provides data on this aspect of the local economy.

Inuvik is the business centre as well as the government administrative hub of the Beaufort Sea region. As of mid 1981 the community's business sector accounted for a large proportion of the business establishments in the region and provided the widest

TABLE 4.1-3

ESTIMATED TOTAL CASH INCOME AND KNOWN SOURCES OF CASH INCOME IN INUVIK - 1980

Item	Amount ($millions)	Percent of Total Cash Income(%)
Estimated Total Cash Income	30.00[1]	—
Amount of Cash Income Derived From:		
- Employment with Government	10.00[2]	33.33
- Dome/Canmar employment and business contracts	3.00[3]	10.0
- Trapping	0.18[4]	0.6
- Social Assistance	0.09[5]	0.3
- Unemployment Insurance	0.50[6]	1.7
- Other unidentified sources	16.20	54.0

Notes:
1. Outcrop/DPA projection of known 1976 total income data ($19.2 million) by 15 percent annually to 1980.
2. Outcrop/DPA based on 500 government jobs at an average 1980 salary of $20,000.
3. Outcrop/DPA estimates; includes induced spending effects.
4. Compiled by Outcrop/DPA from NWT Trappers Incentive Program records for 1979-80.
5. Obtained from Department of Social Services by Outcrop/DPA
6. Outcrop/DPA estimate based on 1978 and 1979 U.I.C. payment data.

range of functions and activities. As of mid 1981, Inuvik had an estimated 210 business enterprises in operation. They ranged in size from small holding companies through large construction and trucking businesses and carried out some 53 different business functions (see Table 4.1-5). Most performed a variety of service industry functions in order to survive; few businesses were highly specialized or limited to one activity.

In general terms, the community's business sector encompasses seven broad groups of activities. Four were the mainstay of the business sector during the early days of the town's development as a government administrative centre and are still important today. These four groups of activities involve:

- provision of goods and services to the various government offices and facilities located in the community;

- provision of goods and services to government employees and their families;

- provision of goods and services to the rest of the population and to people and businesses in other communities in the Beaufort Sea region; and

- provision of goods and services to other businesses in the community, a group of activities that is often characterized as the "taking in of one another's laundry." An example of such an activity would be the supply of fuel to a business which, at some other point, is the source of repairs for the fuel truck.

These four groups of activities are still important elements of the Inuvik business sector. However, during the 1970's three other groups of business activities also grew in importance in the community. One was the provision of goods and services to the oil and gas industry. A second often overlooked group, was the diverse set of businesses and functions that are often collectively termed "tourist services." This group includes tourist accommodation businesses, tour operators, and souvenir businesses. It has been growing rapidly since the completion of the Dempster Highway, the highway link to the Yukon which has brought an increased flow of tourists into the community. The third group of business activities to emerge in the 1970's was more varied and, perhaps, is best termed "miscellaneous new sources of economic activity and change." This group includes the oil and gas companies who have established offices in Inuvik and the business or quasi-business development corporations associated with native associations headquartered or represented in Inuvik.

TABLE 4.1-4

EMPLOYMENT SKILLS
INUVIK 1980

Industry	No. of Persons
Agriculture	21
Air Transport	11
Amusement and Recreation	2
Banking and Finance	10
Broadcast, Motion Picture, and Stage	9
Business Services	2
Catering and Lodging	57
Clerical	120
Construction	35
Education and Training	34
Electrical Equipment and Repairing	5
Electronic Equipment Manufacturing and Repair	3
Forestry and Logging	4
Garment and Fabric Manufacturing and Repair	5
Government Services	14
Insurance and Real Estate	1
Laundering, Cleaning, and Pressing	19
Machining, Welding, and Forging	2
Mechanical Equipment Manufacturing and Repair	2
Medical Services	28
Miscellaneous Services	4
Motor Vehicle Manufacturing and Repair	3
Motor Vehicle Transport	11
Oil and Natural Gas	3
Personal Services	10
Printing and Publishing	1
Professional and Technical Services	18
Rail Transport	1
Retail Trade	30
Ship and Boatbuilding and Repair	1
Social Welfare Services	17
Telecommunications	1
Unclassified	17
Utilities	1
Water Transport	4
	487

Source: TERIS, Government of the Northwest Territories 1980.

TABLE 4.1-5

ACTIVITY ANALYSIS - INUVIK LOCAL BUSINESS SECTOR AS OF MID-1981

Sector of the Local Economy	Activity	No. of Local Businesses engaged in the Activity
Primary	Gravel extraction	3
Secondary	Parka Manufacturing	1
	Fur Garment Manufacturing	1
	Boat Building	1
	Food Products	2
	Light Metal Working Fabrication	3
	Printing, Publishing	2
	Electrical Installation	6
	Building Construction	8
	General Contracting	13
	Handicrafts Production	3
Tertiary	Wholesaling and Distribution	10
	Retail Sales	45
	Building Materials and Supplies	6
	Equipment, Services, Rentals	7
	Automotive/Truck Leasing, Rentals	4
	Automotive Repairs, Parts, Services	7
	Fuel, Lubricates, Propane Sales	3
	Office Supplies and Equipment Sales/Service	4
	Appliance Repairs and Service	5
	Heating Maintenance/Service	2
	Communication System Maintenance	2
	Drycleaning, Laundry Services	2
	Business Management Services	4
	Communication/Interpretation Services	2
	Miscellaneous	9
	Expediting	6
	Taxi/Delivery Service	3
	Bus Charters	1
	Aircraft Charters	3
	Boat Charters, Rentals	2
	Airline Agency	3
	Travel Agency	1
	Trucking/Hauling	11
	Moving/Storage	3
	Airport Services	4
	Barging	4
	Marine Services	2
	Janitoral Services	8
	Building Repairs	6
	Property Management Business	6
	Banking	2
	Insurance, Real Estate	2
	Hotel, Motel Accommodation	4
	Tourist Services	8
	Restaurant/Coffee Shop Cafeteria/Fast Foods	9
	Catering Services	4
	Cocktail Lounge, Bar	5
	Liquor Store	1
	Personnel Services	2
	Holding Company	6
	Radio and T.V. Broadcasting	2
	Miscellaneous Services	10

Source: Externality Associates Ltd.

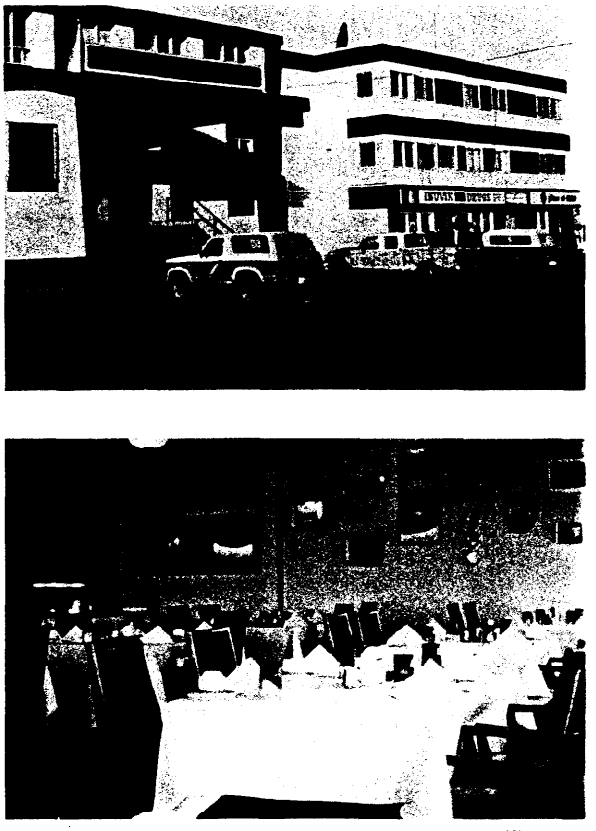


PLATE 4.1-2 *Inuvik's size and development justifies the growth of the service industry. Above: main street. Below: A modern dining room.*

Before turning to a discussion of the characteristics of the Inuvik business sector and its potential to grow and develop with oil and gas development in the Beaufort Sea region, some comments on the principal components of this final group of business activities are in order.

The oil and gas industry established offices in Inuvik as early as the 1960's but it was not until the 1970's that the community really experienced much economic activity as a result of the industry's presence. The boom-bust situation that was associated with the Arctic Gas pipeline proposal of the early to mid 1970's has already been noted and need not be restated here. What should be noted, however, is that the continuing presence of Esso in the Delta and the more recent emergence of Dome as a major source of economic activity in the region helped to turn around the business situation in Inuvik. The Inuvik business sector is no longer in decline. The Industry's employment and local purchasing policies and programs have helped to stabilize the situation and, in some respects, have given the local business community increased prospects for additional growth and expansion in the near term future.

The oil and gas industry's current contribution to the state of the Inuvik business sector is difficult to fully ascertain. Dome has provided Inuvik businesses with a large volume of purchases and contracts in recent years as part of its efforts to increase northern participation in its activities, particularly northerners in communities outside Tuktoyaktuk. Dome's business purchases and contracts in Inuvik over the period 1976 to 1980 are shown in Table 4.1-6. Dome's purchases have been the source of additional employment in the community. Some of the income derived from this employment and some of the income derived from employment directly with Dome are being spent in the community and, thereby, further benefiting local businesses. Esso has also continued to make a number of purchases locally and to hire Inuvik residents. Similar indirect as well as direct employment and income effects are occurring as a result of Esso's activities.

TABLE 4.1-6

DOME BUSINESS OBTAINED BY INUVIK LOCAL BUSINESS 1976-1980

Year	No. of Local Businesses Obtaining Business from Dome/Canmar	Amount of Business $000	Average Amount per Local Business $000
1980	71	6,500	92
1979	68	3,300	49
1978	53	1,312	25
1977	48	800	17
1976	23	320	14

Source: Dome Petroleum Limited, 1981.
1980 Beaufort Sea Operations Evaluation, Calgary, Alberta.

However, the full effects of the oil and gas industry's impacts on the local business community and on community incomes can only be approximated with available data. Outcrop/DPA have made some estimates of the overall effects of Dome's 1980 operations on employment, income and business in Inuvik (Outcrop, 1981). Their estimates include induced as well as direct and indirect impacts; see Table 4.1-7.

The Outcrop/DPA estimates, of course, do not include the effects of Esso's local purchasing and employment activities. These effects are smaller than Dome's but they are significant to the Inuvik business community.

Outcrop/DPA estimate that Dome's economic impact on Inuvik has been substantial in recent years. Their estimate of Dome's 1980 economic impact on the community, as depicted in Table 4.1-7, indicates that the company's activities generated a total of 118 additional man-years of employment. Much of this additional employment was created because of Dome's purchases from Inuvik businesses. It can also be seen

from the estimates that employment with Dome, additional employment in businesses doing business with Dome, and the respending of additional income had a marked impact on the local business sector. Outcrop/DPA have attempted to estimate the impact by identifying the increased "value" added to the materials and services purchased in the community as a result of Dome's presence. They estimate that almost $4 million dollars in additional value added was created by local businesses.

TABLE 4.1-7

DOME BEAUFORT OPERATIONS ECONOMIC IMPACT ON INUVIK, 1980

Type of Economic Impact	Additional Man Years of Employment	Additional Wages and Salaries ($000)	Additional Value added by Inuvik Businesses ($000)
Direct (from Hiring Inuvik Residents)	25	980	980
Indirect (from purchase, contracts with Inuvik Businesses)	64	1,482	2,226
Induced (from responding to Income Locally)	29	578	723
Total Impact	118	3,040	3,929

Source: Outcrop/DPA, 1981

In addition to oil and gas companies, native development organizations have recently emerged as important sources of economic activity and change in Inuvik. These include the Inuvialuit Development Corporation (IDC) controlled by the Committee for Original Peoples Entitlement (COPE)*, the Inuvik Dene Band Office, the Northwest Territories Metis Association Inuvik Office and, by virtue of a long-standing real estate investment, the Inuit Development Corporation controlled by Inuit Tapirisat of Canada.

The IDC is the principal native business organization active in the community. The Inuit Development Corporation's role is simply that of a property-owner, its investment in an apartment building having been made before COPE broke away from Inuit Tapirisat of Canada to pursue a separate land claim settlement. The Inuvik Dene Band does not have a separate business organization. Its current Chief is business oriented and some steps have been taken recently to explore possible opportunities with the oil and gas industry and to advertise for a staff person to work on economic development matters. However, these initiatives have not reached the point where specific ventures are being evaluated. The Northwest Territories Metis Association shares office space with the Inuvik Dene band. Their Metis Development Corporation has not been active in Inuvik. It is involved in some aspects of the Norman Wells Oilfield Expansion and Interprovincial Pipeline Projects to the south of the Inuvik area and conceivably, could turn its attention further north at some point in the future.

The IDC was established by COPE in 1978 and currently operates out of the same building as COPE in Inuvik. Its long range goals are to bring Inuvialuit into the process of economic development in the western Arctic and to ensure that they share in the benefits from such development (Inuvialuit, 1981). Several activities are being carried out in pursuit of these goals. Generally, they can be divided into two types: (1) activities relating to the land claim negotiations process, including planning for the use of monies that will flow to Inuvialuit as a result of a settlement, and (2) to provide Inuvialuit with experience and insight into various opportunities in the regional economy.

The corporation's current business activities encompass three different aspects of the economy:

- Developing and expanding the renewable resource industries;

- Developing a presence in various parts of the transportation industry;

- Leasing of equipment to the oil and gas industry.

The ordering of these activities in the listing presented above is indicative of the relative importance attached to each. IDC continues to place heavy emphasis on projects to strengthen and expand the renewable resource harvesting industries in the region. The corporation is involved in the operation of a country foods store in Inuvik; intersettlement trade in country foods generally within the region but also with communities as distant as Frobisher Bay; development of markets for muskox meat and muskox harvesting by-products (horn, hides) throughout Canada; and test fishing toward the development of a commercial fishery business in the Mackenzie Delta -Beaufort Sea area.

The fishery could develop into a major undertaking. Government grants have enabled IDC to develop its planning to the point where test fishing and a temporary processing plant at Inuvik were scheduled for 1981. If these tests prove successful, a full-scale business based on the processing and freezing of white-

*Throughout the following text, IDC refers to Inuvialuit Development Corporation, not Inuit Development Corporation.

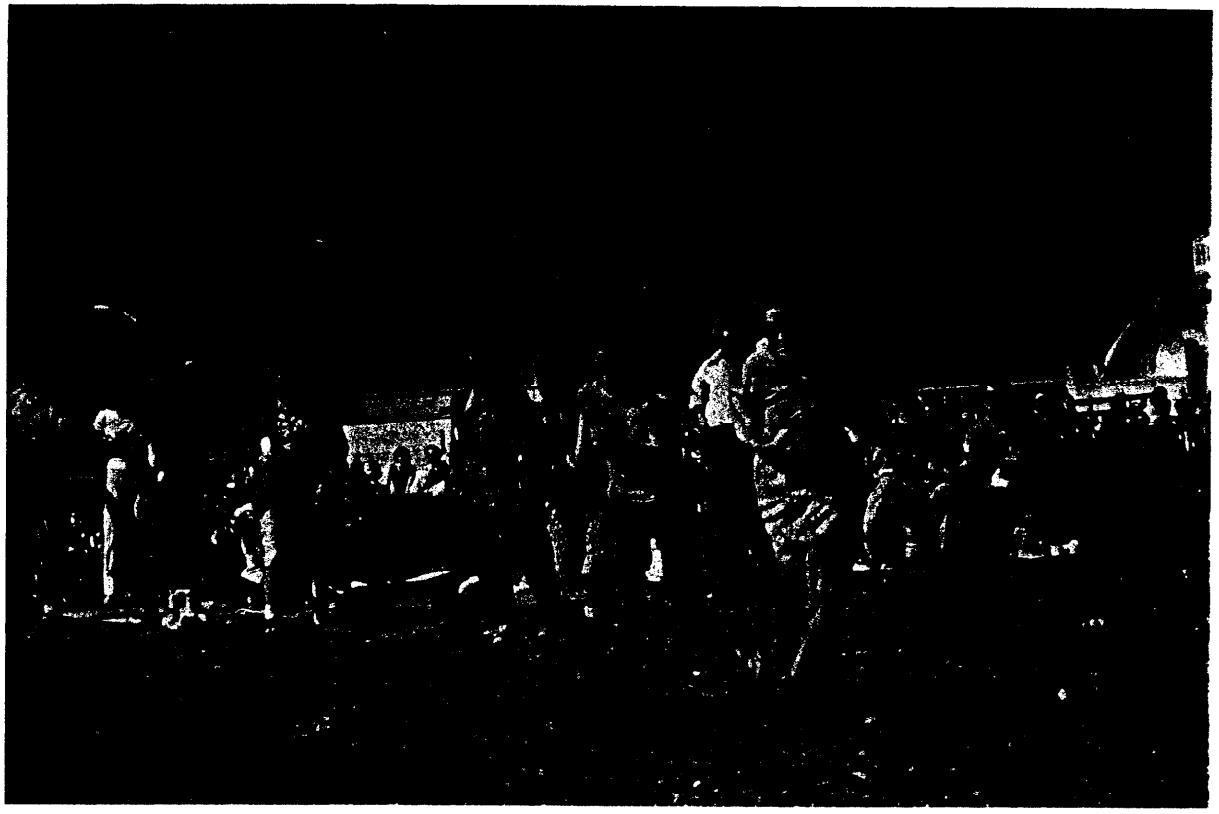


PLATE 4.1-3 *Good woman race. Inuvik hosted the Northern Games in 1979. This important social and recreational event emphasizes both traditional native and modern sport.*

fish from the Delta area and herring from the Beaufort Sea, could be initiated in the near future.

IDC has also established a booking agency for sportsmen wanting to participate in the guided muskox hunts offered by the Hunters and Trappers Associations in Sachs Harbour and Paulatuk. In 1981 IDC's Inuvik office arranged for over 50 sportsmen to participate in such hunts. The demand for guided muskox hunting opportunities is high and sportsmen have come from points as far away as Mexico and Italy.

The Corporation has also become involved in other business activities in recent years. It has invested in the transportation industry at both the community and regional levels and has gained some experience with the oil and gas industry through an equipment leasing arrangement worked out with the Industry.

IDC moved into the transportation industry in late 1980. It purchased outright the Inuvik Taxi Company and launched an equipment upgrading and expansion program. Three new vehicles were added to the company's taxi fleet. IDC also acquired a 50% interest in the ownership of Aklak Air Ltd., a regional charter aircraft company with a good record of growth and performance. Efforts are being made to expand Aklak Air Ltd.

IDC's business relationship with the oil and gas industry is still evolving. At present it is involved in a number of arrangements whereby it leases equipment (trench cutting machines, fuel truck and crane) to Dome for 3 to 5 year periods. IDC purchased this equipment using money loaned to it by the Inuvialuit Investment Corporation. Dome has the option to purchase the equipment at the end of the lease period for 25% of the original cost. These purchases would give IDC a return of up to 30% on its capital.

There is considerable scope for IDC to expand its oil and gas related business activities and it is believed that careful consideration is being given to possible additional ventures. At various points over the past year or so the Corporation has given serious thought to the possibility of becoming involved in shorebase construction and operation (with respect to a possible Wise Bay location then under consideration by Dome), the possibility of providing certain trucking services if a barite mine proposed for the Yukon were brought into production to supply Beaufort Sea oil and gas exploration operations and to additional equipment leasing arrangements. Some consideration at the preliminary planning level has also been

given to the possible involvement of the Corporation in barging and fuel transport operations associated with the oil and gas industry. No decisions have been announced on any of these possibilities.

In general, the IDC's relationship with the oil and gas industry appears to have reached a point of decision. The opportunity exists for the Corporation to become much more involved with the Industry. However, it is not clear whether this can be done without undermining COPE initiatives in the land claim area or overloading IDC staff to the point where other corporate activities such as the expansion of the renewable resource industries in the region are jeopardized.

IDC's business activities, while impressive relative to those of some other native organization's in the north, are minor in comparison to the size and diversity of the overall business sector in Inuvik. The community's business sector, as was noted above, is sizeable and its role in the community and the region is important.

TABLE 4.1-8

THE INUVIK LOCAL BUSINESS SECTOR AS OF MID-1981

Sector of the Local Economy	No. of Local Businesses[1] Active as of August, 1981	No. of Different Functions[2] Provided
Primary	3	1
Secondary	40	10
Tertiary	173	42
	210[3]	53

Note:

[1] Excludes non-local companies such as Northwestel, Northern Construction Co. Ltd., Northern Transportation, Pacific Western, Esso Resources Canada and Dome/Canmar.

[2] For a more detailed listing of the various functions see Figure 4.1-5.

[3] Since some businesses are active in more than one sector, it would be misleading to simply sum this column. The total shown here was obtained by a separate count.

Sources: Compiled from business director listings assembled for Dome/Canmar and G.N.W.T. by Jessie Hill (August, 1981, Draft); G.N.W.T. business profile listing (August, 1981) and interviews with various Inuvik businesses in August/September, 1981.

The presence of a large business sector in Inuvik is readily apparent. There is a compact but recognizable "downtown" commercial area along and just off Mackenzie Road containing some 20 different businesses and business offices, several other light industrial and commercial areas within the Town, and a busy light industrial and transport services area adjacent to the main airport.

The wide variety of business activities undertaken by the Inuvik business community has already been noted. As is shown in Table 4.1-8 many of the activities are concentrated in the tertiary or service sector of the local economy but there is also a growing number of secondary industry activities, particularly ones relating to construction.

Most businesses in Inuvik are small in terms of capitalization, personnel, facilities and annual business volumes. Many were started in makeshift quarters, and as one or two person operations. Some have not yet grown far beyond this stage. However, a small number of businesses primarily involving transportation, construction, and wholesale-distribution activities have grown to the point where they are enterprises of considerable size.

The current state of the Inuvik business sector is a reflection of the talents, initiative, perseverence, and diverse viewpoints of over 200 different residents. Many are non-native but it would be overly simplistic to term the Inuvik business community a "white" business community. Some of the most successful and respected businessmen are native people or people with a partial native background. Few members of the business community were born in the region but, again, it would be a mistake to label them all as recently arrived southerners. Many have been in the community for nearly two decades and others have lived elsewhere in the north before coming to Inuvik. A few individuals have moved into the Inuvik business community in recent years but they are more the exception than the general rule.

Indeed, there is a widespread feeling in the Inuvik business community that the business people active in the area now are the ones who are there for the "long haul" rather than the "fast buck". Thus, some businessmen or businesswomen will remark that the shakeout that followed the demise of the Arctic Gas pipeline, while traumatic in its own right, was actually beneficial to the long-term health of both the business community and the wider Inuvik community. In their view, the people who were committed to Inuvik stayed on; others with shorter-term outlooks and objectives left.

The business people who have remained in Inuvik have had to contend with the same range of problems that face businessmen in any small community, as well as a number of situations that are somewhat less common. Generally speaking, the Inuvik business community has to contend with local markets that are much less than optimal size, overheads that are higher than in the south because of the increased cost of heat and power, higher staff turnover, particularly individuals with business training or business related skills, and a shortage or complete absence of many of the management support services (accountants, bookkeepers, lawyers) available in larger centres such as Yellowknife.

These problems are not unique, but several merit comment. The small local and regional markets for

foodstuffs and consumer merchandise contribute to the considerable markup on such items in Inuvik stores. Some residents believe such markups to be excessive and support initiatives to increase competition at the local level. In the meantime, some have joined together in food cooperatives to purchase various staple items in the south in large amounts and have them shipped north at bulk rates.

The shortage or absence of management services such as bookkeeping, accounting, management consultant and legal firms in the community is also noteworthy. In part, this shortfall is due to the small size of the local and regional business sector and to occasional extraneous factors such as a local bookkeeper buying another type of business and having less time available in the bookkeeping services. In part, the shortfall is also a reflection of the low level of demand for accounting and other management support services in some parts of the Inuvik business community. The larger business enterprises have survived and grown because of their own management's careful, continuing attention to accounting matters. However, many of the smaller businesses in the community keep only the most basic accounts. Indeed, both bank managers in the community say they often have to put together the cash flow projections and other financial statements for businessmen seeking loans. Government loan officers report similar experiences.

The fact that quite a number of the smaller businessmen do not have much capability in cash flow projections and analysis should be a matter of some concern. Small businesses are not simply little big businesses and no one should expect their managers to utilize mini-versions of the detailed accounting and control techniques used by big businesses. However, more than any other type of business, small businesses are cash flow businesses. Ventures or expansions that are seemingly quite profitable over the longer term often fail when problems develop in their pattern of cash flows over the shorter term. Clearly, if a large number of Inuvik businesses are going to grow with the community or with other activities in the region, such as oil and gas development, their management will have to give more attention to financial planning and forecasting. The Federal Business Development Bank is beginning to schedule some of its one day seminars on financial and management topics in Inuvik and this development should be encouraged and expanded as appropriate.

The presence of federal and territorial government departments and agencies in the community has a number of effects on the business sector. On the positive side of the picture are the number of business opportunities and larger markets associated with the presence of government offices and activities and public servants and their families. Some of the wives of public servants have skills that are business related and find ready employment in the business sector. The savings rate among public servants is thought to be high, particularly when husband and wife are both employed in well paying positions and live in inexpensive, government-provided housing. A small portion of these savings are invested in local business and in some instances, an individual or family will leave the public service and go into business.

On the negative side, the local business community has found it difficult, if not impossible, to compete with government in the area of employee benefits. Government often can provide better housing and more liberal transportation benefits, particularly plane trips south for family members as well as the public servant, than can businesses. Local businesses find that they lose staff to government because of this.

There are widely divergent viewpoints in Inuvik concerning the relative uniqueness and special problems of northern businesses and concerning the type of assistance, if any, that should be provided to northern business. Some individuals feel that no grants should be given out. In their view, a grant to one business is unfair to others already engaged in the same activity and grants to facilitate competitive start-ups involving native people are doing little more than buying people off. Others believe that northern businesses do face higher costs and should be accorded some preference, such as a 10% premium on bids. A small number of business people, often individuals with long experience in the region, say that even this type of assistance is unnecessary if tenders are called for delivery of the goods right to the northern work site. They argue that if southern, as well as northern firms have taken all transport costs into account, northern businessmen are just as capable as others in wielding a sharp pencil and coming up with competitive bids.

The latter view is not widespread. The more common point of view is that northern businesses merit some assistance. However, there is no firm agreement in the Inuvik business community about the type and degree of assistance that should be provided, which makes it difficult for oil and gas companies to formulate policies to assist local businesses.

One concern that many business people share is that care should be taken to avoid creating a situation where individual initiative and risk taking are replaced by a feeling that the oil and gas industry owes local businesses a "free ride" and that it is the Industry's responsibility to do whatever is necessary for north-

ern businesses to benefit from its activities. A view expressed is that if personal initiative and the willingness to take risks is undermined through well meaning corporate and government initiatives, a distinctly unhealthy situation will be created. Too many businesses will become too dependent on the oil and gas industry. In the short-term this over dependence could lead to another 1977-78 type of shakeout if oil and gas development were to be delayed. Over the longer term, the undermining of individual initiative and risk taking could make it difficult for the Inuvik and other regional business communities to diversify into non-oil and gas related activities in preparation for the day when hydrocarbon exploration and production activity begins to decline.

Some individuals in the Inuvik business community believe that too much is being done for the business sector already and that an unhealthy situation is already at hand. Others do not agree and argue that, on a selective basis, more will have to be done to prepare the ground for business sector expansion if oil and gas development proceeds. They point to the lack of strong government programs of assistance to business in the region. They ask where the special training facilities are to help overcome the shortage of people with technical skills in the community, particularly native people. They look at the existing loan programs and question their adequacy if development really takes off in the near future. They ask where the additional funds will come from.

Clearly, the Inuvik business community is concerned about the future. Most business people feel that they have weathered a stormy period and are now in an interlude before another period of rapid change occurs. No one can say for sure how long the interlude will last but while it lasts a number of businesses are going through certain changes. They are not expanding dramatically because the future is still uncertain. Instead, there is a lot of shuffling of interest and consolidation going on. Loan volumes in Inuvik have doubled in the past year at the local banks and the Federal Business Development Bank in Yellowknife has reported an upsurge in loan activity in Inuvik over the past year or so. Efforts are being made to expand the Chamber of Commerce and give it a more powerful voice in business related matters.

Some Inuvik businesses are considering taking on new product lines to meet the needs of the oil and gas industry, or have recently done so. A few are becoming quite dependent on the Industry but most are holding back, not wanting to become too dependent lest they be caught in a sudden drop-off of business should oil and gas development not go forward as rapidly as planned.

Efforts have also been made to put together a strong, locally based investment group, with sufficient economic clout to get into ventures that individuals and small businesses on their own would find beyond their reach. The Beaumac Investment Group was established by a small group of local business people early in 1981 and has generated much discussion at the local and regional levels. It is believed to be considering investing in the ownership of an offshore supply boat to service the oil and gas industry but no firm decisions have been made at the time of writing. There has been some reluctance within the wider Inuvik community to participate in Beaumac, the feeling being in some quarters that a small group will dominate it. Beaumac's proponents have taken pains to stress that individual ownership will be limited to 1% of the voting shares but not everyone appears to understand this arrangement.

In summary, the Inuvik business sector is the most highly developed in the region. It is growth oriented and expects to benefit from the expansion of the oil and gas industry. Owing to its size, the Inuvik business community is seldom unanimous in its views on a particular matter. However, it is concerned about the amount and type of assistance that is being made available to northern businesses by industry and government and is still very cautious about becoming over-commited to the short-term needs of oil and gas exploration companies. Over the longer term the oil and gas industry is seen as the major new source of business growth and activity.

4.1.4 EDUCATION, HEALTH AND OTHER SERVICES

Inuvik has the most extensive education facilities of any of the Beaufort Sea region communities. However, despite the fact that it has been at the centre of many northern non-renewable resource development activities over this past two decades, the community does not have adequate technical training facilities or any type of post-secondary educational institution such as a community college. Although some changes have been announced in the Northwest Territories secondary school curriculum in recent months, and the Minister of Indian Affairs and Northern Development indicated in a speech in Inuvik in mid 1981 that additional financial assistance will be made available for education and training matters, it is still unclear as to whether or not these initiatives will be sufficient to remedy the education problems that currently exist in Inuvik.

The educational facilities already in place in the community are good and could accommodate a considerable increase in enrollment without undue strain (Table 4.1-9). The elementary school had an enrollment of 542 in 1980 - 1981, a figure that was only 72% of its capacity. The school has 28 classrooms,

two kindergarten rooms, a music room, two resource rooms and a gymnasium. The high school, with an enrollment of 398, was only operating at 57% of its capacity in the same year. The school has 24 classrooms, two science rooms, an art room, typing room, home economics room, resource centre and a gymnasium. The community also had a resident adult educator and a home management consultant. In 1980-81, 40 students were reported to be taking courses at Thebacha College in Fort Smith (formerly known as Adult Vocational Training Center (AVTC) where 77 beds were in use in 1980-81 (Outcrop, 1981). Inuvik has a Local Education Committee, which performs an advisory role to the territorial Department of Education and the local principals and schools in regard to local programs. The Department of Education sets budgets and provides total funding, including salaries, operations and maintenance monies.

TABLE 4.1-9

SCHOOL FACILITIES PROFILE INUVIK 1980

	Sir Alexander Mackenzie School	Samuel Hearne School
Enrollment	542	398
Teachers	28	25
Classroom Assistants	3	—
Capacity	750	697
Unused Capacity	208	52

Source: Department of Education, Government of the Northwest Territories, 1980.

The Northwest Territory Curriculum of Studies is followed for Kindergarten through Grade 9 to develop skills in reading, writing, arithmetic, and speaking. With the exception of some industrial arts and home economics taught for Grades 7 through 9, little career counselling or vocational training is offered. Alberta's High School Matriculation and Diploma programs, designed for students preparing for university or advanced technical training, are followed for Grades 10 through 12. While some limited industrial arts, business education and home economics options are available at this level, sufficient education for apprenticeship program entry or further existing training programs is not generally attained by students who take these courses.

Upgrading programs to bring adults up to a Grade 10 level and Grade 12 equivalent are provided through the services of an adult educator, with basic facilities in a separate building in the town. In the opinion of some local residents, the upgrading programs are underfunded and understaffed, which results in over-crowding; constraints are put on the ability of the adult educator to obtain suitable teaching materials or to adapt existing ones; and there is inadequate equipment availability and maintenance.

Inuvik is the site of the only hospital in the Beaufort region. The hospital was designed to meet the needs of both the community and the larger Inuvik health region, an area that covers much of the Beaufort region. The hospital has a capacity of 120 beds and is considered oversized relative to the population of the Inuvik health region. The town plan prepared by Underwood McLellan Associates (UMA) estimates that it could serve a regional population of between 16,000 and 20,000 before expansion would be necessary (UMA, 1981). The hospital currently operates with a staff of 27 nurses, 23 nurses aides, 5 lab technicians and a physiotherapist. Inuvik also has a clinic with five doctors.

The RCMP has a 15 member detachment and regional sub-division headquarters in Inuvik and the Town employs a local bylaw enforcement officer. There are three justices of the peace, three coroners and a Native Band Workers Association. As well, there are some 15 social service workers performing a variety of regional and local functions.

4.1.5 HOUSING

Inuvik is a large community by Beaufort Sea region standards and its size is reflected in its housing stock (Table 4.1-10). There are 1,030 housing units in the community. Among these, the largest group (478) are government staff housing units. There are 236 company staff housing units, 161 Northwest Territories Housing Corporation northern rental housing units (ten of which are for senior citizens) and 155 privately owned units. A recent review of the housing situation by the town's planning consultant indicated that housing was one of the main reasons for the high turnover rates among government staff in Inuvik (UMA, 1980). Many of the housing units available to government staff have not been well maintained and are considered less than satisfactory by residents.

UMA has estimated that the available residential land areas of the Inuvik townsite could accommodate an additional 115 single family housing units and five multi-family dwellings. The potential for an additional 20 multi-family dwellings was also noted. On the basis of an assumed density of 4.3 individuals per housing unit (Table 4.1-11), UMA estimated that these additions to the community's housing stock would be sufficient to accommodate a population increase of 1,040 or 33%.

4.1.6 COMMUNITY INFRASTRUCTURE

In keeping with its origins as a planned northern community, Inuvik has a good basic infrastructure. Most of the streets have been paved and sidewalks

TABLE 4.1-10

HOUSING STOCK
INUVIK 1974

Housing Type	No. of Units
Self-owned	155
Government staff	478
Company staff	236
Northwest Territories Housing Corporation (NWTHC)	161
Other	0
Total	1030

Source: Beaufort Sea Development, An Infrastructure Analysis, 1980.

have been laid down along the main street. A utilidor is used to transport water to and sewage from most buildings in the community. A small number of housing units, approximately 20 to 35 mainly located in the west end of town are supplied with water by truck.

The community's water supply is adequate at present, but could be improved. Water is piped from Lake B three miles northeast of the community during the summer months. The pipe is not insulated and cannot be used during the winter. Once freeze-up occurs the community's water supply is obtained from the Mackenzie River. Neither source can be used during break-up and freeze-up and the community has to draw its water supply from the smaller Hidden Lake located just northeast of the townsite. It has been estimated that Hidden Lake's capacity will be exceeded once the community's population exceeds 4,770 (AESL, 1980). Inuvik has a new water treatment plant designed for population of up to 8,000.

The community's current sewage disposal system is adequate although there are some problems with odours. The utilidor carries Inuvik's sewage to a natural lagoon area situated north of the townsite. The lagoon has the capacity to accommodate the sewage from a community almost twice Inuvik's present size. However, sludge tends to build up at the point where the outflow from the lagoon enters the river and offensive odours occasionally reach the townsite. It has been suggested that, when the community's population reaches the 5,000 to 6,000 range, the lagoon system should be abandoned and replaced by primary settling and long-term storage lagoons on the west bank of the East Channel (UMA, 1980).

Inuvik has good air transportation links to nearby communities and to key centres in the Mackenzie Valley and southern Canada. At one point in the early 1950's its main airport was the fifth busiest, in terms of aircraft movements, in all of Canada. Traffic volumes are nowhere near this level at present.

The community has a small in-town gravel airstrip, a major asphalt runway and air terminal eight miles

TABLE 4.1-11

DWELLING TYPE AND AVERAGE PERSONS PER UNIT
INUVIK 1976

Dwelling Type	Total Occupied	Persons Per Unit	Owned Units	Persons Per Unit	Rented Units	Persons Per Unit
Total Occupied Dwellings	860	3.45	105	4.21	755	3.35
Double House	50	4.18	-	-	50	4.22
Row House	260	3.67	-	-	260	3.67
Attached to Non-Residential Structure	20	2.79	5	4.40	15	2.21
Total Single Attached	330	3.70	5	4.00	320	3.69
Single Detached	270	4.34	65	3.56	200	4.27
Apartment	190	1.84	5	-	185	1.79
Duplex	15	3.23	-	-	10	3.20
Mobile or Other Moveable	60	3.23	25	3.38	35	3.14

Source: Census of Canada, 1976.

PLATE 4.1-4 *To reduce costs, houses in Inuvik have been built in rows. Services and utilities are provided by utilidor. Inuvik scene in the winter dawn.*

out of town and a float plane base on Long Lake. Pacific Western Airlines provides regular scheduled service several times a week between Inuvik and centres such as Norman Wells, Yellowknife, Edmonton and Calgary. Ken Borek Air provides regular air service to Delta area communities and several charter aircraft and helicopter companies provide service to various points as required. Dome runs daily flights between Inuvik and Tuktoyaktuk for its staff and both Esso and Dome route crew rotation aircraft through Inuvik. Esso has a separate departure/arrival area at the main airport for the use of its staff.

Inuvik has several docking facilities. There is a private marina, a Northern Canada Power Commission fuel jetty, a wharf and dock owned by the Department of Public Works, as well as the community's main dock which is used by river tug and barge units during the summer re-supply season.

The community is linked to Tuktoyaktuk and Aklavik by winter ice roads and to communities such as Fort McPherson and Arctic Red River as well as such Yukon centres as Dawson and Whitehorse by the all-weather Dempster Highway.

Inuvik has good communication facilities. The CBC operates a local and regional broadcasting studio in the community and CBC and other television programming are available locally. The community has a modern local telephone system and is connected to Northwestel's microwave-based long-distance telephone system.

Inuvik has long been noted in the region for its excellent recreation facilities. It has an arena, a six sheet curling rink, an outdoor curling rink and a system of cross-country ski trails. The gymnasiums at both schools are open to the public and the gym at the Canadian Forces Base is available to the public one evening a week. The town also has a large community hall and a library. There are some playground areas but the equipment in them has not been well-maintained.

4.2 TUKTOYAKTUK

Tuktoyaktuk is the only community in the Beaufort Sea region that has had direct experience with the effects of a large offshore support base in its immediate vicinity. It is located 122 km (76 miles) northeast of Inuvik and, as of 1980, had a population of approximately 760 (Figure 4.2-1).

The community's origins lie in the population movements that occurred in the aftermath of the disasterous whaling era in the western Arctic. The disease

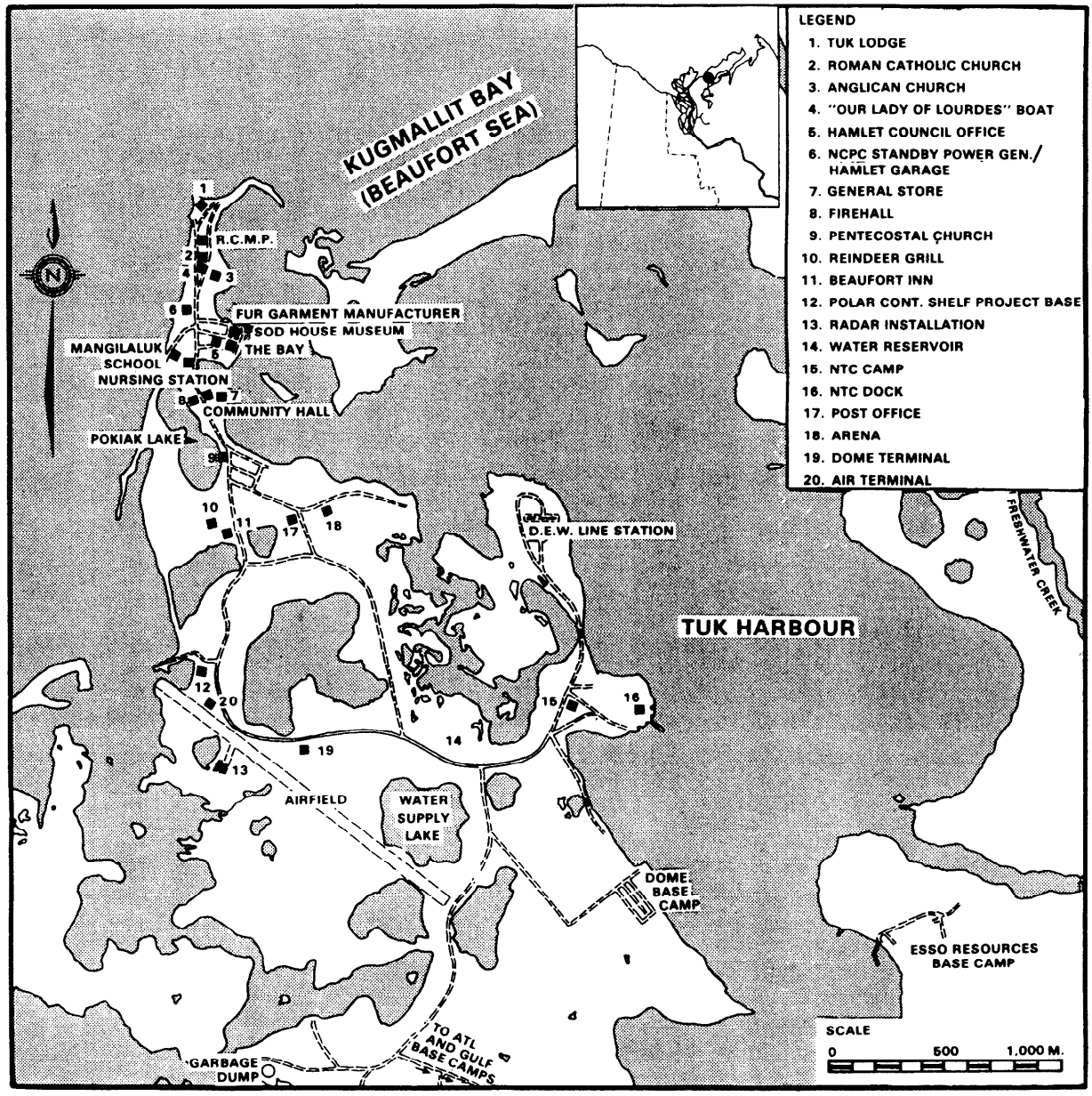


FIGURE 4.2-1 *Hamlet of Tuktoyaktuk.*

and social disruption that the whalers brought to the western Arctic in the late 19th and early 20th centuries almost wiped out the entire original Eskimo population, including groups living in the general Tuktoyaktuk area. The Tuktoyaktuk area was not re-occupied on a permanent basis until the Hudson's Bay Company, seeking an alternative location for its Herschel Island post and a good harbour for transshipping freight brought by barge down the Mackenzie River to Arctic coastal freighters, chose Tuktoyaktuk (then called Port Brabant) in 1934.

The Hudson's Bay Company store was completed in 1937 and Anglican and Roman Catholic missions were opened in the same year. The settlement's population soon comprised Inuit formerly resident at Herschel Island, Baillie Island and Cape Bathurst. Some gained seasonal employment in the Hudson's Bay Company's transshipment operations. A school was opened by the Anglican mission in 1947 and a RCMP post was established in 1950.

In 1955 Tuktoyaktuk was chosen as a key supply and distribution centre for the construction of the DEW line and a DEW line station was built across the harbour from the community. The community's

population grew quickly during this period and in 1957 a nursing station was opened, an Area Administrator arrived, and a Pentecostal missionary took up residence. The Northern Transportation Company expanded its use of the harbour at Tuktoyaktuk to supply central Arctic communities in the 1960's.

By the 1960's, local people had developed a dependance on wage income. However, there were insufficient local wage opportunities, and several employment initiatives were taken by government. A fur garment shop was established in 1962, and is still in operation. Efforts were also made to place the reindeer herding operation initiated in the Delta in the 1930's on a firmer footing.

The Tuktoyaktuk area was the scene of increased economic activity in the late 1960's and early 1970's when Esso and other major oil companies began to explore the hydrocarbon potential of the Mackenzie Delta. Esso established a base near Tuktoyaktuk to support its exploration efforts. The base is still in use but remains isolated from the community because of its location across the harbour.

Some Tuktoyaktuk residents were employed in the early oil and gas exploration activities in the area but the real upswing in local employment in the Industry did not occur until Dome located its support base near the community in 1976. Since then, many Tuktoyaktuk residents have been employed by Dome, and have been afforded increased opportunities to upgrade their education and skills. The community's business sector has expanded under the stimulus of the business opportunities available with Dome. Within the past year Gulf has also announced that it will be leasing facilities in the immediate vicinity of Tuktoyaktuk and this announcement has been viewed as possible additional employment and business opportunities.

It is clear, however, that Tuktoyaktuk will not be the only focus of oil and gas activities in the Beaufort Sea region. Tuktoyaktuk's harbour has depth limitations which restrict access to shallow draft vessels. A major dredging project would be required to accomodate the larger vessels that will be needed to support Beaufort Sea oil and gas development. This fact, together with a feeling among local residents that continued expansion of shorebase facilities and activities close to Tuktoyaktuk would not be beneficial to the community, have helped to focus attention on other harbour areas such as McKinley Bay.

4.2.1 THE PEOPLE

The impact of recent oil and gas industry activity in the Tuktoyaktuk area is apparent in available population data (Table 4.2-1). The community's population grew slowly over the period 1961 to 1976. Between 1976 and 1980, the latest year for which population estimates are available, the community's population increased by 6.5% annually, reflecting in-migration from the south and other northern communities. Tuktoyaktuk's population increased by 172 in just four years.

Data are available on the age distribution of Tuktoyaktuk's population and the ethnic composition of the community, but they are several years out of date and may not fully reflect the current situation (Figures 4.2-2 and 4.2-3). Age distribution data for 1976 indicated that Tuktoyaktuk had a very youthful population with some 56% of its residents under the age of 20. Estimates of ethnic composition for 1980 were 87% Inuvialuit, 2.1% Dene, and 10.9% non-native.

TERIS labour force and employment data available for the community are based on the results of a household survey. The catering and lodging category contained the largest proportion of the total respondents, a reflection of the number of residents who are, or have been, employed in housekeeping and food preparation jobs at Industry facilities. Clerical positions were the next most common group, again a possible reflection of the type of positions that have been created in the community during recent years. The

TABLE 4.2-1

TOTAL POPULATION BY 5 YEAR INTERVALS TUKTOYAKTUK AND THE NWT 1961 - 1980

	1961	1966	1971	1976	1980
Tuktoyaktuk	409	N/A	596	590	762
Northwest Territories	22,998	28,738	34,805	42,610	45,882

Source: Census of Canada 1961 - 1976;
Government of the Northwest Territories 1980.

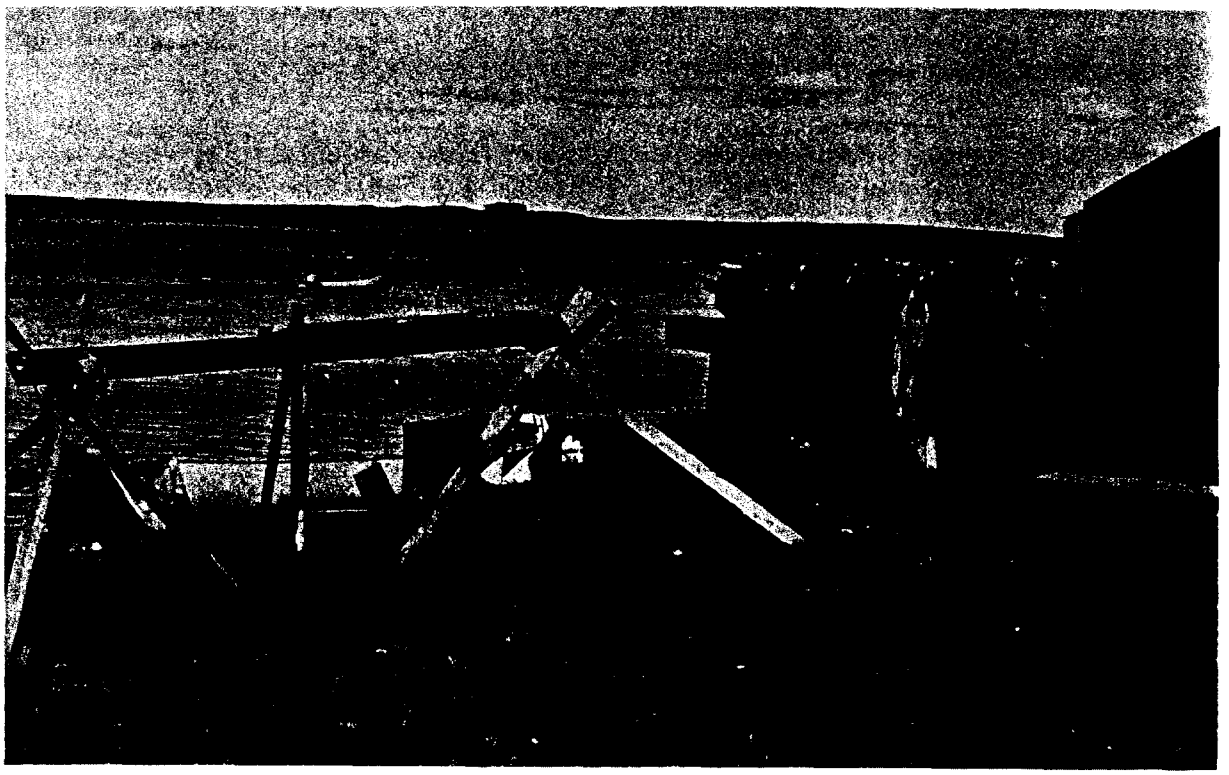


PLATE 4.2-1 *The people of Tuktoyaktuk have become heavily involved in wage employment. Even so, they continue to be involved in the traditional economy. Fish drying.*

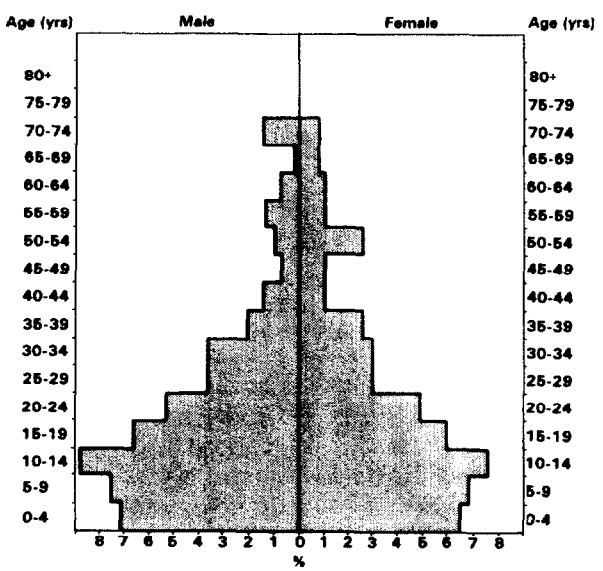


FIGURE 4.2-2 *Population by age & sex. Tuktoyaktuk, 1976.*

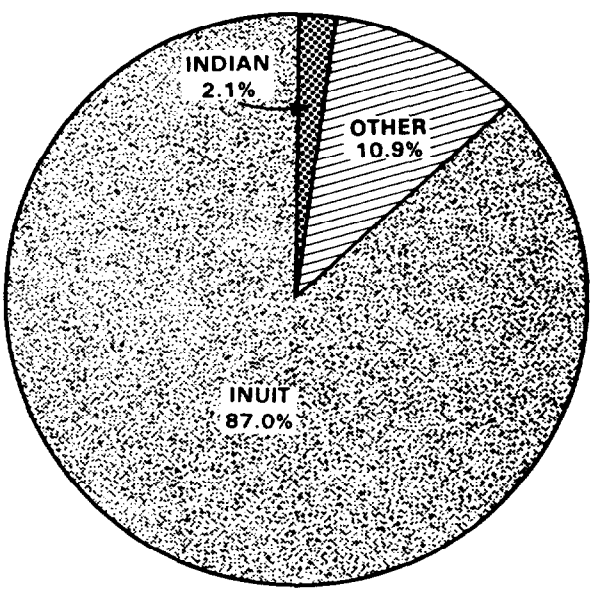


FIGURE 4.2-3 *Ethnic distribution. Tuktoyaktuk, 1980.*

TERIS data also revealed that a large number of the respondents considered themselves semi-skilled or skilled, suggesting that the stock of industrial skills available in the community is significant (Table 4.2-2).

TABLE 4.2-2

EMPLOYMENT SKILLS TUKTOYAKTUK 1980

Industry	No. of Persons
Agriculture	3
Amusement & Recreation	2
Any Industry	39
Banking & Finance	1
Broadcast, Motion Picture, & Stage	4
Business Services	6
Catering & Lodging	73
Clerical (component of all industries)	69
Construction	46
Education & Training	24
Electrical Equipment	1
Fabric & Garment Manufacturing & Repair	9
Fishing	1
Forestry & Logging	2
Fur Goods	7
Government Services	12
Hunting & Trapping	3
Iron & Steel Processing	1
Laundering, Cleaning & Pressing	21
Machining, Welding & Forging	3
Mechanical Equipment	1
Medical Services	16
Mining & Quarrying	4
Miscellaneous	1
Motor Vehicle Manufacturing & Repair	5
Motor Vehicle Transport	15
Non-Ferrous Metal Processing	2
Oil & Natural Gas	24
Personal Services	8
Professional & Technical Services	7
Retail Trade	14
Ship & Boat Building & Repair	2
Social Welfare Services	11
Water Transport	14
	451

Source: TERIS, Government of the Northwest Territories, 1980.

4.2.2 COMMUNITY ORGANIZATION

Tuktoyaktuk is a Hamlet under the Northwest Territories Municipalities Ordinance. This means that it is an incorporated municipality without taxing authority, but with authority to develop by-laws regulating matters such as traffic, curfews, and dog control. Property taxes are assessed by the Government of the Northwest Territories. Municipal budgets are negotiated between the Hamlet and the Territorial Government, and the Hamlet also has authority to generate some revenues to offset municipal expenses through collection of fines, fees for water delivery, and so on. The municipality's authority includes development of building by-laws, and provision of services such as garbage removal, water, road maintenance, and fire protection. As with other incorporated municipalities, the Hamlet also has authority to develop municipal plans, in cooperation with the territorial Town Planning and Lands Division.

Tuktoyaktuk's elected council consists of a mayor and eight other councillors. Due to past experience of some councillors periodically being absent from the community for prolonged periods while hunting, trapping or fishing, the hamlet has one more councillor than most other communities which elect councils in the Northwest Territories.

Tuktoyaktuk is a community sufficiently small in size for residents to have regular face to face contact. However, some residents have noted that regular visiting and sharing among community members, a common feature of past times, is declining in frequency. Wage employment, with its commitments and routines, has in some ways supplanted the routine and shared experiences of renewable resource harvesting, and the associated extensive opportunities for special contact. Perhaps reflecting the many changes that have occurred, Tuktoyaktuk residents do not always appear to be unified regarding aspirations, values, and attitudes about their future.

4.2.2.1 Socialization and Education

Most residents show long family histories in the area within the general vicinity of Tuktoyaktuk. Overlaid on the lessons passed from earlier generations and the land-based economy are those of the formal school system, government and industry programs, and the wage economy. These different systems have generated conflicting messages and for some, confusion about behaviors and skills needed for future years.

Tuktoyaktuk residents have commented that, in the face of uncertain expectations, some parents have lost control of their children and no longer play an effective role in encouraging regular school attend-

ance, while others make sure that their children go to school every day. Some adults also act as role models by taking educational courses themselves. The importance of education in preparing residents for positions of leadership in the community is recognized by some local residents. However, some also question the relevance of course offerings to community needs and job opportunities.

The Adult Education Program attempts to be responsive to the community, within budget and staffing constraints. A local school committee has been established to act in an advisory capacity regarding education programs, and to encourage community involvement in education. However, formal education, while helping to prepare young people for the values and way of life of the wage economy, is also seen by some as a sign of the disappearance of the traditional way of life and associated values. Finding a balance between meeting the needs of both ways of life, and the differences in expectations of long-term residents and new residents who come to the community to provide services or work for wages in businesses and industry, is a difficult task for all concerned.

4.2.2.2 Social Problems

Tuktoyaktuk residents have noted a variety of social problems in their community: widespread alcohol abuse and gambling; limited recreation opportunities; inadequate attention of parents to their children (and lack of respect for parents by children); poor money management; dependence on social assistance payments and other subsidies; lack of initiative and participation in community programs; and too much reliance on outside agencies and individuals.

Some community members have noted that residents are too ready to seek assistance from outsiders, and do not put sufficient effort into addressing community needs and problems themselves. The limited number of educated or politically aware community members who can participate in community leadership, and the limited communication and support between community members and those in local leadership positions and in the regional native organization, have been raised as concerns by some.

The need for development of money management skills has been noted by some community members, although some residents point out that problems of affluence have not only come with industrial activity, but were also a factor in the past when fur harvests and prices were good. In the face of the social change which the community has experienced, residents' opinions differ about the extent to which outside groups such as the Industry and community members share responsibility for social problems and their resolution. Some people feel that residents could do more on their own behalf than has tended to be the case.

4.2.2.3 Political Organization

Organizations represented in the community include the Hamlet council, the Hunters and Trappers Association, Committee for Original Peoples Entitlement, the churches, a local school committee, a local alcohol committee, and the Chamber of Commerce. In addition, the Government of the Northwest Territories Departments of Social Service, Education, Economic Development, Public Works, and Renewable Resources are represented, as are the Federal Government's Departments of Health and Welfare, Energy Mines and Resources, Transport and the RCMP. Tuktoyaktuk is also represented on the Beaufort Sea Community Advisory Committee.

4.2.2.4 Social Control

As was previously discussed, social controls sanction patterns of behaviour in interactions among community members, and between the community and the "outside." These controls are generally based on a system of shared values. The uncertainties involved in the changes Tuktoyaktuk residents are experiencing, and the transitions in values and behaviors, have affected the character and extent of social control in the community.

In many native societies, avoidance was a traditional means of social control. As one Tuktoyaktuk resident commented, "In the old days, if you got drunk, you were stayed away from." However, in a community where expectations or values are changing and becoming less certain, avoidance becomes less effective as a control mechanism, as do other forms of peer pressure. Role modelling, or acting-out examples of appropriate behavior, has been attempted by some residents, reportedly with some success. However, according to community members interviewed, control and discipline currently depend primarily on the individuals or families rather than on standards established by the community as a whole.

4.2.2.5 Leadership and Government

Some local residents have expressed frustration with the limited extent to which community leaders keep other residents informed about their activities and decisions. At the same time, some sympathy is expressed toward local leaders concerning the lack of constructive support they get in the community, and with their limited influence with more senior levels of government. As one person noted, "They're scared in a way. Once the government says they're going to do something, nothing will stop them." Some feel that their elected leaders "run away" from problems,

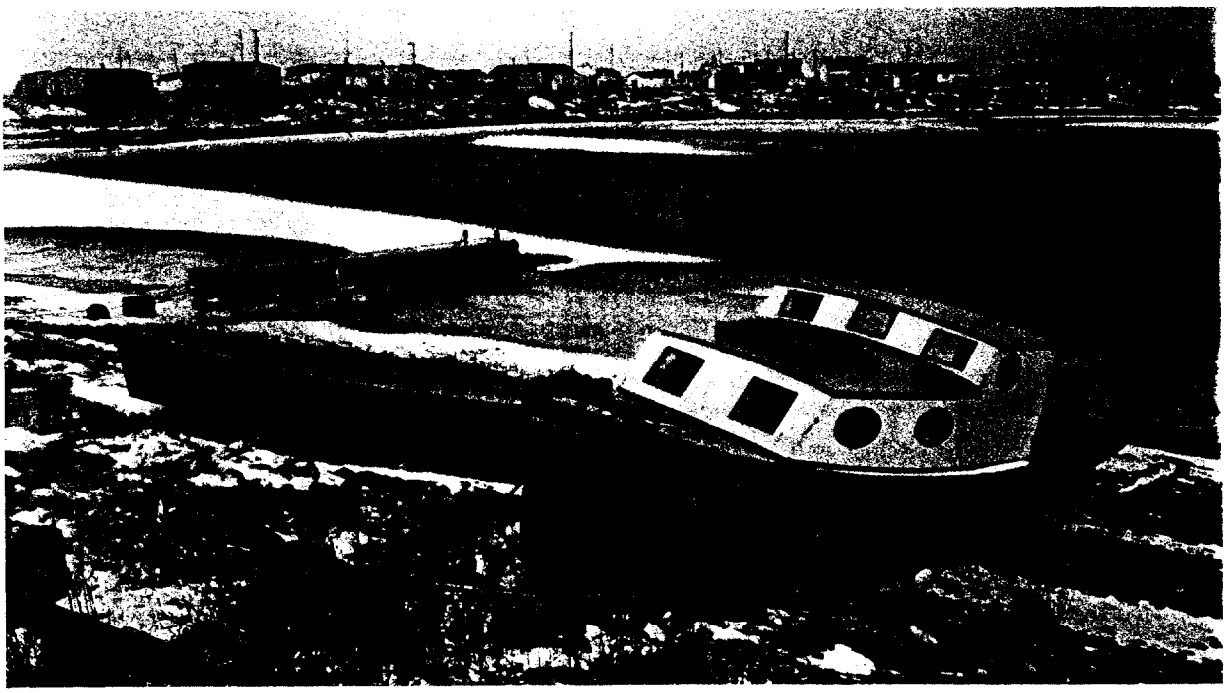
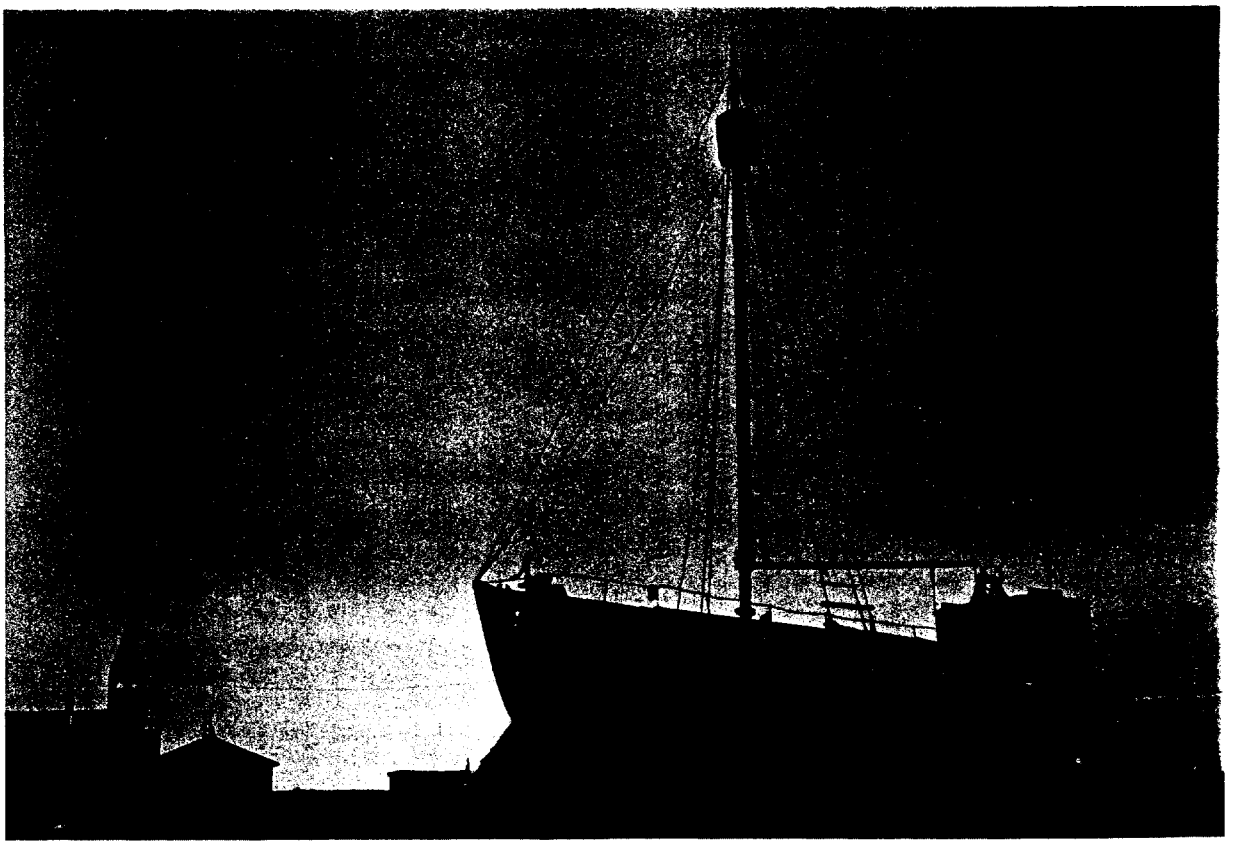


PLATE 4.2-2 *Two views of Tuktoyaktuk. The community began in the 1930's when the Hudson Bay Company founded a trading post. People moved there from Herschel Island to the west and the Cape Bathurst area in the east. Below: "Our Lady of Lourdes" historical display.*



and look too much to outsiders to provide solutions. Others suggest that local leaders are faced with too many demands on their time, and do not receive enough assistance from the community; that too few are carrying too great a load. According to some residents, because many community members have little understanding of the issues being considered, community leaders find it more efficient to proceed on their own, without involving, or explaining the issues to the rest of the community. As one person noted "Everyone waits for everyone to help them — We have got to have good leadership — someone who thinks not of himself but of community gains — but we need good leadership and members. We need to rely on our own resources a little more."

As in other northern communities, external agencies and organizations dominate planning and the allocation of resources. Community leaders direct much of their attention outward, and often act as brokers between external organizations and the community, getting the best deal they can for their constituents. The need to respond to plans and goals set by outsiders, and the complexity of the "outside" systems, tends to limit the involvement of most community residents in decision-making, and sometimes frustrates communication between community members and the leaders.

4.2.3 LOCAL ECONOMY

This section does not include a discussion of renewable resource harvesting, which is considered in Chapter 5. Its main focus is the local business sector.

The business sector in Tuktoyaktuk has grown rapidly in recent years, largely as a result of the Industry's efforts, and currently is second in size and diversity to Inuvik in the Beaufort Sea region. As of mid 1981 there were some 35 businesses in operation in Tuktoyatkuk. As shown in Table 4.2-3, they performed a wide range of functions, including those found in most Beaufort Sea communities. However, there were some functions unique to the community such as the provision of marine support services.

In general terms, the community's business sector encompasses seven broad groups of activities:

- provision of goods and services as is common to most other communities in the region — a retail store (The Hudson's Bay Company), motel, airline agency etc;

- provision of services in keeping with Tuktoyaktuk's status as a Hamlet — water delivery, sewage pickup, some local trucking;

- provision of facilities, goods and services in keeping with higher than average incomes in the community — a bank sub-agency, a hardware store, three coffee shop/restaurants, an additional retail store under construction;

- enterprises owned by local people and oriented primarily to the supply of goods and services to the Industry;

- enterprises owned by individuals who have arrived in the community within the past five years, often from other centres in the north, and which are oriented primarily to the supply of goods and services to Dome;

- various special services in keeping with the expanded business sector in Tuktoyaktuk — for example, equipment rentals, land and building rentals;

- unique or semi-unique activities such as reindeer herding and the Delta Fur Shop production facility.

Several other activities in the Tuktoyaktuk area, while economic activities in the broadest sense of the term, are not considered part of the local business sector. These activites are:

- DEW line facility separate from the community;

- Northern Transportation Company transshipment and repair base adjacent to the community;

- Esso's base across the harbour from the community;

- Dome's "Tuk Base" adjacent to the community, including the offices and facilities of a number of exploration service contractors from southern Canada.

- Gulf leased facilities: an office at Tuk Base and certain support facilities at the Arctic Transportation Limited base adjacent to the community;

- Arctic Transportation Limited base facility — a marine transport and services facility;

- The Polar Continental Shelf Project's western Arctic base adjacent to but separate from the community.

Except for the Dome and Gulf related activities, all of these undertakings have been going on in the vicinity of Tuktoyaktuk for at least a decade and in many instances longer. They all take place at facilities adjacent to, but separate, from the community. To varying degrees each activity has been the source of some wage and employment and the occasional contract for local residents over the years. Gemini North, for example, reported that in 1972 the Northern

TABLE 4.2-3

THE TUKTOYAKTUK LOCAL BUSINESS SECTOR AS OF MID-1981

Name of Business*	Function(s)**
1. A-W Hardware	Retail Hardware Sales
2. APUN Commercial	Building Rentals
3. Arctic Coast Services	Marine Charters
4. Beau-Tuk Marine Services	Exploration Services, Warehousing, Tank Cleaning
5. Beaufort Environmental Support Services	Oil Spill Containment and Clean Services
6. Beaufort Flying	Aircraft Charter
7. Beaufort Inn	Motel, Restaurant/Coffee Shop
8. C and L Services	Water Delivery
9. Canbo Tool Distributors	Wholesale, Retail Tool Sales
10. Canadian Imperial Bank of Commerce	Banking Services (Sub-agency of Inuvik Branch)
11. Canadian Reindeer Herding	Commercial Reindeer Herding
12. CFCT - Tuk Radio	Local Radio Broadcasting
13. Cockney's Taxi	Taxi Service
14. Ed Smith Construction	Construction Company
15. Felix Equipment Rentals	Equipment Rentals
16. Gruben's Transport	General Contracting, Hauling, Trucking
17. Herschel Island Transport	Marine Transport, Charters
18. Hudson's Bay Company	Retail sale of food, clothing and other merchandise
19. Igloo Inn	Pinball machines, confectionary
20. Macdonald Brothers Electric	Electrical Contracting and Repairs
21. Igloo Inn Cafe	Coffee Shop
22. Ipunta Tours	Town of Tuktoyaktuk Harbour and Pingoes; Overnight camp accommodation for tourists
23. Jacobson Bear Service	Protection of personnel against polar bears and related services
24. JL Transport	Trucking, Hauling, Contracting
25. Ken Borek Air	Air Transportation
26. Philips Cleaners	Commercial Cleaning Services
27. Reindeer Grill	Restaurant, fast foods outlet
28. Raymond Laundry	Contract Laundry Services
29. Steve Kikoak Bus Services	Contract Bus Services
30. Ski-Doo Shop	Ski-Doo sales, parts and repair services
31. Tuk Enterprises	Investments, Holding Co.
32. Tuk Fur Shop	Fur Product Manufacturing and Sales
33. Tuk Lodge	Usually visitor accommodation, meals and Tourist Services; more recently seasonal rentals of the facility to groups working in the Tuk area
34. Tuk Taxi	Taxi Services
35. Tuk Transport	Marine Charters

Source: Local Business Directory prepared for Dome/Canmar and G.N.W.T. by Jessie Hill (August, 1981 Draft); personal communication with Economic Development Officer, Tuktoyaktuk, September 1981.

Notes

*Name listed is that listed in day to day parlance.

**Principal function(s) only; other minor or occasional functions are carried out by some Tuktoyaktuk businesses. No attempt has been made to identify and list them.

Transportation Company Limited, a crown corporation, was the source of ten man years of employment for Tuktoyaktuk residents. Esso and other oil and gas companies provided 18 man years of employment to Tuktoyaktuk residents in the same year (Gemini North, 1974). In more recent years Northern Transportation has continued to employ a small number of Tuktoyaktuk residents in its operations.

The local business community has also been involved in a number of contracts with the companies and agencies operating at these various facilities over the years, particularly with Esso.

The biggest impact on the local employment and local business sector in Tuktoyaktuk in recent years has come from the presence of Dome's shore base adjacent to the community. The volume of business placed with Tuktoyaktuk businesses by Dome annually since 1976 is shown in Table 4.2-4.

As shown in the Table, Dome's purchases and contracts have generated a considerable volume of business activity each year since 1976. However, data relating to total business volumes and number of firms involved do not fully indicate the amount of change that has occurred in the local business sector in recent years. Tuktoyaktuk's business sector was quite rudimentary prior to Dome's arrival. The number of businesses was small and their functions limited in keeping with the size of the local population, limited personal disposable incomes and the community's orientation to trapping and other resource harvesting activities. Dome arrived in Tuktoyaktuk at a time when other oil and gas related employment and contracting activities were in a decline pending a government decision on the Arctic Gas pipeline proposal. It was a period when local residents were acutely conscious of the employment and local business benefits that could be associated with oil and gas activities if government or company policies were developed and implemented with the maximization of such benefits in mind.

TABLE 4.2-4

DOME PURCHASES FROM LOCAL BUSINESSES TUKTOYAKTUK, 1976-1981

Year	No. of Local Businesses Providing Goods, Services to Dome	Value of Purchases In $000[1]	Average Purchases In $000
1981	29	6,238	215
1980	27	3,617	134
1979	26	2,204	85
1978	25	1,364	55
1977	23	370	16
1976	6	100	17

Source: Dome Petroleum Limited, 1980 Beaufort Sea Operations Evaluation; and Senate Presentation, 1982.

Note: [1]Figures rounded to nearest thousand.

Dome responded positively to community and individual concerns about matters such as employment and local business contracting. The local business contracting opportunities that were potentially available with Dome exceeded by a considerable degree the capacity of the existing local business sector. Dome worked with the owners of local enterprises, and with individuals in the community who wanted to go into business, to expand the number of businesses and the range of goods and services available. The number of businesses in the community grew from an estimated 8 in 1976 to 25 in 1977, 29 in 1978, 32 in 1979 and 33 in 1980.

This growth has recently slowed down for a number of reasons. Foremost among these is the fact that almost every person interested in and capable of running his or her own business in the community has had the opportunity to do so. Another key reason has been Dome's efforts to spread its local business contracts and purchases over a larger number of communities.

The expansion and continuing high level of activity in the local business sector in Tuktoyaktuk since Dome arrived has had a number of effects on this aspect of the community. There are, of course, more individuals and a larger percentage of the community's population engaged in business activities than ever before. The community's 33 local businesses in 1980 accounted for some 130 full time or long-term seasonal job opportunities and an additional 150 part time or casual positions. Twenty-seven local businesses had business contracts and/or sales involving Dome. Local businesses in Tuktoyaktuk have also benefited from the increased levels of disposable income among the many residents employed by local businesses servicing Dome or employed directly by Dome. Outcrop/DPA have estimated that in 1980 the total Dome related income in Tuktoyaktuk was $3 million or some 55% of all income earned or received by Tuktoyaktuk residents. Local businesses providing taxi, hardware, food, clothing and ski-doos, to list but a few items, have benefited from the increased amount of income in the community.

Local residents, to a greater degree than ever before, have a larger range of options with respect to participating in the modern economy. Many have chosen to work for themselves rather than simply seek employment with others. In so doing they have not only responded to their own aspirations, they have helped to create a much more visable and high-status role-model for younger residents.

Tuktoyaktuk residents engaged in business activities have also gained a new perspective on the importance of reliability and punctuality. On occasion, they will publicly note the effect on their operations when local people hired at a good wage fail to show up, are chronically late, or quit without notice.

Many Tuktoyaktuk businessmen find it difficult to hire and retain the best workers in the community, and several have mentioned losing good workers to the Industry or having promising workers go into business for themselves. Many businessmen are convinced that if their firms are to continue to grow some workers will have to be brought in from other communities in the region.

The growth in business activity in the Tuktoyaktuk area has also brought with it an expansion in the number of non-native business people resident in the community. Many of these people are long-time northerners and some have married native people. Their presence in the community is both a source of tension and a challenge to other businessmen. One of the non-native entrepreneurs is currently building a second retail store for the community and a second is engaged, among other things, in the provision of trucking services. Both activities are or will be in competition with existing enterprises operated by native people.

The strong link that exists between business and politics in most small communities is evident in Tuktoyaktuk. Local businessmen are prominent in community politics and occupy a number of positions on the hamlet council. At times, it is difficult for some businessmen to keep their business and political roles separate. The council, for example, at one point considered passing a local by-law to give local businesses priority in business opportunities associated with the oil and gas industry.

The Tuktoyaktuk business community has also had some difficulty in developing a vehicle for expressing common concerns. Some effort was expended on a local Chamber of Commerce but this organization is currently reported to be defunct (Matthews, 1981). In some respects, the Tuktoyaktuk business community is very competitive. Many businessmen are reluctant to discuss their operations with other businessmen or to join together to seek larger contracts lest they somehow lose something in the process.

In other respects the business community is rather uncompetitive. To a large degree many local businesses have been highly dependent on the oil and gas industry. Many members of the business community have not had to make as great an effort to obtain contracts as have business people in other communities.

Local businessmen express a desire to continue to work for Dome and other oil and gas companies, expanding and diversifying their operations even to the point of providing services to points well-removed from the community such as McKinley Bay. However, it is clear that not all business people are in a position to do this. The preparedness of those who are is evident in the sophisticated cost accounting systems that they have installed and in their willingness to approach various outside sources of funding directly rather than go through government channels with the consequent delay and "red-tape". These business people are non-native and are the exceptions in Tuktoyaktuk.

Most business people in Tuktoyaktuk, particularly a good many of the native business people in the community, are still working towards this level of development in their operations. They are highly dependent on the services of a GNWT Area Economic Development Officer based in the community for such vital matters as invoicing, bookkeeping and loan applications, and general management advice. The community and the local business sector has been fortunate in recent years that a high-calibre individual has been posted to the community as the Area Economic Development Officer.

In some respects, some of the responsibilities borne by the Area Economic Development Officer have hindered the expansion of the local business sector. Thus, efforts are being made to develop a local bookkeeping service so that the officer will have more time to devote to loan applications and matters of greater significance such as new business development.

The Tuktoyaktuk business situation has helped to highlight both the strengths and weaknesses of the existing sources of capital for business initiation and expansion. Few people have the money available to cover the equity portion of a small business startup or growth situation in Tuktoyaktuk. Pre-payment of the first and last month's invoices associated with a contract by Dome has provided the basis for some individuals initial equity in a venture and this equity in turn has enabled them to qualify for government assisted loans. However, even this approach does not produce a large initial equity position.

Thus, with many of the smaller business opportunities in Tuktoyaktuk having been developed already, the question of where the equity will come from for initiating larger ventures has arisen more prominently in recent years. Certainly, government loan and grant programs have helped the community's business sector grow to its present state in recent years. These programs still seem inadequate to enable local individuals, particularly local native people, to launch larger ventures such as hotels and apartments.

With this problem in mind, considerable attention has been given in recent months to the possibility of a

community owned development corporation. The basic concept and some of the financial and ownership aspects of such a corporation have been sketched out by the Area Economic Development Officer and informally discussed with members of the hamlet council and various government officials. No decision has been made on this concept to date.

There is some question whether existing government loan and assistance programs would be suitable additional sources of capital for a community development corporation. Some business people in Tuktoyaktuk, noting the types of businesses that tend to be assisted by existing government programs, wonder if these programs are not becoming too oriented to helping small scale, low risk enterprises such as coffee shops.

As the local business sector in Tuktoyaktuk expands, some difficulty may be experienced in finding sufficient room for all operations. The amount of open space left in the community is quite limited and the scattered nature of existing business operations within the hamlet does not lend itself to concentrated areas of expansion. One area where future growth could perhaps occur is on land created by filling in a small lake or two along the main road to the airport. However, the hamlet council has expressed some reservations about such infilling and has suggested the creation of a separate industrial enterprise area beyond the airstrip. No firm decisions have been taken on these matters to date.

Employment and income levels in Tuktoyaktuk are currently high relative to most other communities in the region largely because of the employment and business opportunities created by Dome's presence. The wages earned by residents employed by Dome in recent years and the amount of business carried out locally by Dome are summarized in Tables 4.2-5 and 4.2-6.

Outcrop/DPA have estimated the income effects of Dome's presence in the Tuktoyaktuk area as of 1980 (Outcrop/DPA, 1981). These estimates are shown in Table 4.2-7. The very important role that Dome, and the oil and gas industry generally plays is clearly evident.

The Tuktoyaktuk business sector is a dynamic aspect of the community's life and a potential source of additional change in the future if the oil and gas industry continues to expand in the Beaufort Sea region. The Tuktoyaktuk business community is one of the most sophisticated and politically aware in the entire region. It is also an example of what can be done in a fairly short period of time if the Industry and a community are willing to work together for their mutual benefit.

TABLE 4.2-5

WAGE EARNINGS FROM DOME EMPLOYMENT

Year	Total	Average per Tuk Employee	Average Beaufort Communities
1976	N/A	N/A	$2900
1977	$371,500	$3950	$4500
1978	$288,500	$6700	$6300

Source: Hamlet of Tuktoyaktuk Community Plan, M.M. Dillon Ltd.

TABLE 4.2-6

DOME EXPENDITURES RELATIVE TO GROSS COMMUNITY INCOME

Year	Non-Gov't Community Income	Gov't Community Income	Total	Dome % of Total	Dome % of Non-Gov't
1977	$1.23 M	$2.13 M	$3.36 M	11%	30%
1978	$3.50 M	$5.80 M	$9.30 M	15%	40%

Source: Hamlet of Tuktoyaktuk Community Plan, MM Dillon Ltd.

4.2.4 EDUCATION, HEALTH AND OTHER SERVICES

As noted above, a mission school was established at Tuktoyaktuk in 1947. It was transferred to the federal government in the following year and became one of the initial nuclei of the Department of Northern Affairs and National Resources school construction and expansion program in the 1950's. Despite the lengthy presence of educational facilities in the community, education levels in Tuktoyaktuk remain low.

Many families are ambivalent about schooling for their children and school attendance is poor. The poor attendance is not limited to older children. In September of 1981, for example, a grade one teacher reported to a public meeting called by the Northwest Territories Legislative Council's Special Committee on Education that 11 of the 21 students registered in her grade one class had yet to attend school; although school had been in session for nearly a month.

Thus, it may be somewhat misleading to describe the educational facilities in Tuktoyaktuk without pointing out that the community does not have the same attitude towards education that one finds in Aklavik. The situation must be considered chronic since it was documented as far back as the community profile material prepared for the Advisory Committee on the Government of the Northwest Territories in 1966.

Poor educational performance would not, at least on the surface, seem due to lack of facilities or staff. Tuktoyaktuk has a substantial school building. It has

TABLE 4.2-7

ESTIMATED TOTAL CASH INCOME AND KNOWN SOURCES OF CASH INCOME IN TUKTOYAKTUK - 1980

Item	Amount ($millions)	Percent of Total Cash Income(%)
Estimated Total Cash Income	5.50[1]	—
Amount of Cash Income Derived From:		
- Employment with Government	1.20[2]	22
- Dome employment and business contracts	3.00[3]	55
- Trapping	.09[4]	1
- Social Assistance	.08[5]	1
- Unemployment Insurance	.35[6]	6
- Other unidentified sources	.80[7]	15

Notes:
1. Outcrop/DPA estimate based on 1976 union data of $1.8 million; increased by 25% annually to reflect Canmar presence.
2. Outcrop/DPA assume 60 jobs at $20,000/annum $ per job.
3. Outcrop/DPA estimates; includes induced spending effects.
4. Compiled by Outcrop/DPA from NWT Trappers Incentive Program records for 1979-80.
5. Outcrop/DPA from NWT Department of Social Services.
6. Based on U.I.C. data for 1979 escalated by 50 percent to 1980.

ten teachers and two classroom assistants (Table 4.2-8). School enrollment in 1980-81 was 193; Grades Kindergarten to nine are taught but actual attendance is small in grades seven and above. The community also has a resident adult educator.

TABLE 4.2-8

SCHOOL FACILITIES PROFILE TUKTOYAKTUK 1980

Enrollment	193
Teachers	
Capacity	200
Unused Capacity	7

Source: Department of Education, Government of the Northwest Territories, 1980.

With respect to other services, Tuktoyaktuk has a two bed nursing station with a staff of three nurses, a community health worker and a dental therapist. There is a four man RCMP detachment. These services are adequate for present purposes, but would have to be expanded with significant population growth.

4.2.5 HOUSING

The housing situation in the community has been improved in recent years but much work remains to be done. As of 1981 the Northwest Territories Housing Corporation has 112 northern rental housing units in the community and the GNWT had 16 staff units. No recent data are available for housing units owned by other parties. In 1976, there were eight federal, two municipal, two company, and six privately owned units, and six units termed owned by "others" in the community (Outcrop, 1981). Various reports on the community in recent years (Bachmayer, 1977; Dillon, 1980) have commented on the over-crowding in many Tuktoyaktuk households. This overcrowding was still evident in 1981.

4.2.6 INFRASTRUCTURE

Local infrastructure and services include a 900 Kw diesel generator operated by the Northern Canada Power Committee (NCPC), a recently constructed municipal water supply reservoir, and bagged sewage pickup and sewage pumpout services. Water is distributed and sewage gathered by truck. The community has a 14 person volunteer fire department and a modern fire truck.

Tuktoyaktuk is linked to Inuvik via an ice road in winter. The community has also had an airstrip for

many years. It was substantially upgraded with the arrival of Dome in order to facilitate the landing and takeoffs of the company's Boeing 737 jet. The gravel runway has been extended to a length of 5,000 feet and navigational and landing aids have been upgraded. Esso also maintains a smaller airstrip at Tuktoyaktuk but it is on the other side of the harbour adjacent to the company's base camp and is not used by local residents.

Northern Transportation Company Ltd. operates a major freight and fuel receiving and transshipment base at Tuktoyaktuk and maintains a large floating drydock in the harbour to service river tugs, barges and coastal re-supply vessels.

Tuktoyaktuk has a number of recreational and cultural facilities. It has a community hall (which is also used as a day care centre), an arena, a radio station, a curling rink and a sod house museum. A coastal vessel used by the Roman Catholic missionaries for many years in the western Arctic has been mounted as a permanent historical display at a central point in the community.

4.3 AKLAVIK

Aklavik, the second largest community in the Beaufort Sea region, is located on the Peel Channel of the Mackenzie River Delta some 36 miles west of Inuvik. Its population in 1980 was estimated to be 818 (Table 4.3-1).

The general area of the settlement was used seasonally by both Inuvialuit and Loucheux Dene prior to the movement of fur trade posts into the Mackenzie Delta. The origins of the present settlement lie in the establishment of a Hudson's Bay Company post at Pokiak, an Inuvialuit camp site, across the river from the site of the present community in 1912. The settlement was moved across the river in 1921 to facilitate the docking of river steamers and was given the name Aklavik.

During the fur trade boom which followed the First World War, Aklavik quickly became the trapping, trading, administrative and transportation centre of the entire western Arctic. A mission residential school, hospital, and government airmail service were established in short order and people moved into the community and nearby trapping areas in large numbers. By the early 1930's a recognizable "Delta culture" was emerging, incorporating elements of the culture and values of Inuvialuit, Dene, Metis and non-native people (Van Ginkel Associates, 1974).

Alaskan Eskimos also moved to the Aklavik area to participate in the muskrat trapping boom, and when white-fox fur prices dropped in the late 1930's and early 1940's, some Inuvialuit moved from Banks Island to the Delta to trap near Aklavik and Tuktoyaktuk. By the late 1940's and early 1950's the population of Aklavik and its associated network of trapping camps exceeded 1,500 (Van Ginkel Associates, 1974).

The community ceased to be the administrative and commercial centre of the Delta in the 1950's when Inuvik was built. At one time there were plans to move the entire population to Inuvik but residents resisted the proposed move and many chose to remain in Aklavik close to the good ratting areas in the western part of the Delta. When it became apparent that Aklavik would not be abandoned, a fur garment cooperative was established by the federal government to improve the local employment situation and other renewable resources based projects such as a sawmill were initiated at nearby sites. All but the fur garment project have since ceased operation. Aklavik residents were employed by the oil and gas industry in exploration activities beginning in the late 1960's and some residents currently work for Dome and Esso. The local business sector has also benefited from Dome's efforts to expand the number of northern businesses supplying goods and services to its Tuktoyaktuk operations.

TABLE 4.3-1

TOTAL POPULATION BY 5 YEAR INTERVALS
AKLAVIK 1961 - 1980

	1961	1966	1971	1976	1980
Aklavik	599	N/A	677	781	818
Northwest Territories	22,998	28,738	34,805	42,610	45,882

Source: Census of Canada 1961 - 1976;
Government of the Northwest Territories, 1980.

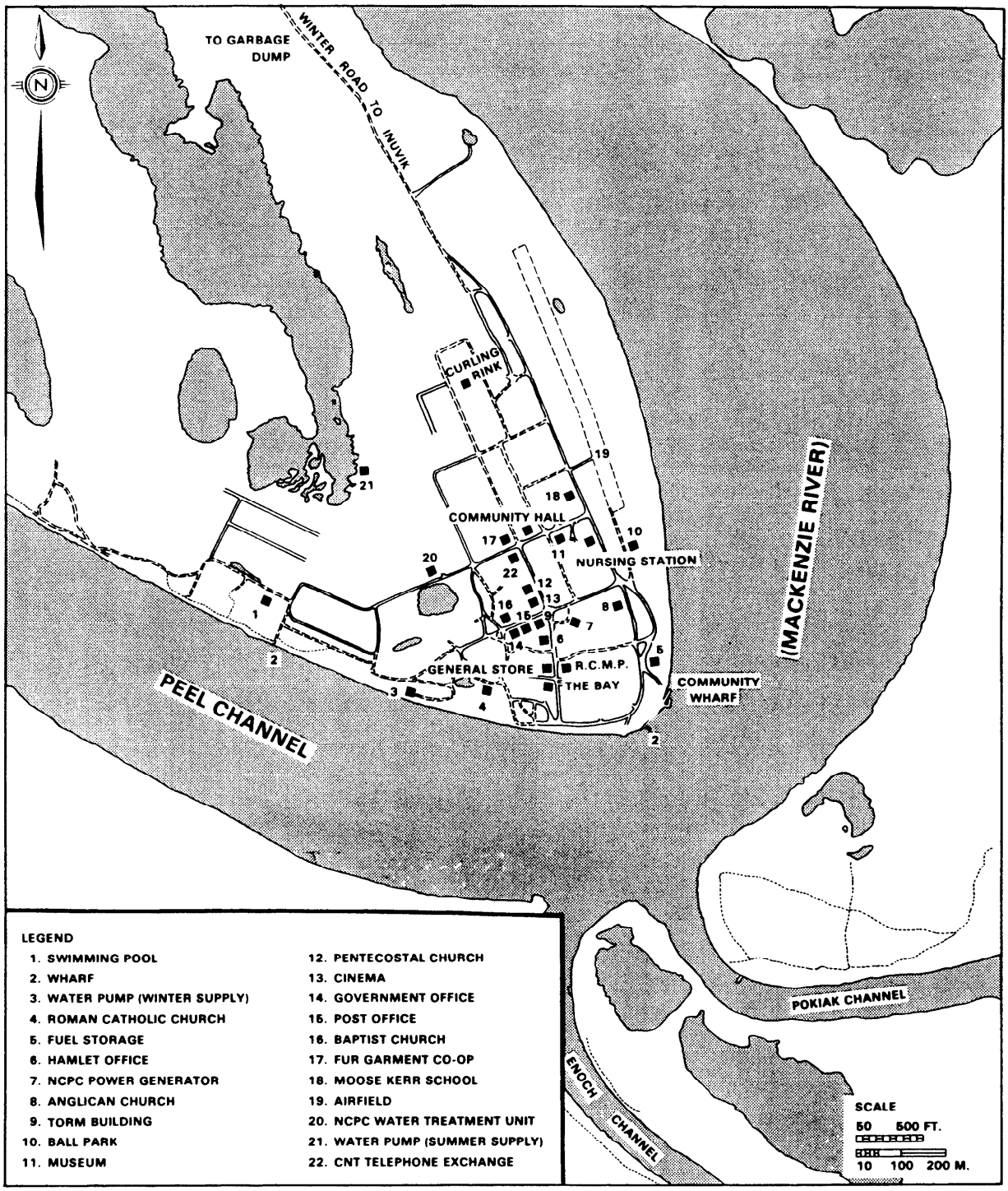


FIGURE 4.3-1 *Hamlet of Aklavik.*

Aklavik was one of the first communities in the Northwest Territories to become a Settlement and in 1974 it achieved Hamlet status. This means that Aklavik has no taxing authority, but can generate some revenues to offset municipal expenses through such means as collection of fines, or fees for water delivery. A municipal budget is provided from the territorial government for the hamlet to provide such services as garbage removal, water, and road maintenance. The hamlet has the authority to pass by-laws, and to undertake community planning in cooperation with the territorial government's Division of

Town Planning and Lands. The community has a Mayor and an elected Council as well as a Dene Band Chief. Local residents have been prominent in Delta area and Northwest Territories politics for many years. In 1967 a local resident was the first native person appointed to the Northwest Territories Legislative Council and other local residents have been active in the work of the Committee for Original Peoples Entitlement (COPE) since its inception in 1970. It has a strong Hunters and Trappers Association.

Aklavik's current population reflects the varied origins and backgrounds of its residents. GNWT estimates for 1978 indicate that some 45% of the population was Inuvialuit, 44% were Dene and the balance was "other," generally non-native. Population growth has been slow over the past two decades, averaging 1.8% per annum between 1961 and 1976, a growth rate well below that of Inuvik for the same period (6.4%). There is considerable in-migration and out-migration going on at present. Often the same individuals are involved in both types of population flows as they temporarily leave the community in search of other opportunities. In 1978, for example, Aklavik's population decreased by 51 as a result of net migration. The net change attributable to migration in 1979 was also negative (-19) but the following year it was a positive 53 (Table 4.3-2).

TABLE 4.3-2

BIRTH, DEATH, AND MIGRATION EVENTS AKLAVIK 1978, 1979, 1980

Year	Births	Deaths	Migration	Net Change
1978	19	4	-51	-36
1979	15	7	-19	-11
1980	27	12	53	68

Source: Population Estimates, Government of the Northwest Territories 1979 & 1980, & NWT Population Estimates for December 31, 1978, Methodological Report.

Detailed population data for the community are somewhat dated, being based on the 1976 Census. Two points stand out rather prominently in these data. First, the community's population is youthful, a situation similar to that in most other Beaufort Sea communities. Almost 55% of the population was under the age of 20 in 1976. Second, there is a somewhat larger percentage of women in the 25 to 29 year old age group than would be expected on the basis of regional population data, which may in part reflect the larger number of job opportunities for women at the community's fur garment shop.

There are no recent data on employment and income levels in the community although TERIS compiled information on employment skills (Table 4.3-3). Resource harvesting, particularly the trapping of white fox and coloured fox, contributes a significant amount of cash income to the local economy. The number of wage employment opportunities available in the community or filled by local residents at Dome and Esso work sites also provides considerable cash income for local residents. However, there are insufficient data available to place these sources of income in perspective against government sources such as transfer payments and social assistance payments.

TABLE 4.3-3

EMPLOYMENT SKILLS AKLAVIK 1980

Industry	Number of Persons
Air Transport	1
Amusement and Recreation	11
Any Industry	2
Broadcast, Motion Picture, and Stage	1
Business Services	1
Catering and Lodging	16
Construction	22
Clerical	34
Education and Training	3
Fabric and Garment Manufacturing and Repairing	2
Forestry and Logging	3
Fur Goods Manufacturing and Repairing	3
Government Services	4
Laundering, Cleaning and Pressing	10
Medical Services	1
Motor Vehicle Manufacturing and Repairing	2
Motor Vehicle Transport	3
Oil and Gas	7
Personal Services	2
Professional and Technical Services	5
Retail and Trade	8
Telecommunications	1
Water Transport	2
	144

Source: TERIS, Government of the Northwest Territories, 1980.

The community has an active business sector and a number of local residents are employed in it on a permanent or casual basis. Most enterprises are service oriented and primarily geared to the needs of the local market (taxi, fuel sales, local building, retail merchandise and food sales). A small but dynamic element in the business community is more expansive in outlook, seeking construction, trucking and special service opportunities with the oil and gas indus-

try in the Delta area. One entrepreneur, for example, has established a company to provide oil spill containment and cleanup services in recent years. The company currently bases two vessels at Tuktoyaktuk and there has been some discussion of a possible move of other operations from Aklavik to Tuktoyaktuk.

The Delta Fur - Aklavik Fur Garment Co-op, a government sponsored economic development project, is a significant source of employment and income for many of the women in Aklavik. It has had some financial difficulties in recent years and the Government of the Northwest Territories has been seeking a private buyer.

Social assistance payments in Aklavik are high relative to many of the other communities in the Mackenzie Delta-Beaufort Sea region. The average per capita payment for fiscal 1980-81 was $192.

There are 197 housing units in Aklavik (Table 4.3-4). The GNWT Housing Corporation owns 142; the GNWT has 21 staff housing units; private individuals own 23 houses; and the remaining 11 housing units are owned by outside interests. Commercial hotel accommodation is available in the community at the Torm Building. The hotel area has six double rooms, a lounge and kitchen facilities.

TABLE 4.3-4

HOUSING STOCK
AKLAVIK 1976

Housing Type	No. of Units
Self-owned	23
Government staff	21
Company Staff	3
NWTHC (includes 30 senior citizen units)	142
Other	8
Total	197

Source: Beaufort Sea Development, An Infrastructure Analysis, 1980.

There is a long history of education, and many people in Aklavik appear to place a high value on their children's schooling. The Moose Kerr School offers Kindergarten to Grade 10. in 1980-81 it had an enrollment of 204 students, 62 of whom were in grade seven or above (Table 4-3-5). The school had a staff of 12 and two classroom assistants in the same year (Outcrop, 1981). There was also an adult educator resident in the community, and three residents were attending Thebacha College (then AVTC) at Fort Smith in 1980-81.

TABLE 4.3-5

SCHOOL FACILITIES PROFILE
AKLAVIK 1980

Enrollment	204
Teachers	12
Classroom Assistants	2
Classrooms	10
Home Economics Room	1
Gymnasium	1
Portables	1
Capacity	300

Source: Department of Education, Government of the Northwest Territories, 1980

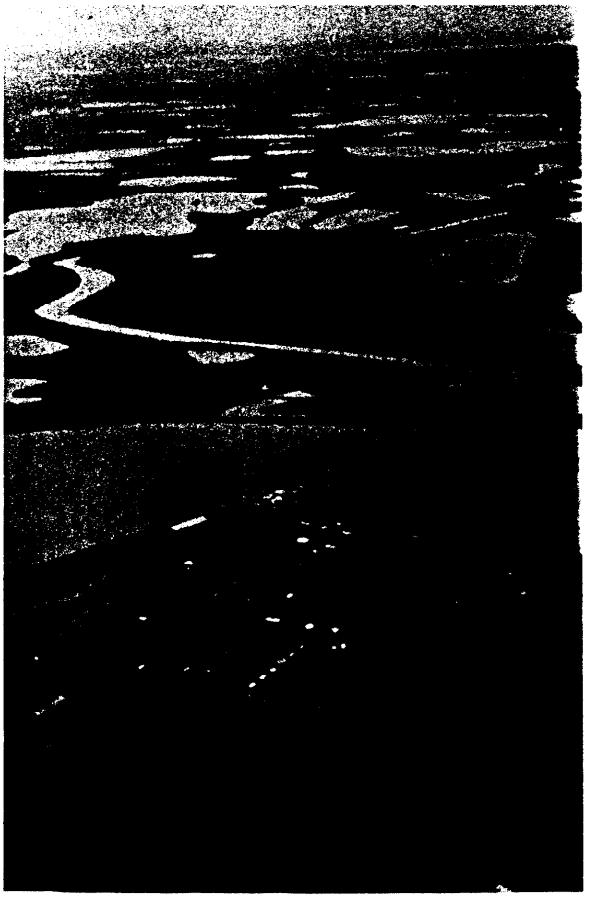


PLATE 4.3-1 *Aklavik and the Mackenzie Delta. People from Aklavik are active in both the traditional and modern economies.*

Aklavik has a large nursing station, an RCMP detachment, and volunteer fire department. As of 1980, the nursing station had a staff of three nurses, a community health worker and a dental therapist. Facilities included five beds and two cribs. The RCMP maintained a three man detachment in the community; local residents have been appointed to the positions of Justice of the Peace and Coroner. The local fire brigade has 15 members and a pumper truck.

Aklavik is linked to Inuvik via an ice road each winter and year round by commercial air service. The GNWT operates a 3,000 foot long gravel runway with basic navigational aids and landing lights. There is also a float plane landing area adjacent to the community wharf. The wharf is heavily used each summer during the annual barge based re-supply of the community by Northern Transportation Company Ltd.

The community's infrastructure has been upgraded since the 1950's when poor sanitation conditions at Aklavik were among the reasons cited by government officials for the decisions to establish a new community in the Delta. Half of the buildings in Aklavik now have sewage holding tanks. These are pumped out once or twice a week under private contract. Other buildings use a honey bag system with a pickup every second day. Garbage is picked up two to three times a week and all wastes are disposed of at a site some two and half miles west of the community.

The community obtains its water supply from Peel Channel. A water treatment plant was installed in 1979 and there is an efficient system of water storage and delivery. The latter is via a surface pipeline network during the summer and truck tanker in the winter months. Electrical power is supplied by the Northern Canada Power Commission which operates a 1,350 Kw diesel electric generator at Aklavik.

Aklavik has good communication facilities. Northwestel provides local and long distance telephone service to the community and CBC Radio and Television programming are available locally. Mail service is three times weekly, a reflection of the frequency of air service between Aklavik and Inuvik.

The community has a number of different recreational and cultural facilities. It has an active Recreation Committee, curling rink, school gymnasium and outdoor playground. There is also a small museum.

4.4 ARCTIC RED RIVER

Arctic Red River is a small, traditional community located at the confluence of the Mackenzie and Arctic Red rivers some 60 miles south of Inuvik. Most residents are Loucheux Dene or of Loucheux Dene descent. Arctic Red River had an estimated population of 98 in 1980 making it the smallest community in the Beaufort Sea region (Table 4.4-1).

TABLE 4.4-1

TOTAL POPULATION BY 5 YEAR INTERVALS ARCTIC RED RIVER AND NWT 1961-1981

	1961	1966	1971	1976	1980
Arctic Red River	87	N/A	108	120	98
Northwest Territories	22,998	28,738	34,805	42,610	45,882

Source: Census of Canada 1961 - 1976;
Government of the Northwest Territories, 1980.

The origins of the community as a permanent settlement can be traced to the late 1860's when the Roman Catholic church established a mission post at the site of Loucheux summer fishing camp at the mouth of the Arctic Red River. The mission was built in response to the success that Anglican missionaries were having at Fort McPherson and soon flourished. Fur trade posts were subsequently established near the mission in the early years of this century: Hyslop and Nagel between 1901 and 1912, the Hudson's Bay Company in 1902 (a post which is still in operation) and Northern Traders between 1912 and 1938.

Few Loucheux Dene took up permanent residence near the mission and trading posts. Most continued to live on the land hunting, fishing and trapping until well into the 1950's and early 1960's. RCMP population counts in the area in the mid 1940's, for example, recorded only three Loucheux Dene families living at Arctic Red River. At the time it was also reported that about 200 Loucheux Dene visited the community each summer to fish and trade (Taylor, 1975).

In the 1960's, when larger numbers of Loucheux Dene began to take up residence in the settlement in response to government initiatives in education and housing few did so wholeheartedly. The community's population soon reached 120 but most Loucheux Dene residents spent considerable periods of the year in bush camps away from the settlement. At one point in the mid 1960's the local school was temporarily closed because so many children were away in bush camps (ACGNWT, 1966).

Arctic Red River remains a small community, somewhat away from the mainstream of activities in the Beaufort Sea region. There was some activity in the immediate area during the construction of the Dempster Highway in the 1970's and a few residents found temporary employment in the construction activities. The community, in common with other Mackenzie

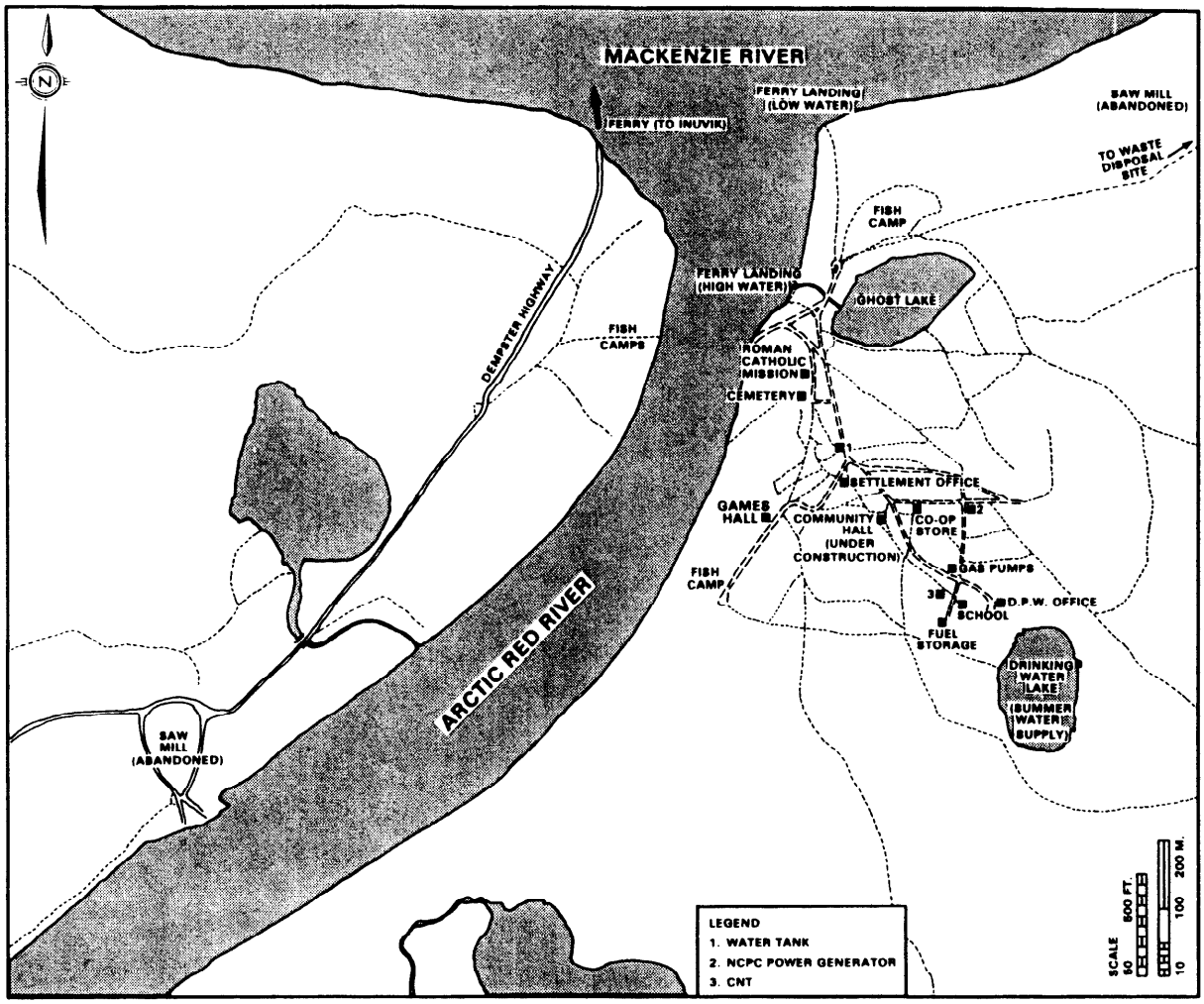


FIGURE 4.4-1 *Settlement of Arctic Red River.*

Valley communities, was concerned about land claim and pipeline issues during much of the 1970's and remains so today.

Arctic Red River currently has the status of a Settlement under the Northwest Territories Muncipalities Ordinance. Local government is provided by a joint Dene band-settlement council of eight members. There is also a Hunters and Trappers Association. As a settlement, Arctic Red River has no revenue-raising powers. The settlement's budget is administered by the Inuvik regional office of the Department of Local Government, which may contract with the settlement for services to provide local employment.

Arctic Red River's population has been declining in recent years largely because of out-migration (Table 4.4-2). It declined by 4.8% per year between 1976 and 1980. In 1978 about 87% of the population was Loucheux Dene, 8% was Metis and the other 5% was non-native (GNWT, 1980). The population is youthful but not as biased towards young age groups as that of other communities in the Beaufort Sea region, a reflection, perhaps, of the number of young people that have left the community in the past few years.

There are 25 housing units in Arctic Red River (Table 4.4-3). The Northwest Territories Housing Corpora-

TABLE 4.4-2

BIRTH, DEATH, AND MIGRATION EVENTS ARCTIC RED RIVER 1978, 1979, 1980

Year	Births	Deaths	Migration	Net Change
1978	2	1	- 9	- 8
1979	1	1	-32	-32
1980	2	—	17	19

Source: Government of the Northwest Territories

tion owns 14, the GNWT has two staff housing units, seven residents own their own homes and two houses are owned by outside interests.

TABLE 4.4-3

HOUSING STOCK ARCTIC RED RIVER 1976

Type	No. of Units
Self-owned	7
Government staff	2
Company staff	1
NWTHC	14
Other	1
Total	25

Source: Beaufort Sea Development, An Infrastructure Analysis, 1980.

Medical services are provided locally by a lay dispenser, and a doctor and dentist visit the community on a regular basis. The RCMP service the community from their Fort McPherson detachment.

TABLE 4.4-4

SCHOOL FACILITIES PROFILE ARCTIC RED RIVER 1980

Enrollment	16
Teachers	1
Classroom Assistants	1
Capacity	30
Unused Capacity	14

Source: Department of Education, Government of the Northwest Territories, 1980; Beaufort Sea Development, An Infrastructure Analysis, 1980.

Arctic Red River has few permanent wage employment opportunities. Many residents depend on resource harvesting for much of their food and cash requirements. TERIS wage employment experience and skill data for the community are based on a very small number of respondents and would be misleading to cite here. It is apparent, however, that even with a shortage of wage employment opportunities locally few residents have become dependent on social assistance payments. Per capita payments averaged only $32 in fiscal 1980-1981, a figure generally below that of other Beaufort communities (GNWT, Dept. of Social Services, 1981).

Arctic Red River has a rudimentary business sector. The Band Council has established the Arctic Red River Indian Band Development Corporation. The Corporation operates a retail store, sells fuel and provides taxi and local hauling services. No other businesses or entrepreneurs were reported to be active locally in 1981.

The community has a small school but is without a nursing station or an RCMP post. The school offers Kindergarten to Grade 5 and in 1980-81 had an enrollment of 16 students (Table 4.4-4). This figure was eight less than the previous school year, a reflection of the out-migration from the community. The school has one teacher and a classroom assistant. Students wanting to progress beyond grade six have to leave the community and attend residential school in Inuvik.

The Dempster Highway crosses the Mackenzie River by ferry in the summer and ice road in winter in the vicinity of Arctic Red River. There is some road traffic between the community and Inuvik at these times of year. There is no airstrip. Air access is by soft tire aircraft which land on the river bank or via float plane, and disruptions and delays occur during freeze-up and break-up each year. Most bulk goods and all fuel supplies reach the community via the NTCL barge service from Hay River each summer.

Arctic Red River has a rudimentary infrastructure. The Northern Canada Power Commission operates a 280 Kw diesel electric generator in the community and basic water delivery and honey bag pickup services are provided by the Development Corporation under contract with the Band Council. Sewage and solid wastes are disposed of at a site on the floodplain of the Mackenzie River. The community also has a volunteer fire brigade and a Bombardier mini-pumper.

The community has 12 telephones and two long distance (ANIK) telephone circuits. There is a also a Northwestel radio telephone system for communications with people in bush camps. Residents have CBC Radio service but no plans have been announced to extend CBC television service to the settlement.

Arctic Red River has a small community hall and a playground area. No other recreational facilities were reported in 1980 (Outcrop, 1981).

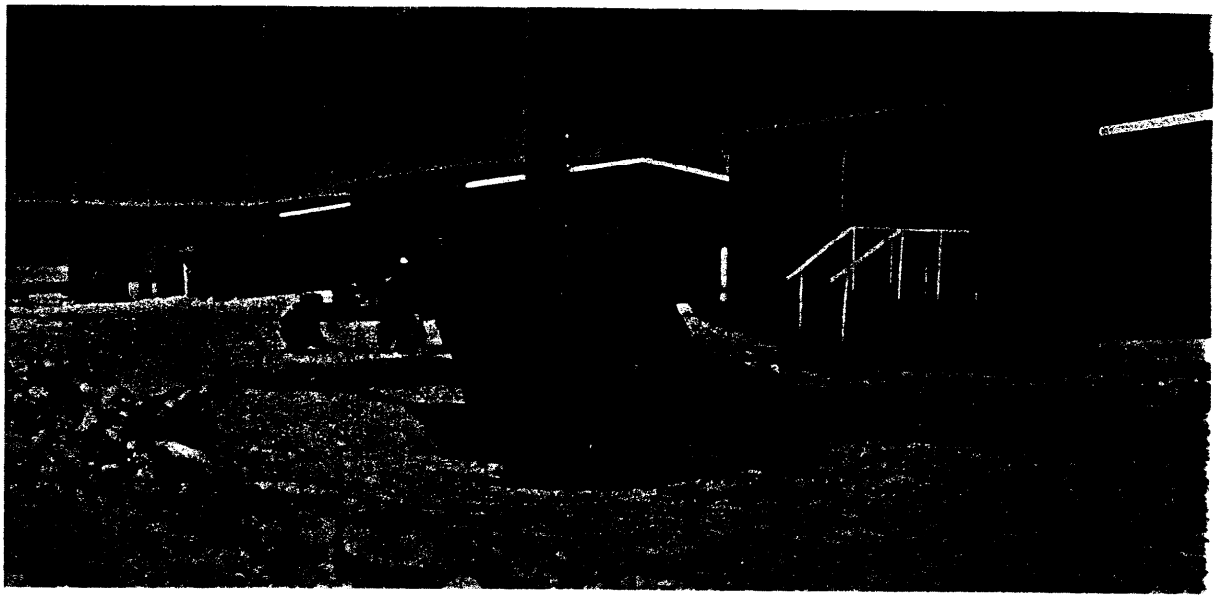


PLATE 4.4-1 *Arctic Red River, a small, traditional Loucheux (Kutchin) Dene community at the confluence of the Mackenzie and Arctic Red Rivers. Courtesy: J. Cheng.*

4.5 COPPERMINE

Coppermine is the major community in the eastern portion of the Beaufort Sea region. It is situated on Coronation Gulf near the mouth of the Coppermine River approximately 740 km (460 miles) east of Inuvik. The community's population in 1980 was estimated to be 761.

The origins of the present settlement lie in the competition between independent fur traders and the Hudson's Bay Company in this area of the western Arctic in the early decades of this century. A free trader established a trading post near Coppermine in 1916 in an attempt to intercept Inuit trading into the Hudson Bay post at Bernard Harbour some 115 km further north (Farquahrson in Freeman, 1974). The Hudson's Bay Company built a competing post at Coppermine in 1927-1928 and an Anglican mission was established there in 1928. Inuit in the Bernard Harbour area were hit by an epidemic at about the same time and more than 70 are reported to have died. The survivors moved to Coppermine. A nursing station was built in Coppermine in 1948 and a small school was established shortly thereafter. These facilities attracted more Inuit to the community.

Many of the Inuit at Coppermine and in the Coppermine area worked on DEW line construction in the mid 1950's and some Inuit families continued to live near DEW line sites on the mainland and Victoria Island for a number of years after the radar stations went into operation. Some Inuit obtained work at the stations but the number of job opportunities was never large and declined appreciably in the early 1960's as intermediate DEW line sites were phased out. Coppermine's population began to increase in the late 1950's and early 1960's following the peak of DEW line construction activities as federal government initiatives improved health, education and local housing in the community. By the late 1960's most Inuit living in the area had moved permanently into Coppermine.

Coppermine residents have a widespread reputation in the north for their positive attitude toward wage work. Many participated in employment opportunities at Mackenzie Delta area oil and gas exploration sites in the 1970's. Gulf employed these people on a rotational basis from late 1972 through early 1977; a smaller number were employed by Gulf in 1978 and 1979 during the course of shutting down and dismantling its Swimming Point Base camp in the Delta. Hobart has documented the various economic, social and cultural impacts of this employment on the community (Hobart, 1978 and Hobart, in press). Dome has also employed a number of Coppermine residents in its Beaufort Sea exploration work since 1976.

Coppermine is a Hamlet under the Northwest Territories Muncipalities Ordinance and, as such, has an elected Council and Mayor. The community has an active Hunters and Trappers Association and is prominent in the work of the Beaufort Sea Advisory Committee, Kitikmeot Inuit Association and Inuit Tapirisat of Canada.

Coppermine's population grew rapidly between 1961 and 1976, averaging a net increase of 8.2% annually over the period (Tables 4.5-1 and 4.5-2). In recent years population growth has been more moderate.

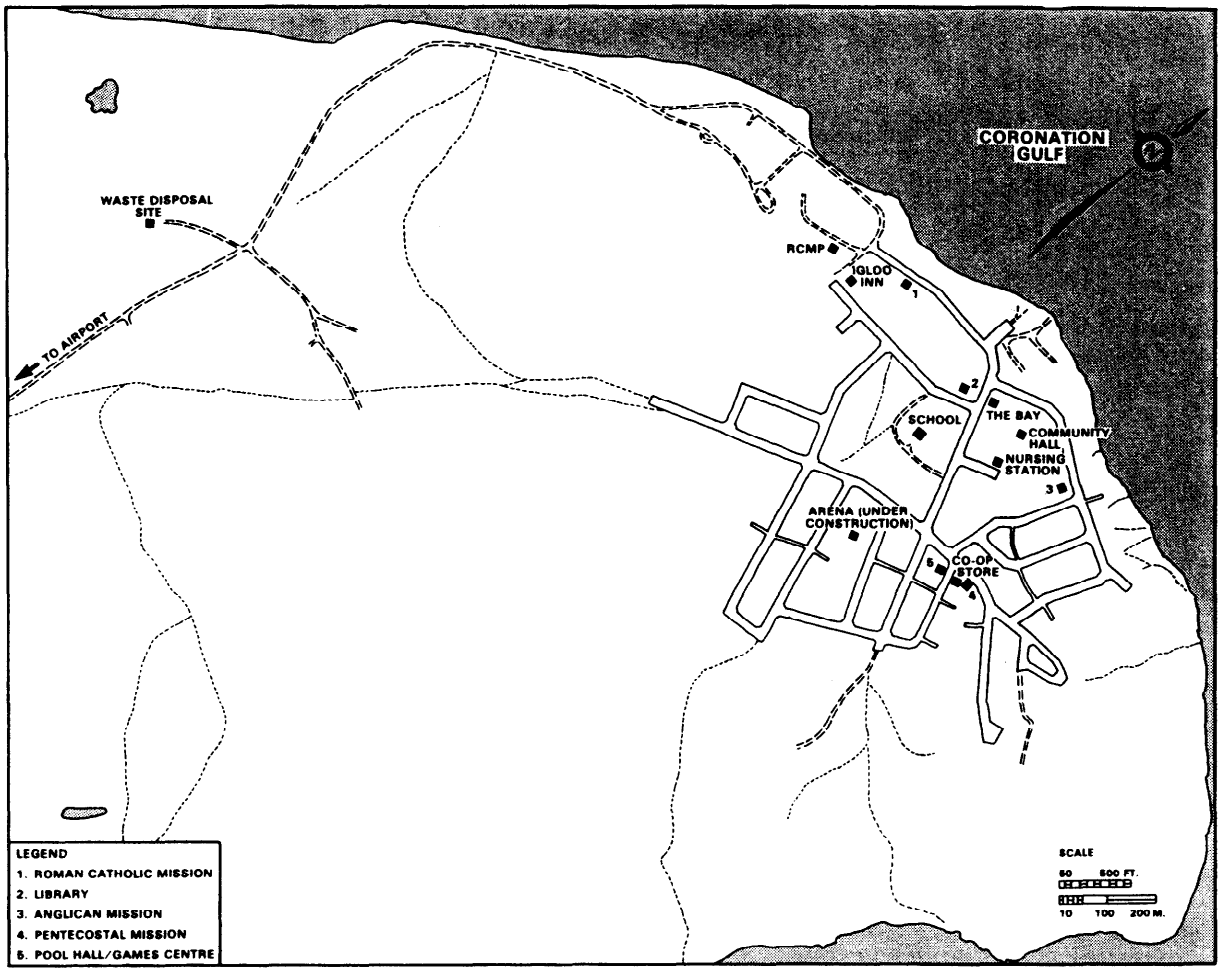


FIGURE 4.5-1 *Hamlet of Coppermine.*

The growth during the early 1960's reflected the movement of Inuit into the community from camps on the land. The improved medical services and housing available in the community gave rise to very high rates of net natural increase in the 1960's and early 1970's. Population growth has slowed in the past few years largely because of out-migration but also because natural increase has slowed.

TABLE 4.5-1

TOTAL POPULATION BY 5 YEAR INTERVALS COPPERMINE AND NORTHWEST TERRITORIES 1961-1981

	1961	1966	1971	1976	1980
Coppermine	230	N/A	637	755	761
Northwest Territories	22,998	28,738	34,805	42,610	45,882

Source: Census of Canada 1961-1976, Government of the Northwest Territories 1980.

Coppermine's population is about 92% Inuit (GNWT, 1980). No current data are available on the age composition of the population, but the 1976 Census revealed that some 55% of the community's population was less than 20 years of age. This figure is indicative of a youthful population which will be involved in harvesting, and utilizing housing, employment and social services in the near future as it reaches maturity.

Coppermine residents are strongly oriented to resource harvesting. Some of the money earned in oil industry employment during the 1970's was used to purchase snowmobiles, rifles, boats and other items of equipment useful for resource harvesting activities.

No data are available on current wage employment and income levels in Coppermine. However, Hobart (in Freeman, 1981) presents the estimates shown in Table 4.5-3 for Inuit residents in 1979-1980.

Hobart's figures are only estimates, particularly the figures pertaining to local employment, and additional minor sources of income may have been overlooked. However, on the basis of Hobart's data and

TABLE 4.5-2

BIRTH, DEATH, AND MIGRATION EVENTS COPPERMINE 1978, 1980

Year	Births	Deaths	Migration	Net Change
1978	24	—	-22	2
1979	14	7	-44	-37
1980	23	2	-26	-5

Source: NWT Population Estimates for December, 1978, Methodological Report Population Estimates, NWT December, 1979 and 1980

TABLE 4.5-3

CASH INCOME OF INUIT RESIDENTS OF COPPERMINE BY SOURCE, 1979-1980

Source	Amount ($)	Percent of Total Known Cash Income
Dome wage employment	288,000	14
Mining/Exploration wage employment	245,000	12
Local Wage Employment	840,000	40
Fur Sales	223,522	11
Carving Handicraft Sales	120,119	6
Old Age Pensions & Child Allowances	200,900	9
Social Allowances Payments	198,698	9
TOTAL	$2,117,939	100

the estimated community population of 761 in 1980, average per capita cash incomes in the community would have been about $2,800 in 1979-1980.

TERIS data indicate that Coppermine residents have a somewhat wider range of skills to offer than do residents in other communities such as Holman Island and Sachs Harbour in the eastern portion of the Beaufort Sea region (Table 4.5-4). This wide range likely reflects the experience that Coppermine residents have gained while working in oil and gas exploration activities in the Delta area.

Some wage employment is available locally at govern-

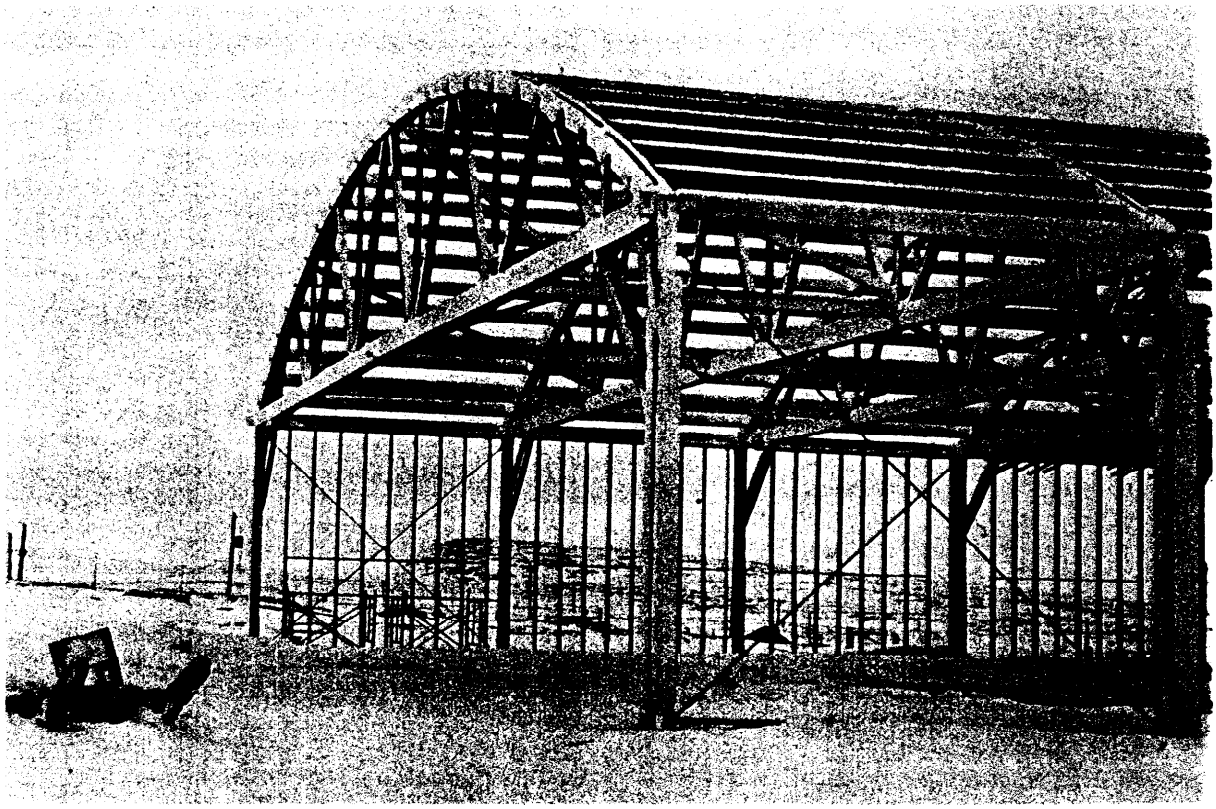


PLATE 4.5-1 *A new arena is under construction at Coppermine. People from the community had extensive experience in working with Gulf during the 1970's.*

TABLE 4.5-4

EMPLOYMENT SKILLS
COPPERMINE 1980

Industry	Number of Persons
Agriculture	1
Amusement and Recreation	2
Business Services	2
Catering and Lodging	10
Clerical	13
Construction	19
Education and Training	1
Electrical Equipment Manufacturing and Repair	1
Fabric and Garment Manufacturing and Repair	4
Government Services	1
Hunting and Trapping	1
Laundering, Cleaning, and Pressing	3
Medical Services	1
Mining and Quarrying	1
Motor Vehicle Transport	1
Oil and Natural Gas	2
Personal Services	2
Professional and Technical Services	1
Retail and Trade	7
Social Welfare Services	1
Welding, Machining, and Forging	1
TOTAL	76

Source: TERIS, Government of the Northwest Territories 1980.

ment offices and facilities and the community's growing local business sector also provides a number of job opportunities. The business sector is currently characterized by two situations. One is the continuing major role of the Coppermine Eskimo Co-operative Ltd. The Co-op operates a retail store, produces art and crafts, handles fuel sales in the community and is the local agent for Northwest Territorial Airways (NWT Air). The second situation is the recent emergence of the Coppermine Development Corporation (CDC), a private company established by several local residents. The CDC owns and operates the local hotel, provides a taxi service and bids on construction and other business opportunities in the community and elsewhere. In early 1981 the corporation was negotiating a manpower services agreement with the management of the Lupin gold mine under development by Echo Bay Mines in the Contwoyto Lake area some 290 km (180 miles) southeast of the community.

CDC and various individuals in Coppermine have also had a number of discussions in recent years with the Inuit Development Corporation about possible joint efforts to develop additional housing and rental commercial office space in the community. No projects have been announced to date.

The shortage of wage employment in the community is reflected in social assistance data. Social assistance payments have been high in recent years, averaging $330 per capita for the year ending March 31, 1981 (GNWT, Department of Social Services, 1981). This figure is high relative to those for other communities in the Beaufort Sea region. Most payments are made because the incomes of recipients are considered to be "too low." The GNWT has two social workers resident in the community. They receive advice from a local Welfare Committee composed of three residents of the community.

As of January, 1981, there was a shortage of good housing units in Coppermine. The Northwest Territories Housing Corporation had 159 housing units in the community (Table 4.5-5). Sixty-five percent of these were northern rental units, the rest were public housing units (Morton Warner Health Care Associates, 1981). The GNWT had 18 staff housing units (Outcrop, 1981). Plans were in hand to contruct 12 additional houses and one fourplex unit in 1981.

TABLE 4.5-5

HOUSING STOCK
COPPERMINE 1977

Type	No. of Units
Self-owned	0
Government staff	24
Company staff	7
NWTHC	159
Other	3
Total	193

Source: Beaufort Sea Development, An Infrastructure Analysis, 1980.

Coppermine has a modern school, a spacious nursing station and a three man RCMP detachment. The school provides education from Kindergarten to Grade 9. Its 1980-81 enrollment was 243, a decrease of 12 from the previous year (Table 4.5-6). There were 12 teachers and four classroom assistants. The nursing station has a staff of three nurses, a community health worker, part-time clerk, janitor and a cleaning woman. Its facilities include four adult beds, two pediatric beds, three newborn cots, a large

TABLE 4.5-6

SCHOOL FACILITIES PROFILE COPPERMINE 1980

Enrollment	243
Teachers	12
Classroom Assistants	4
Classrooms	10
Home Economic Rooms	1
Gymnasium	1
Portable Classrooms	1
Capacity	275

Source: Department of Education, Government of the Northwest Territories 1980; Beaufort Sea Development, An Infrastructure Analysis, 1980.

treatment clinic room, a public health room and a reception area. The local Health Committee was reported to be not functional in 1980-81 (Morton Warner Health Care Associates, 1981).

Commercial hotel accommodation in Coppermine is available at the Igloo Inn. The hotel has space for 40 people as well as a modern dining area.

In terms of local services, Coppermine compares well with many other Beaufort Sea communities. It obtains its water supply from the nearby Coppermine River. New intake pipes and a package pumphouse unit were installed in 1980. The intake is screened and the water is chlorinated at the reservoir building. Water is delivered to some buildings in the community via utilidor and to the remaining buildings via two tanker trucks. Three different systems are used for sewage containment in the community. The GNWT staff houses and institutional buildings use pumpout units; the school and nursing station partially settle their sewage in septic tanks prior to pumpout and the remaining homes use honey bags. The local Co-op handles water delivery and sewage pickup on regular basis. There is a waste disposal site about a mile and half from the community.

Other infrastructure in Coppermine include a Northern Canada Power Commission powerhouse, an airport and telephone, radio and television facilities. NCPC operates a 1,575 Kw diesel generator to meet the community's electrical power requirements. The GNWT operates the local airport. There is a 5,000 foot gravel airstrip, basic navigation aids (non-directional beacon, wind indicator) and landing lights. There is also a small airport terminal building. Northwest Territorial Air provides regular air service between Coppermine and Yellowknife several times each week. There is no direct air service to points such as Inuvik or Tuktoyaktuk.

Northwestel provides local and long-distance telephone service in the community. There is also a local community radio studio and local radio broadcasting facility as well as equipment to receive and rebroadcast live CBC radio and television programming.

The Northern Transportation Company operates a barge resupply service to the community each summer via Hay River and Tuktoyaktuk.

Coppermine has an active Recreation Committee and a number of different sports facilities. Most sports activities are centred on the school gymnasium but there is also an arena, curling rink and, in the summer months, an outdoor pool and sports field for various activities. Coppermine celebrates the return of good weather and longer daylight hours each spring with its annual Easter Games festival.

4.6 FORT McPHERSON

Fort McPherson is the oldest community in the Beaufort Sea region and one of the oldest settlements in the Northwest Territories. It is located on the east bank of the Peel River, 40 km (24 miles) from its junction with the Mackenzie River some 75 air miles south of Inuvik.

The community had an estimated population of 793 in 1980 (GNWT and Dome, 1980). Most residents are Loucheux Dene (Takudh Kutchin) or Metis. The latter are descendants of Loucheux Dene and Scottish traders. A Hudson's Bay Company post was established on the Peel River in 1840 by Isbister and Bell, taking its present name in 1848 from the then chief trader of the company, Murdoch McPherson. Roman Catholic and Anglican missions were established near the post in 1860. An RCMP post was established at Fort McPherson in 1903.

Fort McPherson's population remained small until well into the 1960's. Government welfare, housing, health and education programs induced people to move into the settlement during the 1960's, and the community's population began to grow.

During the middle to late 1960's, Esso maintained a basecamp on the Peel River opposite the settlement. The company's drilling and transportation departments hired local residents on a casual basis. Other residents were employed in a government sponsored Canada Bond project in the community, with various geophysical crews in the Peel

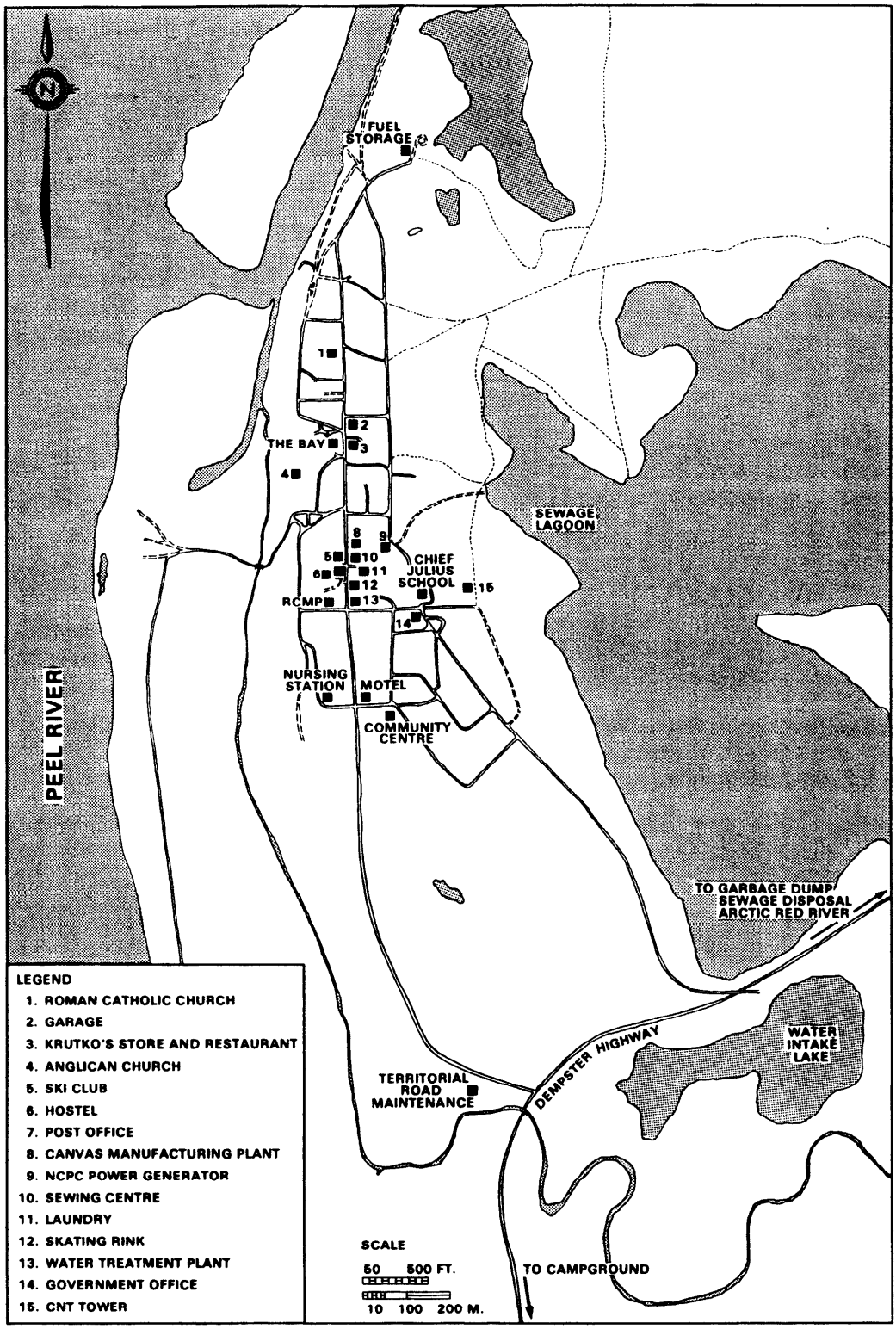


FIGURE 4.6-1 *Settlement of Fort McPherson.*

Plain area and later, in the 1970's, in the construction of the Dempster Highway. In more recent years some residents have become employed with Dome and Esso in Beaufort Sea exploration.

The community has thus had a long history of exposure to various types of economic and social initiatives from the south. Some residents have drawn on this experience in becoming involved with various native associations and in political activities at the territorial and federal levels. Fort McPherson was the home of the first Dene member of the Territorial Council (appointed in 1967) and a local resident was the first northern native elected to Parliament. The community is active today in the work of the Dene Nation and the Northwest Territories Metis Association.

Fort McPherson is a Settlement, with no revenue raising powers, for the purposes of local government and administration. It elects its own eight member Settlement Council. Other organizations include the local Dene Band, the Metis Association, the Hunters and Trappers Association, an education committee, and the churches.

Data for 1978 cited by Outcrop (1981) indicate that some 76% of the population were Loucheux Dene; 14% Metis; 1% Inuvialuit and the remaining 9% non-native. The local population increased rapidly in the 1960's when people were moving in off the land but has grown more slowly in the 1970's. The growth rate during the 1976 to 1980 period was approximately 3% annually.

Demographic data reveal that there are significant numbers of Fort McPherson residents under the age of 20 or just entering their early adult life. The community has undergone some marked swings in population in recent years. In 1978, for example, it increased by 23 as a result of 16 births, five deaths and 12 in-migrants (Table 4.6-1). The following year the local population decreased by 32 largely as the result of the out-migration of 49 residents. In 1980 out-migration was less extreme and the community experienced a net population gain of 12 people (GNWT, 1980). Migrations to and from the community may reflect the search by local residents for better employment opportunities elsewhere.

TABLE 4.6-1

BIRTH, DEATH, AND MIGRATION EVENTS FORT McPHERSON 1978, 1979, 1980

Year	Births	Deaths	Migration	Net Change
1978	16	5	12	23
1979	22	5	-49	-32
1980	19	5	- 2	12

Source: NWT Population Estimates for December, 1978, Methodological Report for Population Estimates, Government of the Northwest Territories, 1980.

As is the case with many northern communities, there are dualistic aspects to the economy of Fort McPherson. Many residents still depend upon resource harvesting for an important part of their food and cash requirements. Wage employment opportunities are provided by a number of local employers. These include the Tetlit Service Co-operative, the Northwest Territories Department of Economic Development's Canvas Good Project, a major employer of local women, and a number of privately owned local businesses.

TERIS survey data indicate that Fort McPherson

TABLE 4.6-2

EMPLOYMENT SKILLS FORT MCPHERSON 1980

Industry	Number of Persons
Amusement and Recreation	1
Any Industry	3
Business Services	2
Catering and Lodging	5
Clerical	19
Construction	12
Education and Training	3
Electric Power, Generating and Distribution	2
Fabric and Garment Manufacturing and Repair	6
Forestry and Logging	1
Government Services	2
Hunting and Trapping	1
Laundering, Cleaning, and Pressing	2
Medical Services	4
Motor Vehicle Transport	6
Non-Ferrous Metal	1
Oil and Natural Gas	7
Personal Services	1
Professional and Technical Services	1
Social Welfare Services	7
TOTAL	92

Source: TERIS, Government of the Northwest Territories, 1980.

PLATE 4.6-1 *Fort McPherson garment factory; an example of a small-scale local industry which has benefited greatly from the industry's presence in the Beaufort region.*

residents have a number of different vocational skills to offer. As is shown in Table 4.6-2, several local residents had skills applicable to the clerical and construction industry. In common with the TERIS results reported for most other communities, most people in Fort McPherson classified themselves as semi-skilled or skilled in their area of training or experience.

There are indications that the community is experiencing some social strains. Five social workers are working in the community, three of whom specialize in alcohol and drug problems. Social assistance payments, on the basis of 1980-1981 data, are high but not out of line with many of the smaller communities in the region. Payments averaged $116 per capita in 1980-1981.

Local employment opportunities are growing slowly. Both Esso and Dome have placed orders for work clothes with the Canvas Good Project. The Project's volume of business has nearly doubled as a result of these industry related orders (Outcrop, 1981). The opening of the Dempster Highway and its route close to the community has provided increased scope for the local business sector. A 12 room motel with a dining area is already in operation and the Band Council is working hard to establish a service station to meet the fuel and service requirements of motorists driving the Dempster Highway. The Band Council has received governmental grants and other financial assistance to develop the service station project. It was awarded a Local Assistance Program (LEAP) grant in September, 1981 to cover the costs of hiring a project coordinator to oversee the development of the service station and the training of Band members in its operation and management.

There are 175 housing units in the community (Table 4.6-3). almost 40% are owned by their inhabitants, the balance being owned by the Northwest Territories Housing Corporation and, in smaller numbers, by the GNWT, federal government, local government and private companies.

Fort McPherson has a large modern school and a small education hostel. The school offers Kindergarten to Grade 8. Enrollment in 1980-81 was 140 in grades Kindergarten to six and 50 in grades seven and eight (Table 4.6-4). The staff included 11 teachers and two classroom assistants. There was also an adult educator resident in the community. Eight students were attending Thebecha College (AVTC) in Fort Smith in 1980 (Outcrop, 1981).

The community has a four-man RCMP detachment, three Justices of the Peace, two coroners, and draws upon the staff of the Delta Native Courtworkers Association in Inuvik as the need arises. Many social problems are alcohol related and the community has

TABLE 4.6-3

HOUSING STOCK
FORT MCPHERSON 1976

Housing Type	No. of Units
Self-owned	62
Government staff	26
Company staff	3
NWTHC (8 are senior citizen units)	68
Other	1
Total	160

Source: Beaufort Sea Developments, An Infrastructure Analysis, 1980.

TABLE 4.6-4

SCHOOL FACILITIES PROFILE
FORT MCPHERSON 1980

Enrollment	190
Teachers	11
Classroom Assistants	2
Capacity	325
Classrooms	12
Home Economic Rooms	1
Gymnasium	1
Portables	1

Source: Department of Education, Government of the Northwest Territories Beaufort Sea Development, An Infrastructure Analysis, 1980.

received funding for its Fort McPherson - Peel River Alchohol Society from the Northwest Territories Alchohol and Drug Coordinating Council in recent years.

Fort McPherson has a five-bed, two-crib nursing station. It is staffed by three nurses and a dental therapist. Doctors and dentists visit the community on a regularly scheduled basis, generally from Inuvik.

The community also has a active volunteer fire brigade. The 14 member brigade has a heavy duty pumper truck and maintains a system of call boxes throughout the settlement.

Fort McPherson has a number of transportation links with the outside world. The Dempster Highway can be used to reach either Inuvik or Dawson City, Yukon Territory, although it is impassable during freeze-up and break-up. Ken Borek Air operates a regular service between the community and Inuvik using the local 3,500 foot gravel runway. The Government of the Northwest Territories operates the airport; navigational aids consist of a nondirectional beacon and wind indicator. Northern Transportation Company provides barge resupply services to the community each summer.

The community has good basic communication services. Northwestel operates a local and long-distance (Anik) telephone system for local residents and the necessary receiving and broadcasting equipment has been installed to provide local residents with live CBC radio and television.

Fort McPherson obtains its water supply from a lake to the south of the settlement. Some homes are served by a storage tank and utilidor; the balance receive their water via delivery truck. Several different sewage systems are in use in the community. Some 16 housing units have holding tanks and are serviced via a pumpout truck. Some buildings have gravity sewage systems that discharge directly into a lake to the east of the settlement. Most houses dispose of their sewage using the ubiquitous honey bag system. There is daily pickup of the honey bags. Pumpout and bagged sewage are disposed of in an area off the Dempster highway some five miles from the community. Garbage pickup is by truck and the same disposal area is used.

Fort McPherson has an active community recreation program. There is a community hall, gymnasium in the local school, curling rink, outdoor skating rink and a system of cross-country ski trails in the immediate area. Many recreation activities are run under the auspices of the Community Hall Club. The community sponsors the festive Peel River Jamboree each May.

4.7 HOLMAN ISLAND

Holman Island is a small community on the Diamond Jenness Peninsula of Victoria Island, 650 km, (400 miles) northeast of Inuvik. Its population in April, 1982 was 310 (R. Condon, pers. comm., 1982). About 90% of the population is Inuvialuit. Holman Island's residents have strong ties to Inuvialuit and Inuit living in Sachs Harbour, Coppermine, Cambridge Bay and Tuktoyaktuk. The community is well known nationally and internationally for the work of its print-makers and artisans.

The community's origins stem from the establishment of a Roman Catholic mission close to the site of the present settlement in 1939. A Hudson's Bay post

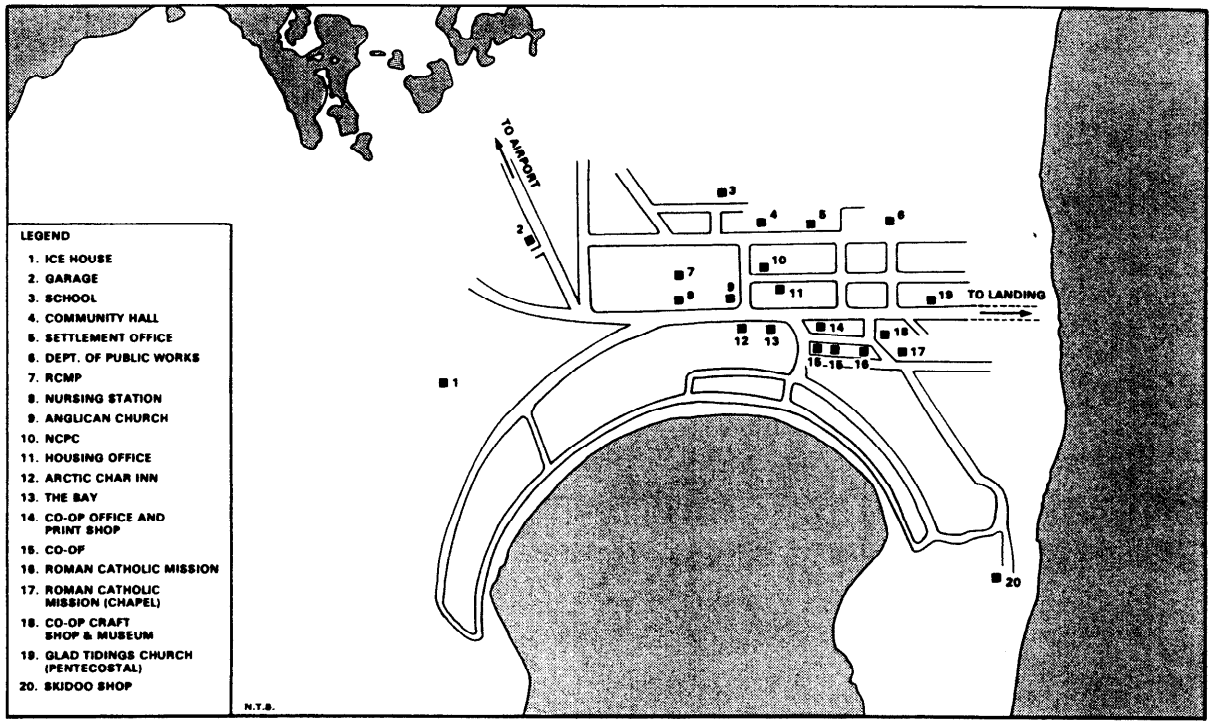


FIGURE 4.7-1 *Settlement of Holman Island.*

established elsewhere in the same part of Victoria Island in 1923 was moved there in the same year. As the federal government began to provide education and medical services in this area of the Arctic in the 1960's local residents began to live in or closer to Holman Island. More people moved to the settlement in 1962 when the Hudson's Bay Company closed its post at Read Island (Freeman, 1974).

Holman Island is a Settlement, with an elected council of eight members. It has no revenue raising authority, and the budget is administered by the regional office of the Northwest Territories Department of Local Government. It is active in such organizations as COPE for the purpose of a land claims settlement, the Kitikmeot Inuit Association for central Arctic affairs and the Beaufort Sea Community Advisory Committee. It has a strong Hunters and Trappers Association.

Holman Island's population has grown rapidly over the last two decades (Table 4.7-1). Its average annual growth rate for the period 1961 to 1980 was 7.7%, a rate similar to Inuvik but higher than that for Tuktoyaktuk. This rapid growth reflects the movement of people off the land and into the settlement and their subsequent high rates of natural increase amidst conditions of better health care, housing and social assistance (Table 4.7-2). In common with other urban centres in the region, Holman Island has a young population. The latest available age specific population data are for 1976. They reveal that some

FIGURE 4.7-1

TOTAL POPULATION BY 5 YEAR INTERVALS HOLMAN ISLAND AND NWT 1961-1980

	1961	1966	1971	1976	1980
Holman Island	98	N/A	241	263	358*
Northwest Territories	22,998	28,738	34,805	42,610	45,882

*This estimate is believed to be high.
In 1982, Holman Island had 310 residents.

Source: Census of Canada 1961-1976, Government of the Northwest Territories, 1980.

FIGURE 4.7-2

BIRTH, DEATH, AND MIGRATION EVENTS HOLMAN ISLAND 1978, 1979, 1980

Year	Births	Deaths	Migration	Net Change
1978	7	0	15	22
1979	8	—	—	8
1980	9	2	15	22

Source: Government of Northwest Territories, 1980.

58% of the community's population in that year was under the age of 20; the comparable figure for the Northwest Territories in the same year was 49%. It is likely that 1981 Census data will reveal a continuation of this young-age bias.

PLATE 4.7-1 *Inukshuk overlooking Holman Island. Many Arctic communities grew rapidly during the 1950's and 1060's because of the movement of people off the land.*

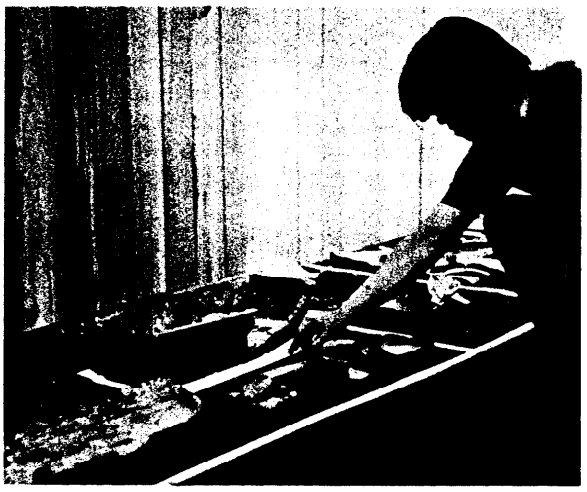
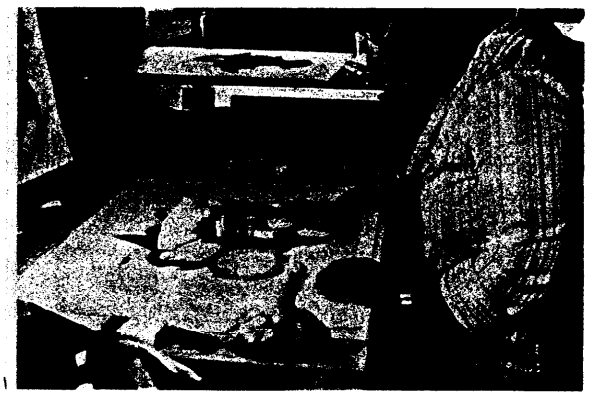


PLATE 4.7-2 *The Holman Island Eskimo Co-operative has undertaken a number of activities and businesses and is a key employer for residents of the community. Above: The Co-op's Museum. Below: Surveying a stencil in the print shop.*



Holman Island's local economy is still strongly oriented to resource harvesting. However, craft and print making activities and a small but growing local business sector are providing some residents with regular wage employment. No data are available on current employment levels in the community but employment skills were surveyed by TERIS (Table 4.7-3). The Holman Island Eskimo Co-operative is a key employer, operating the local motel and a thriving print-making and handicraft production business. A local entrepreneur has established a business hauling freight, another operates a taxi service and a third has established a package tours business (Kingalik Tours).

TABLE 4.7-3

EMPLOYMENT SKILLS
HOLMAN ISLAND 1980

Industry*	No. of Persons
Air Transport	2
Amusement and Recreation	5
Any Industry	13
Broadcast, Motion Picture & Stage	1
Business Services	2
Catering and Lodging	4
Clerical	33
Construction	21
Education and Training	12
Electrical Power, Generating & Distributing	5
Fabric & Garment Manufacturing & Repair	20
Government Services	4
Hunting & Trapping	9
Laundering, Cleaning & Pressing	8
Medical Services	4
Mining & Quarrying	2
Motor Vehicle Manufacturing & Repair	2
Motor Vehicle Transport	10
Personal Services	2
Professional & Technical Services	19
Retail & Trade	9
Social Welfare Services	3
Water Transport	3
	193

Source: TERIS, 1980.

*Not purely industry categories.

Three local residents have recently joined together to form and operate a Holman Island - based construction company - Kem Inuit Industries Limited. The company's motto is "We Build Anywhere" and it has been successful in obtaining contracts in communities such as Tuktoyaktuk. The company is demonstrating that it is possible to benefit from economic activity in other parts of the Beaufort Sea region while operating from points other than from Inuvik and Tuktoyaktuk. It may be a forerunner of the type of companies that will enable residents in outlying communities to participate in activities associated with hydrocarbon exploration and development in the Beaufort area.

Holman Island does not have a resident social worker. Its needs are met as required by social workers based in Coppermine. Social assistance payments are made to a number of residents particularly during the winter months. In 1980-81 these payments amounted to $105 per capita, a figure above that for Inuvik but well below the comparable figure for Paulatuk.

There are 81 housing units in Holman Island. Sixty-six are owned by the Northwest Territories Housing Corporation; 6 are GNWT staff houses and the balance are owned by others (Table 4.7-4).

TABLE 4.7-4

HOUSING STOCK
HOLMAN ISLAND 1982

Housing Type	No. of Units
Self-owned	2
Government staff	6
NWTHC	66
Other	7
Total	81

Source: Beaufort Sea Development,
An Infrastructure Analysis, 1980.
Condon, R., pers. comm. Holman Island, 1982.

The community has a modern school and a nursing station. The RCMP has a small trailer for use of members who come from Coppermine from time to time. The school provides education for Kindergarten to Grade 9. In 1980-81 it had an enrollment of 95 students (including two students in grade seven or beyond). The staff was composed of four-teachers and two-classroom assistants (Table 4.7-5). The nursing station had four-beds and two-cribs in 1980. It is presently staffed by a community health nurse. RCMP services were provided to the community on an as required basis by the Coppermine detachment. A local resident has been appointed to the positions of Justice of the Peace and Coroner.

Holman obtains its water supply from several sources. During the summer months it is taken from the Ukpillik River; after freeze-up it is obtained from a nearby lake. Water is distributed throughout the community by water truck by a local firm which also picks up sewage and garbage. About one quarter of the homes in Holman have plumbing and pumpout units. The community's waste disposal area is located north of the airport road. There are separate pits for sewage, bagged sewage and garbage. Electrical power is provided in Holman Island by the Northern Canada Power Commission. It operates a 500 kw diesel generator in the community.

TABLE 4.7-5

SCHOOL FACILITIES PROFILE
HOLMAN ISLAND 1980

Enrollment	95
Teachers	4
Classroom Assistants	2
Capacity	125
Classrooms	4
Home Economics Room	1
Portables	2

Source: Department of Education,
Government of the Northwest Territories;
Beaufort Sea Development,
An Infrastructure Analysis, 1980.

Holman Island has good transportation and communication services. It has a 4,300 foot gravel runway and a new airport terminal building. Northwest Territorial Air operates a regular twice weekly service to the community from Yellowknife via Coppermine. The community receives live CBC radio and television programming and its telephone system is linked to the outside world via the Anik satellite.

Holman Island has a small museum behind the Co-op print shop and a large community hall. Many local residents are active in the Kingalik Jamboree Festival each year.

4.8 PAULATUK

Paulatuk is a small, traditional community located at the south end of Darnley Bay on the Arctic coast some 250 miles northeast of Inuvik. Its 1980 population was estimated to be 169 (GNWT and Dome, 1980).

The community's name is derived from the Inuvialuit term for coal soot. The Karngmalit or Mackenzie Eskimos living in this part of the western Arctic at the time of initial contacts with Europeans had developed a strongly independent lifestyle based on whale hunting and, for heating purposes, the small scale mining and use of local coal deposits. A Roman Catholic mission opened a trading post at Paulatuk in 1935 and the population in the area began to camp there on a seasonal basis. The post was closed in the 1950's about the same time that employment activities at DEW line construction sites in the western and central Arctic drew many Inuvialuit families away

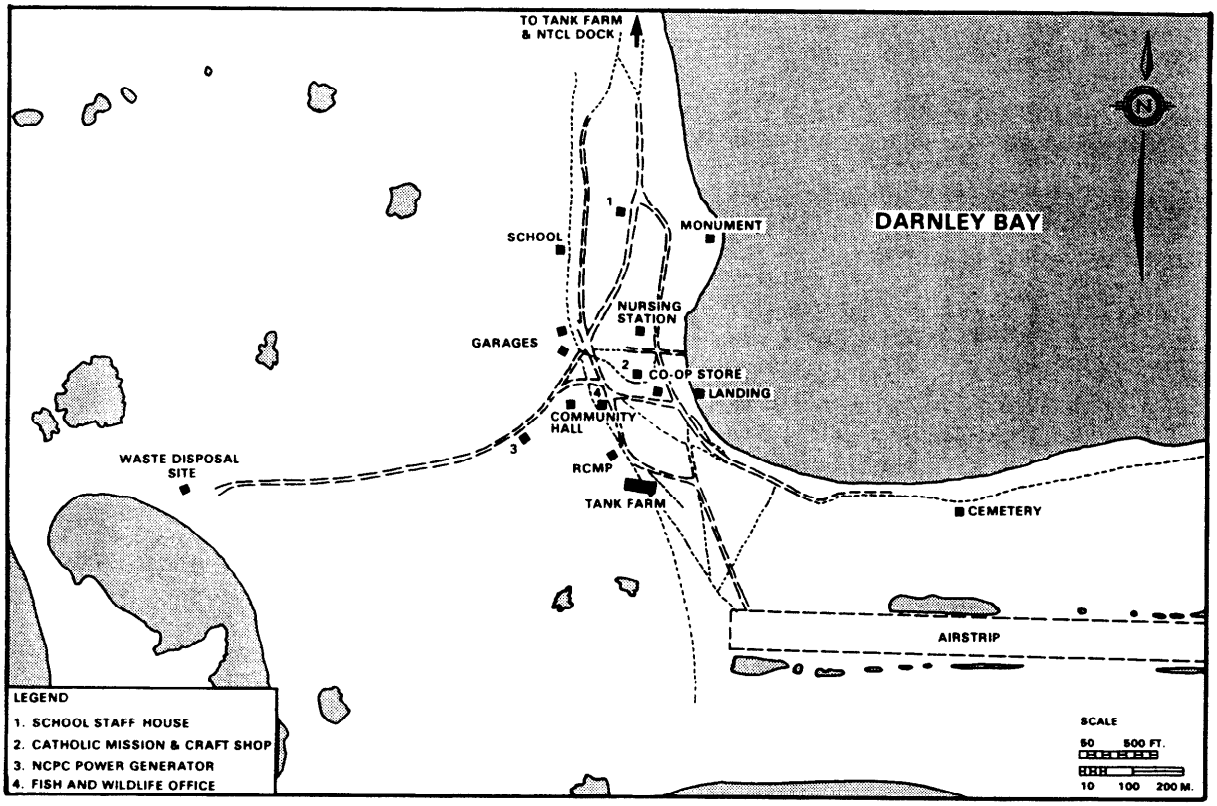


FIGURE 4.8-1 *Settlement of Paulatuk.*

from the area. The opening of the Paulatuk Co-operative's store in the late 1960's marked a new beginning of local population growth and the origins of the present community.

Paulatuk is a Settlement for the purposes of local government and administration. It elects a Settlement Council and Council Chairman, but its budget is administered by the GNWT Department of Local Government. The community participates in the work of the Committee for Original Peoples Entitlement (COPE) and has been active in the work of the Beaufort Sea Community Advisory Committee since its inception. It has a strong Hunters and Trappers Association.

Paulatuk's population is almost entirely Inuvialuit. It has grown rapidly in recent years, the annual growth rate for the period 1976 to 1980 being 6.8% (Tables 4.8-1 and 4.8-2). A large proportion of the population is under 20 years of age. The latest available age specific population data are for 1976 and illustrate the youthfulness of the community's population. As of 1976 almost 62% of the local population was under the age of 20; the comparable figure for the Northwest Territories in the same year was only 49%.

The basis for the local economy continues to be resource harvesting. The Paulatuk Hunters and Trappers Association is working with the local Co-

TABLE 4.8-1

TOTAL POPULATION BY 5 YEAR INTERVALS PAULATUK AND NWT 1961-1980

	1961	1966	1971	1976	1980
Paulatuk	N/A	N/A	N/A	130	169
Northwest Territories	22,998	28,738	34,805	42,610	45,882

Source: Census of Canada 1961-1976; Government of the Northwest Territories 1980.

TABLE 4.8-2

BIRTH, DEATH, AND MIGRATION EVENTS PAULATUK 1978, 1979, 1980

Year	Births	Deaths	Migration	Net Change
1978	4	1	—	3
1979	5	2	—	3
1980	3	—	—	3

Source: Government of Northwest Territories.

op and groups such as the Inuvialuit Development Corporation and Dome to develop and expand the commercial market for Arctic char in the western Arctic. Wage employment opportunities are limited locally. Detailed employment figures are not available but the principal job opportunities are with the Co-op store, craft shop, Settlement Council and local municipal service contractors. In recent years some Paulatuk residents have sought and obtained work outside the community with Dome.

TERIS survey data for 1980 indicate that Paulatuk residents reported skills applicable to 14 different industries (Table 4.8-3). However, only four individuals reported their skill level in responding to the TERIS survey; three were semi-skilled and one was skilled.

TABLE 4.8-3

EMPLOYMENT SKILLS
PAULATUK 1980

Industry	No. of Persons
Amusement and Recreation	1
Any Industry	1
Catering and Lodging	1
Clerical	2
Construction	3
Education and Training	1
Garment & Fabric	1
Laundering, Cleaning & Pressing	1
Medical Services	1
Motor Vehicle Manufacturing & Repair	1
Motor Vehicle Transport	1
Oil and Natural Gas	1
Professional & Technical Services	3
Retail & Trade	1
Social Welfare Services	1
	20

Source: TERIS, 1980

The social assistance payments in Paulatuk may reflect some consequences of the growing number of young people and limited local employment base. During fiscal 1980 (April, 1980 to March, 1981) social assistance payments in Paulatuk averaged $162 per capita. The comparable figure for Inuvik for the same period was $62 (GNWT, Dept. of Social Welfare, 1981).

The Industry has been working with Paulatuk residents in recent years to expand local employment activities through business contracts. The local business sector is rudimentary: a Co-op store, arts and craft production and local hauling and vehicle rental services. One of the possiblitiies under consideration at the local level is for businesses to expand their involvement in hydrocarbon exploration through equipment rental contracts.

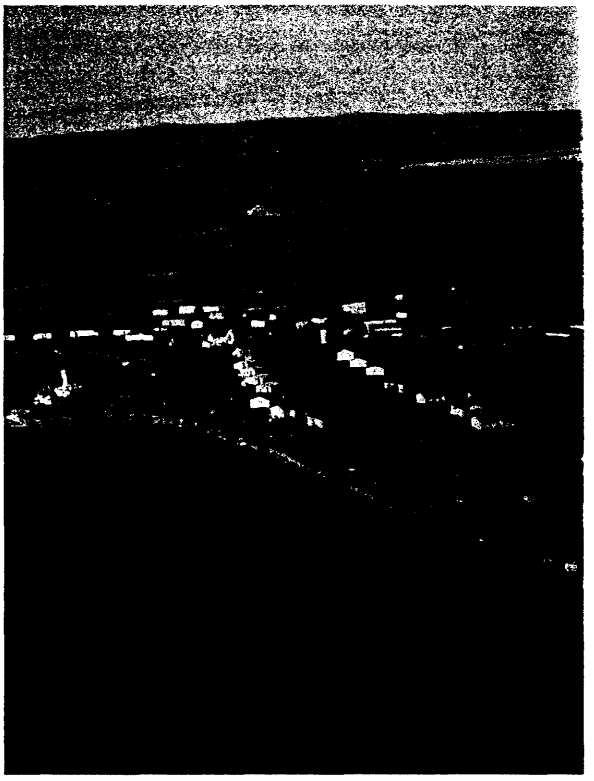


PLATE 4.8-1 *Paulatuk on Darnley Bay. Several people from this traditional community have been employed in Beaufort exploration. The community plays a prominent role on the Beaufort Sea Community Advisory Committee.*

Paulatuk residents have also been working closely with the Inuvialuit Development Corporation to develop a muskox sports hunting business. This venture is proving successful but has recently attracted some negative comment in the southern press, and its future is a little uncertain.

The Northwest Territories Housing Corporation provides most of the housing in Paulatuk on a rental basis. In 1981 it was reported to have 26 rental housing units in the community; the GNWT had one housing unit and the local mission also had one unit (Outcrop, 1981).

Paulatuk has a small school which provides Kindergarten to Grade 6 and presumably could provide grades seven and eight should local demand warrant it. The school had two teachers and a classroom assistant in 1980-1981. School enrollment in the same year was 37. Medical services for Paulatuk are provided on an as needed basis by the staff of the Tuktoyaktuk nursing station. Local residents would prefer that the community have its own nursing station. There is no RCMP detachment in Paulatuk; the RCMP at Tuktoyaktuk service the community on an as needed basis.

Paulatuk has a volunteer fire department but lacks a

proper fire vehicle and alarm system. Water and sanitation services are rudimentary. Water is delivered by truck to each house and sewage bags are picked up on a regular basis for disposal at the community dump. The Northern Canada Power Commission operates a small, 240 Kw diesel electric generator in the community to meet local power demands.

Paulatuk has a 3,200 foot sand runway with basic navigational aids. It is operated by the Government of the Northwest Territories. Kenn Borek Air operates a regular air service between Inuvik and Paulatuk. Northern Transportation Company Limited operates an annual barge resupply service to the community each summer.

Paulatuk has limited modern communications facilities. The community has a local telephone system and a long-distance link with the outside world through a DEW line circuit. There is no local broadcasting or rebroadcasting of CBC radio and television programs.

A new community hall and office complex has recently been constructed at Paulatuk.

4.9 SACHS HARBOUR

Sachs Harbour is a small community on the south coast of Banks Island some 520 km (325 miles) northeast of Inuvik. Its population in 1980 was estimated to be 172 (Tables 4-9-1 and 4.9-2). The community is strongly oriented to resource harvesting, particularly white-fox trapping, and many residents have incomes well above the average income of Inuvialuit and Inuit in other Beaufort communities (Figure 4.9-1).

TABLE 4.9-1

TOTAL POPULATION BY 5 YEAR INTERVALS SACHS HARBOUR AND NWT 1961-1980

	1961	1966	1971	1976	1980
Sachs Harbour	76	N/A	143	162	172
Northwest Territories	22,998	28,738	34,805	42,610	45,882

Source: Census of Canada 1961-1976; Government of the Northwest Territories, 1980.

The community's origin lies in the heyday of the fur trade in the western and central Arctic. Inuvialuit from the western Arctic were first introduced to the white-fox fur trapping potential of Banks Island when some of them accompanied Stefanson and other members of the Canadian Arctic Expedition to

TABLE 4.9-2

BIRTH, DEATH, AND MIGRATION EVENTS SACHS HARBOUR 1978, 1979, 1980

Year	Births	Deaths	Migration	Net Change
1978	4	—	—	4
1979	6	1	-12	-7
1980	1	—	1	2

Source: Government of Northwest Territories.

the Island between 1913 and 1917. Three of the wealthier Inuvialuit families from the Mackenzie Delta area went back to the Island in 1929 using their own schooners and set up winter camps and traplines. In subsequent years they were joined by other Inuvialuit from the Delta, largely relatives and their families. For nearly 30 years these Inuvialuit, their children and later arrivals lived and trapped in the southern half of the Island during the winter months and sailed back to the Delta area each summer to sell their furs and purchase supplies. Many Banks Island trappers became wealthy and went for holidays to Aklavik and the communities in southern Canada. Their children were educated at the mission school in Aklavik and to communities in southern Canada. trading family went on to become the first medical doctor of Canadian Eskimo origin.

The community is a Settlement under the Northwest Territories Municipal Ordinance with an elected Settlement Council. The Hunters and Trappers Association is very prominant locally. Trapping is a well managed, tightly controlled local industry. The success of the community's trappers has brought relative wealth to the community, as well as a sense of pride and independence.

The site of the present community was one of several areas used as campsites by Banks Island trappers in the 1930's and 1940's. It became the focus for Inuvialuit settlement in the mid 1950's. The RCMP established a post there in 1953 and the then Department of Transport (DOT) set up a weather and communications station nearby in 1955. The DOT facility served as the post office for Banks Island and, more importantly, provided a cheque cashing and C.O.D. order and delivery facility for use by local residents. During the same period it became much easier and less expensive for local trappers and traders to fly their furs to the Delta from Banks Island via charter aircraft. By 1962 all of the Inuvialuit resident on the island were living in Sach's Harbour and the annual summer trips to the Delta via schooner had become much less common.

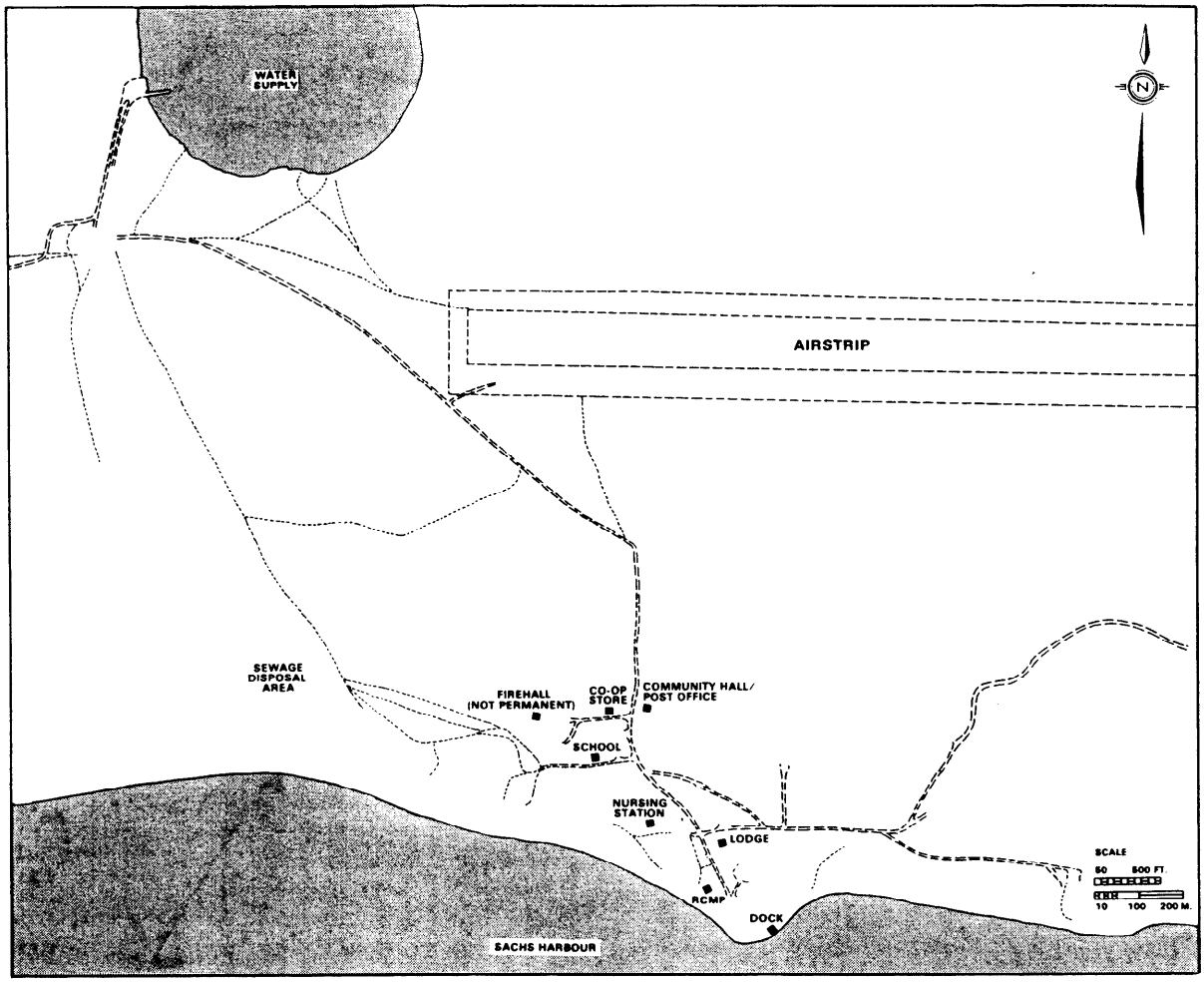


FIGURE 4.9-1 *Settlement of Sachs Harbour.*

Census data show that Sachs Harbour grew at an average annual rate of 5.2% during the period 1961 to 1976, which was between the rates of Inuvik (6.4%) and the Northwest Territories (4.2%). According to GNWT data, an even greater rate of growth (6.2% per year) was experienced during the 1976 to 1980 period, almost equivalent to growth in Tuktoyaktuk (6.5% per year) for the same period. The current population is almost 90% Inuvialuit (Outcrop, 1981). The 1976 Census revealed that Sachs Harbour had a disproportionately large population under 20 years of age (59%). This was a full ten percentage points above the average for the Northwest Territories as a whole (49%). Persons in the 30 to 59 year age groups comprised only 22% of Sachs Harbour's population whereas this same age group in the Northwest Territories was 27%. There were no people in the community over 65 years of age.

The high proportion of young people is significant. Many of these people have reached, or are about to reach, the age when they will seek income producing opportunities and form new family units. It is questionable whether the renewable resource base of Banks Island, particularly the white-fox population, can accommodate any significant increase in the number of trappers without overharvesting occurring.

As Sachs Harbour's young people increased in numbers during the latter part of the 1970's, there was increased pressure on the local housing situation, the local job market and on the already tightly controlled number of trapping opportunities. These pressures may have contributed to the decision of some people in 1979 to leave the community. Twelve individuals left Sachs Harbour and their out-migration, when do not include hunting, trapping and fishing. Banks Islanders are among the most skilled trappers in the world.

In response to a 1980 TERIS survey (Table 4.9-3), nine persons were classified into four industry areas, accounting for 66% of the total. The TERIS data does not include hunting, trapping and fishing. Banks Islanders are among the most skilled trappers in the world.

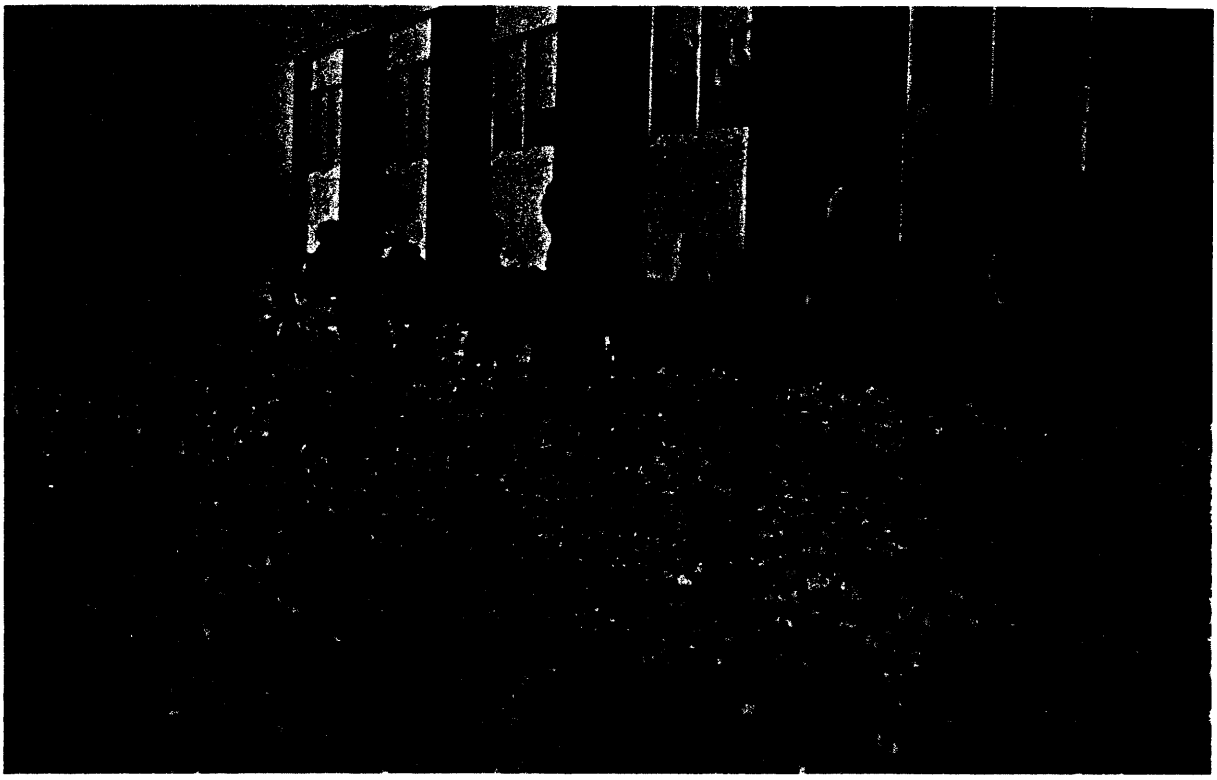


PLATE 4.9-1 *School children at Sachs Harbour. This Banks Island community has depended heavily on trapping, and earnings from White Fox have been among the highest in the world.*

TABLE 4.9-3
EMPLOYMENT SKILLS
SACHS HARBOUR 1980

Industry	No. of Persons
Catering and Lodging	3
Clerical	3
Retail & Trade	1
Social Welfare Services	1
Any Industry	1
	9

Source: TERIS, 1980.

Sachs Harbour has a relatively small business sector which provides a small number of local employment opportunities. The Ikalut Co-operative operates a retail store and local residents operate lodge, construction and airline agent enterprises. A local resident recently received a special ARDA grant to assist with the purchase of a sewage pump-out truck for his business. It will be used to carry out a municipal services contract in the community. The grant was made on the understanding that the majority of people hired in the business would be of Inuvialuit ancestry (News of the North, October 23, 1981).

The Sachs Harbour Hunters and Trappers Association has also been working closely with the Inuvialuit Development Corporation over the past two years to develop a muskox sports hunting business on the Island. This under-taking is proving to be a profitable source of income for local residents and some local businesses. However, it is also beginning to attract negative comments in the southern press and, as such, its future is somewhat uncertain.

Sachs Harbour seems to have few social problems. There are no resident social workers, community needs being met as required by social workers resident in Tuktoyaktuk. Social assistance payments to local residents are low. The amount paid out in fiscal 1981 (April, 1980 to March, 1981) was just over $100 per capita.

The facilities, services and infrastructure available in Sachs Harbour are similar to those found in many small communities in the north.

The community has a modern four room school with the capacity to accommodate 100 students (Table 4.9-4). In 1980, 37 students were enrolled. The staff complement was two teachers and one classroom assistant.

TABLE 4.9-4

SCHOOL FACILITIES PROFILE SACHS HARBOUR 1980

Enrollment	37
Teachers	2
Classroom Assistants	1
Capacity	100
Classrooms	4

Source: Department of Education, Government of the Northwest Territories; Beaufort Sea Development, An Infrastructure Analysis, 1980.

In common with most other Beaufort communities, the majority of the housing units in Sachs Harbour have been built and are owned by the Northwest Territories Housing Corporation. The Corporation had 26 housing units in the community in 1981. An additional five units were owned by the GNWT and used for staff accommodation (Outcrop, 1981).

Sachs Harbour has a small, two bed nursing station staffed by a resident nurse. A doctor and dentist make regular visits to the community. The RCMP maintain a two-man detachment in the community and local residents have been appointed to the positions of Justice of the Peace and Coroner in recent years. There is also a ten member volunteer fire brigade. It has a Bombardier mini-pumper and maintains a system of alarm boxes throughout the community.

The community obtains its water supply from a small lake about a mile from the settlement. Water is piped directly to the weather station; delivery to other buildings and homes is via tanker truck. Sewage is collected via pumpout facilities or honey bag pickup. Sewage and solid wastes are disposed of in a ravine area about a mile west of the community. The Northern Canada Power Commission operates a 700 Kw diesel generator to provide Sachs Harbour with electricity.

The community is linked to Inuvik via Kenn Borek Air Ltd.'s twice weekly air service. The Sacks Harbour airport is operated by the Government of the Northwest Territories. It has a 4,000 foot gravel runway and a nondirectional navigation beacon. The community also has a dock which is primarily used in August of each year when the annual shipment of fuel and supplies arrives from Hay River and Tuktoyaktuk.

Sachs Harbour has a local telephone system and residents can make and receive long distance calls via an Anik satellite circuit maintained by Northwestel. Until recently, the community was without radio or television. However, in September, 1981, Sachs Harbour became the first community of less than 250 people in the Northwest Territories to receive live CBC television programing. The satellite receiving and local broadcasting systems were provided by the Northwest Territories Department of Information. The community purchased its own studio equipment and is operating a local radio station using the newly installed broadcasting system. Arrangements are being made for the community to also receive the live broadcasts of the CBC regional radio network out of Inuvik (Igalaaq, 1981).

Sachs Harbour has a small museum and a community hall. The latter serves a variety of purposes. It is used for sports, movies, bingo and dances, as well as for activities associated with the White-Fox Jamboree held by the community each May.

4.10 OLD CROW

Old Crow is the only Beaufort region community located in the Yukon Territory. It is situated on the north bank of the Porcupine River just west of the mouth of the Old Crow River in the isolated northern portion of the Yukon. The community is some 280 km (176 miles) west of Inuvik and 800 km (497 miles) north of Whitehorse.

In 1981 the community had an estimated population of 219 (Government of the Yukon Territory, 1981). Most residents (about 65%) are Loucheux Dene (Vunta Kuntchin) or of Loucheux Dene background. Their ancestors have lived in the area for many generations although the origins of the present community are more recent, stemming from the establishment of a fur trade post at the mouth of the Old Crow River in 1894 (Crowe, 1974). Some residents still have strong family ties with Loucheux Dene in Fort McPherson as a result of population movements during the height of the fur-trade era in the lower Mackenzie-northern Yukon area.

Old Crow has not changed much in terms of total population over the past decade. It had a population of 206 in 1971, 224 in 1976 and, as noted above 219 in 1981. Although factual data are not at hand, it is believed that the slow growth and recent slight decline in the community's population reflect a number of factors, particularly high infant mortality, a number of deaths as a result of accidents and violence and some out-migration to other northern

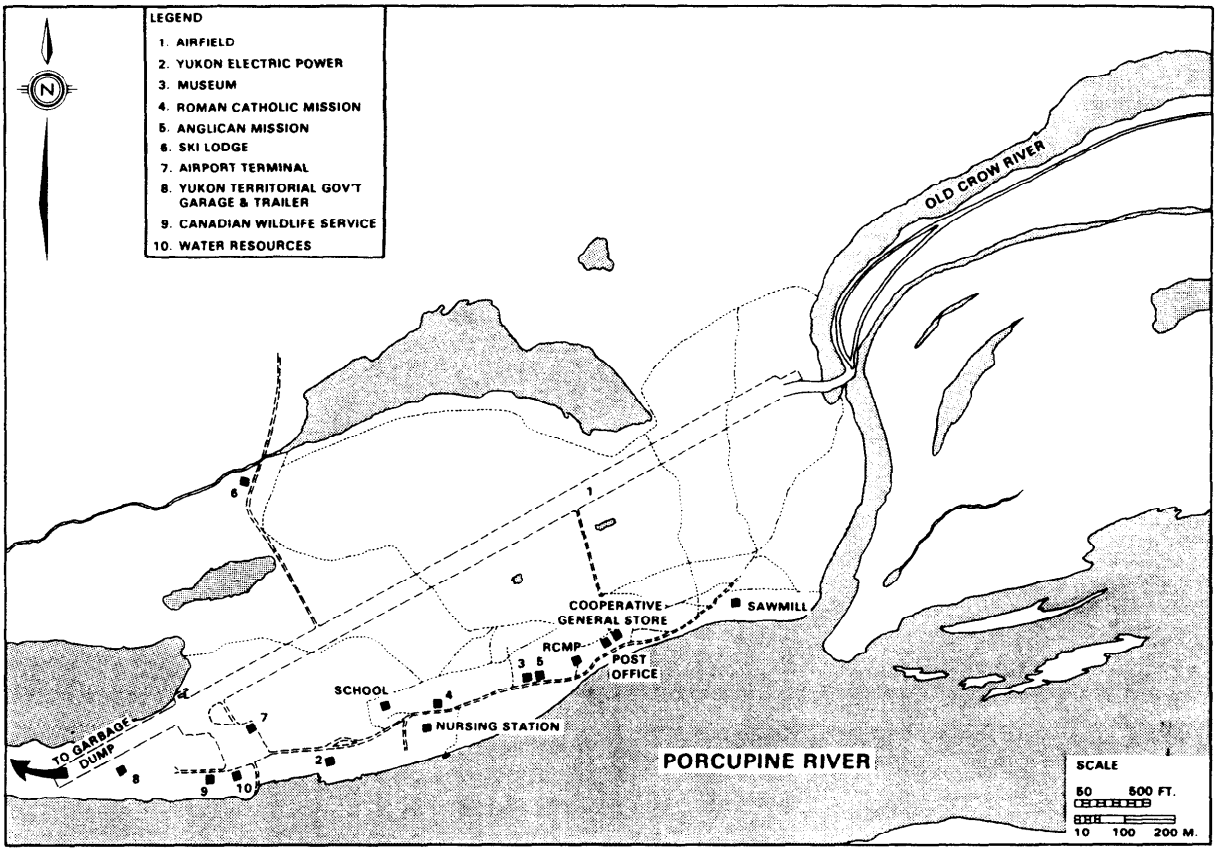


FIGURE 4.10-1 *Settlement of Old Crow.*

communities. No recent information is available on the size and characteristics of the labour force. The 1976 Census data indicate that nearly half of the population was under 20 years of age. There is no reason to believe that the current situation is much different.

Old Crow is a traditional resource harvesting community. Most residents depend upon resource harvesting for a considerable portion of their food supply and much of their cash income. Residents harvest the Porcupine caribou herd, often travelling a considerable distance to intercept it, and fish for local consumption in the Porcupine and Old Crow rivers. Most trapping activities are focussed on the muskrat population of the Old Crow flats, a low-lying, marshy area some 15 miles north of the community. Data on the community's resource harvest in recent years and additional information on the resource harvesting portion of the community's economy are presented in Chapter 5.

There are few permanent wage employment activities in Old Crow. The Band office, the Co-op store, a small motel, and the provision of local services provide most of the job opportunities for local residents. Other employment opportunities are provided by the

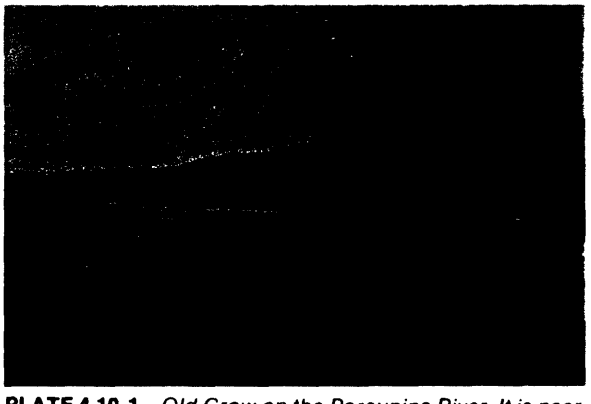


PLATE 4.10-1 *Old Crow on the Porcupine River. It is near this small Loucheux (Kutchin) village that some of the oldest evidence of human habitation in the America's have been found.*

health, education and public safety activities of government in the community, but Old Crow residents have not generally attained sufficient education and training to fill many of thise positions to date.

Old Crow has a limited infrastructure. Water supply is obtained from the Porcupine River and from wells. Sewage disposal is rather rudimentary with septic tanks and privies in general use. There is regular garbage collection. The Yukon Electric Company

has a 400 Kw diesel generator in the community for electrical power supply. Diesel fuel and other bulk items are shipped to the community via barge along the Yukon and Porcupine rivers each summer. The latest published information available on the communications and transportation systems in use in Old Crow is for 1979 (Foothills Pipe Line (Yukon) Ltd., 1979). In that year, Old Crow had 30 telephones with the capacity to add another 20. The CTC had licensed two air services to the community but service was said to be quite irregular. The Government of the Yukon Territory operates a 1,500m long gravel airstrip with basic navigational aids (nondirectional beacon, wind indicator, runway lights) immediately north of the community.

Old Crow is located south of the tree line and the white spruce in the area, although small in diameter, are adequate for building materials and fuel supply. Houses in Old Crow are of log construction and most residents heat their homes with locally cut wood. As of 1979 there were 59 housing units in the community (Foothills, 1979). It was reported that the housing situation was adequate in terms of the average number of residents per housing unit.

Old Crow has a good school offering Kindergarten to Grade 9. (It will also offer Grade 10 beginning in September, 1982). In 1979, the latest year for which data are readily available, it had an enrollment of 56 students and a complement of four teachers (Foothills, 1979). The local nursing station is staffed by one nurse and has a two bed capacity. Other medical services are provided by a doctor on regular visits from Inuvik. There is also a two man RCMP detachment stationed in Old Crow.

The Band Council is the most important community organization in Old Crow. It represents the community in land claim matters through the Council of Yukon Indians. The community is not a member of the Beaufort Sea Community Advisory Committee.

Old Crow has had some experience over the past decade in considering the positive and negative aspects of hydrocarbon exploration and development activities. There has been some hydrocarbon exploration in the Eagle Plain and Peel Plain areas to the south and southeast of the community and some residents have been employed for short periods in exploration activities (Van Ginkel, 1974). The community was also in the vicinity of a possible inland route for the Arctic Gas pipeline and had a vital interest in possible conflicts between the Porcupine caribou herd and pipeline construction activity on the Yukon North Slope. The Berger Commission held community hearings in Old Crow in 1976 and residents expressed their fears about the possible consequences of pipeline construction through their resource harvesting area and the calving areas of the Porcupine caribou herd.

In more recent years there has been less need for the community to become involved in resource development issues. Local priorities have turned instead to the settlement of outstanding land claims through negotiations conducted on the community's behalf by the Council of Yukon Indians.

4.11 CONCLUDING NOTE

One theme that runs through the foregoing material is that much of the population of the Beaufort Sea communities is young, under the age of 20. This suggests rapid future population growth and a need, therefore, to greatly expand the regional economy so that all of the current generation of young people and their descendants will be able to find meaningful work. Few young people will want to support themselves and their families entirely or largely through hunting, trapping and fishing. Even the present population has become strongly reliant on income sources other than the harvesting of renewable resources. It is unquestionable, then, that economic expansion and diversification of the kind that oil and gas development can make possible is necessary to the future welfare of the Beaufort Sea region.

CHAPTER 5

BEAUFORT REGION - THE TRADITIONAL ECONOMY

This chapter is concerned with the role of traditional activities in the lifestyles of people living in the Mackenzie Delta-Beaufort Sea communities. The term "traditional activities" is not meant to be synonymous with "lifestyle." One's lifestyle is all-encompassing and represents all facets of making a living, keeping a home, engaging in recreational pursuits, and sharing time with family and friends out on the land or in a community. Traditional activities are assumed to be those activities originating from the heritage of a native subsistence economy based on hunting, fishing, trapping, and gathering, and with travelling, camping, harvesting, and processing of resources from the land. The management of fish and game resources and lands are vital ancilliary concerns given that activities take place on the land and that success is closely related to resource availability.

Traditional land use in the full, literal sense, no longer exists. Weapons have changed and transportation has changed. Social changes have accompanied technological advances. Thus, to different degrees to different people, reasons for pursuing the activities, and the nature and duration of the activities, have changed. For example, in earlier days people hunted, trapped, and fished to survive. There were no alternate sources of food, no grocery stores, no wages to earn and no transfer payments. The good hunters were the security for people in a camp. Life was a continuous series of moves in response to the seasons and the life cycles of the game. During the 1950's, this pattern of land occupancy and use was drastically altered.

In a critique of the Area Economic Surveys conducted by members of the Industrial Division of the Northern Administration Branch of the (then) Department of Northern Affairs and Natural Resources between 1958 and 1968, Lotz (1976) observed:

> "All the surveys recorded a marked change in land occupancy and use brought about by the buildup of permanent settlements. Before the mid 1950's, most of the Inuit visited the settlements a few times a year to trade. The first school to be operated by the then Department of Northern Affairs was a former Anglican school, taken over by the government in 1948 at Tuktoyaktuk. The construction of the DEW line had a great impact across the Arctic. By the mid 1960's, most of the Inuit were living in permanent settlements, and visiting the land a few times a year. Some were using modern technology (motor toboggans and planes) to combine hunting and trapping with wage employment."

With the breakdown of the nomadic way of life came a shortening in duration of trips and shrinking of geographic area covered. Abrahamson *et al.* (1964) noted:

> "Traps are still set, but lines are shorter and are confined to land around the settlements. This land is heavily trapped while remote areas are neglected."

The traditional subsistence economy requiring nomadism was displaced by a more sedentary lifestyle confined to settlements. With this came the introduction of choices inherent in an exchange economy. Labour or goods could be exchanged for food, and survival was no longer totally dependent on successful hunting, trapping, and fishing. One could choose to pursue those activities for food, supplementary income, recreation, or social reasons if the wages from a job could provide for at least part of the necessities of life. If a person decided to strike a balance between participation in the wage economy and the traditional economy, a unique, mixed lifestyle suitable to the individual would have to be achieved. For each individual, each family, the desirable mix might be different. A person with skills, talents, or "exceptional luck" might prefer to spend most of his time on the land and take wage employment mainly to outfit himself for his land-based activities. His neighbour might be more suited to wage employment and be happier in a full time job with time off to go duck shooting, caribou hunting, or fishing in season.

It is apparent in the Beaufort Sea communities today that the native people like to live in small communities. They enjoy going out on the land with their families and friends and stay for days or weeks at a time pursuing traditional activities. A wage economy is also welcome and accepted for added economic stability. What is questionable is the degree of success that can be attained in achieving the mix between the two economies that people prefer.

Oil and gas development in the Beaufort Sea region will provide job opportunities and, in doing so, has the potential for helping people - Inuit, Dene, Metis, and others - to create a unique new lifestyle for themselves.

5.1 ORGANIZATION

This chapter puts traditional land use in perspective with regard to its continuing economic role and its demand for land and wildlife resource management.

The chapter deals with levels and trends in resource harvesting for the Northwest Territories as a whole and for the Beaufort communities. A follow-up section in Chapter 8 attempts, by employing maps, to show the geographical extent of resource harvesting in the Beaufort Sea region, and, within that region, to show which areas are important to hunting, trapping, and fishing. By superimposing the locations of oil and gas activities, one can identify areas of potential land use conflicts.

Further information on the subject of resource harvesting is available in Volumes 3A, 3B, and 3C of this EIS.

5.2 RESOURCE HARVESTING

Statistics estimating resource harvest have been used as an indicator of traditional use in the past for want of a more precise measure. Given the areal extent of traditional use and the size and distribution of the population engaged, accurate measures of true harvest have been impossible to compile. Other parameters of traditional use such as areal extent, principal harvesting areas for various species, and numbers of hunters and trappers engaged are being investigated in specific regions of the north so that, in the future, a better picture of traditional activity should be forthcoming.

Most of the statistics that are available from the Wildlife Branches of the Governments of the Northwest Territories and Yukon Territory can only be construed as estimations of true harvest. Usher (1975) discusses progressive reduction between actual kill, number retrieved, number used domestically or traded privately, and number recorded as exported or traded in his compilation of fur and game harvest statistics in the Northwest Territories and Yukon between 1915 and 1974. He goes on to look at the merits and limitations of the various data sources including, 1) Fur Export Tax Returns (in future referred to as FETR), 2) Traders Fur Record Books (TFRB), and 3) General Hunting License Returns (GHL), which have since been discontinued. Briefly, numbers that have been compiled are regarded as underestimations of true harvest owing to problems of immediate recording of kills, of recall, of reporting, and intervening use before sale in the Northwest Territories or export from the Northwest Territories. Discrepancies that exist between different sets of statistics attempting to measure polar bear harvest between 1967-68 and 1977-78 are illustrated in Figure 5.2-1. "Number of Pelts Sold" underestimates "known kill", a measure the Game Management Division considers to be highly reliable and to contain minimal sources of error, by an average value of 9.2% over the 11 year period. Although the degree of variation may differ, similar errors are expected in the other furbearer statistics. Kale's (1980) efforts to use statistical methods to obtain better information from existing harvesting data and his efforts to upgrade harvest data information systems may lead to better estimations of true harvest in the future.

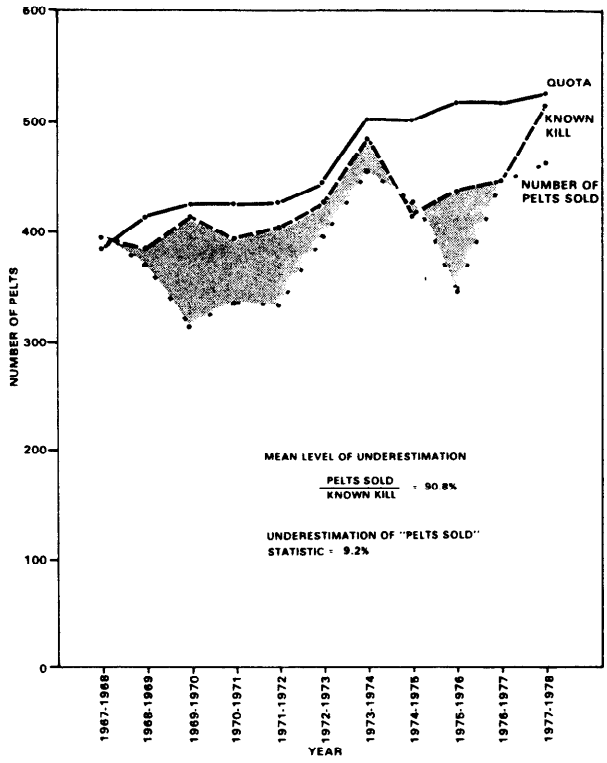


FIGURE 5.2-1 *Variations in Statistics for polar bear production, N.W.T., 1967-68 to 1977-78. Source: Wildlife Service, G.N.W.T., Yellowknife, 1981. (1) Polar bear production records. (2) Polar bear management records.*

5.2.1 TRENDS IN WILDLIFE HARVESTING IN THE NORTHWEST TERRITORIES

5.2.1.1 Fur Production

Fur summaries for the 23 year period between 1957-58 and 1979-80 were analyzed for an indication of upward or downward trend in resource harvests. depicted in Figure 5.2-2. The vertical scale is logarithmic, which means that the steepness of the lines

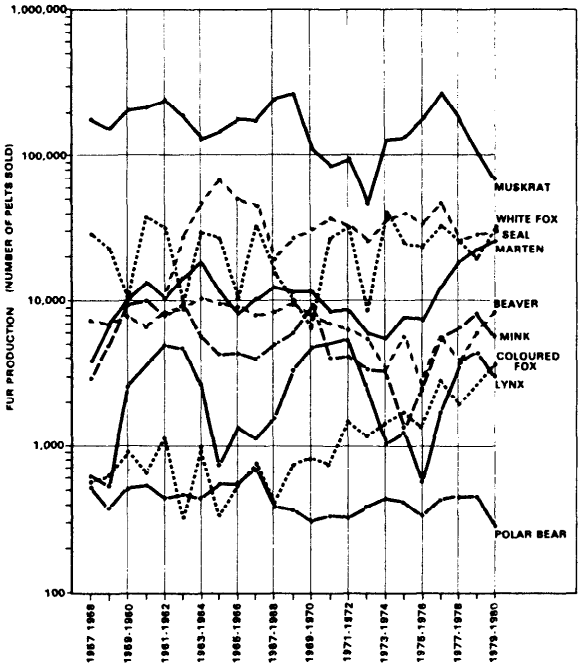


FIGURE 5.2-2 *Variations in fur production for nine species, N.W.T., 1957-58 to 1979-80. Source: Wildlife Service, G.N.W.T., Yellowknife, 1981.*

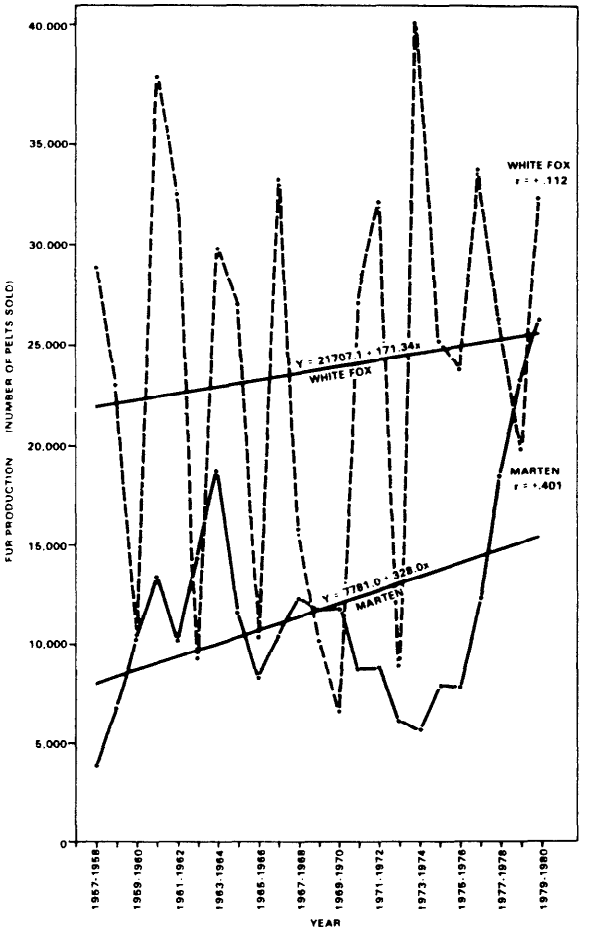


FIGURE 5.2-3 *Trends in white fox and marten production, N.W.T., 1957-58 to 1979-80. Source: Fur Summaries, Wildlife Service, G.N.W.T., Yellowknife, 1981.*

shows rates of increase or decline in harvest from year to year.

For every species, there is a conspicuous cyclicity in harvest which tends to mask the overall upward or downward trend. In order to determine the direction of the trend in harvest for each species, regression lines were fitted to the plotted points. Some of these are shown in Figures 5.2-3 to 5.2-5. It was found that for this time period, harvests are gradually increasing for white fox, marten, lynx, coloured fox, fisher, and wolf but decreasing for polar bear, muskrat, seal, beaver, mink, otter, squirrel, weasel, and wolverine.

The regression line for polar bear shown in Figure 5.2-4 indicates a yearly harvest decline of 5.72 bears in opposition to an upward pattern shown in Figure 5.2-1. This is not a contradiction. Statistics for a longer period were available for the trend analysis, and in the earlier years of this period, polar bear harvests were higher than in the later period which coincides with the life of the quota system.

Despite increased opportunities over the past ten years to take wage employment, residents of the Northwest Territories have not reduced their participation in traditional activities enough to register an overall decline in the fur harvest. Rather, the direction of hunting and trapping efforts may change from year to year for various reasons. Bisset (1974) states that:

> "In recent years, red and cross fox have assumed more importance due to fur market price increases. Black bear skins have also recently been in demand. Otter, squirrel, weasel, fisher, wolverine, and coyote are of minor importance in the fur economy of the Mackenzie Valley due to various factors such as numbers available, trapping effort and/or fur values."

In the case of polar bear, the quota system has been responsible for the decline in harvest more than any other factor.

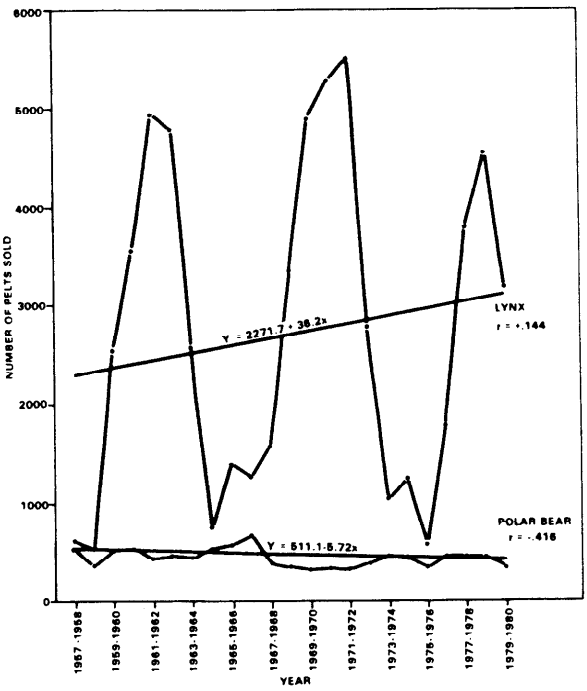


FIGURE 5.2-4 *Trends in polar bear and lynx production, N.W.T., 1957-58 to 1979-80. Source: Fur Summaries, Wildlife Service, G.N.W.T., Yellowknife, 1981.*

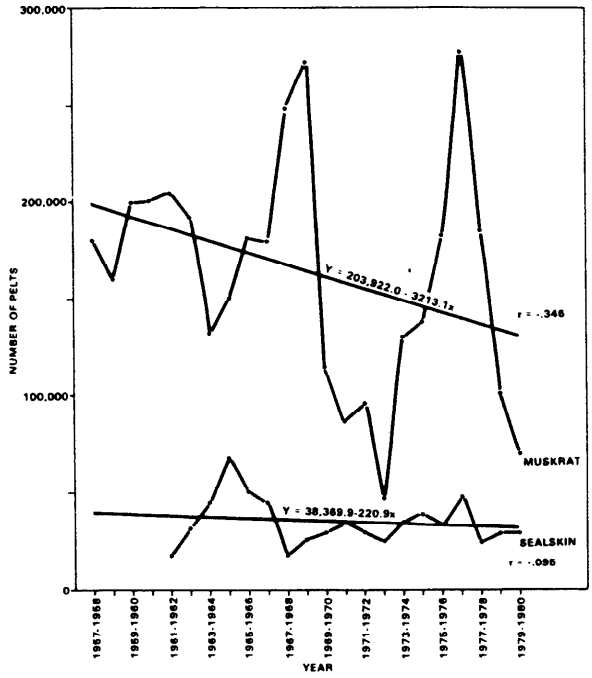


FIGURE 5.2-5 *Trends in muskrat and sealskin production, N.W.T., 1957-58 to 1979-80. Source: Fur Summaries, Wildlife Service, G.N.W.T., Yellowknife, 1981.*

5.2.1.2 Value of Fur Production

Income derived from the sale of pelts is an important source of revenue in the Northwest Territories. Changes in the contribution of the sale of pelts to the economy of the Northwest Territories between 1957-58 and 1979-80 are depicted (Figure 5.2-6) in real dollars for each year, and constant (1978) dollars, to control for the effects of inflation.

The upward trend in revenue is markedly visible. The increase was 15.5% over the first ten year period, 364% over the second ten year period, and 39% between 1977-78 and 1979-80. Accounting for inflation, there was a 6% decrease in the first period followed by an increase of 135% then 10.5%.

The eight top-ranking species in 1979-80 were graphed (Figure 5.2-7) to illustrate their comparative contributions to the economy and to show the magnitude of their growth. White fox, marten, and lynx have been the most important species in the past three years, earning collectively, $2,085,311, $3,029.120, and $3,065,548, in those respective years. The marked escalation of marten and lynx harvesting in 1977-78 reflects market conditions. In the case of lynx, the average price paid per pelt rose 103% from $80 to $163 and a further 27% from $163 to $206 between 1975 and 1977. Marten pelts increased in value by 46% from $16 to $24 over the same period. The next three species - seal, muskrat, and polar bear - have collectively contributed $1,285,920, $1,400,834, and $1,270,019 in the same three years. The value of mink production rose from $145,923 to $310,622 then fell to $231,171 whereas beaver production climbed steadily from $59,950 to $150,476 and $276,488.

The fur statistics show that harvesting of furbearers has remained a consistent source of income in the Northwest Territories over the past 23 years, despite increasing opportunities for people to engage in wage earning activities. The fur industry is, however, important to people for cultural and aesthetic as well as economic reasons. It will be seen in the community specific part of this chapter that the Beaufort communities are not exceptional to trends in the territories as a whole. The fur industry is still an important component of the Beaufort economy.

Owing to the gaps, biasing effects, and other problems peculiar to the game, fishery, and whale harvest data, discussion of harvest trends will be community

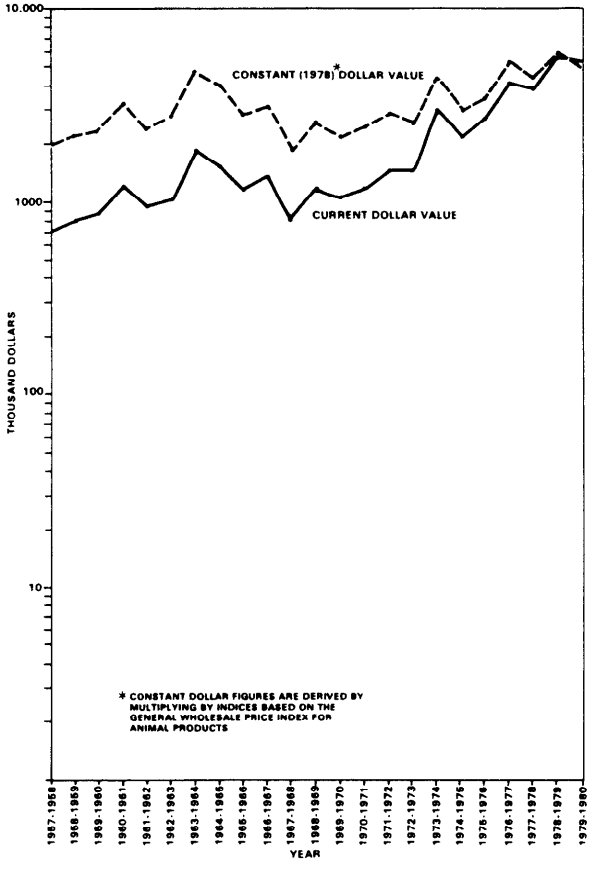


FIGURE 5.2-6 *Changes in value of fur production, N.W.T. in current and constant dollars: 1957-58 to 1979-80. Source: Wildlife Service, G.N.W.T., Yellowknife, 1981.*

specific rather than general for the entire Northwest Territories.

5.2.2 TRENDS IN WILDLIFE HARVESTING IN THE BEAUFORT SEA REGION

The chief concerns in looking at wildlife harvesting in the Beaufort Sea region are with the 1) level of participation from community to community, 2) principal species taken, and 3) level of harvest. Level of participation, which refers to the proportion of people trapping, may be used as an indicator of the role of traditional activities in the life of a community and, indirectly, as an indicator of the importance of wage employment to members of that community. In 1974, in an update of a consulting report on hunter-trapper activities (INA/MPS Associates Ltd., 1973) and his thorough area economic survey of the lower Mackenzie region (Bissett, 1967), Bissett observed that native people continued to rely on traditional activities for food and income "although wage employment and other income sources such as transfer payments and social assistance have become of major importance." Caribou, moose, bear, fish, seal, waterfowl, whale, muskoxen, reindeer, Dall sheep, lynx, beaver and muskrat are main food items in the region and have significant domestic importance. A decline in food production would suggest that an increasing proportion of food is being purchased.

5.2.2.1 Levels of Hunter-Trapper Participation by Community

Levels of participation in hunting are difficult to discern for a number of reasons. There are four kinds of big game hunting licenses, three of which are for sport hunting and require payment of fees; adherence to restrictions on numbers, sex and age class of animals; and reporting of the take. Native people and their descendents are entitled to hold General Hunting Licenses which place no restrictions on hunting big game for domestic use except in the cases of polar bear, muskoxen, barren-ground caribou, and wood bison, which have been declared to be endangered species by Order-in-Council. Holders of General Hunting Licenses do not necessarily hunt every year so the number of licenses issued per community does not correctly reflect the number of people actually hunting. Futhermore, holders of General Hunting Licenses have been asked, but are not required, to report their kill. Consequently, harvest figures reported in the General Hunting License returns represent only a proportion of the true harvest.

Statistics on the numbers of active trappers in each community are better because trappers who are serious and successful market the furs they do not wish to keep for domestic use. The numbers of trappers marketing furs may be counted.

Bissett documented the level of participation in trapping in the Mackenzie Valley by comparing the number of active trappers with total population numbers. In 1972-73, in the Indian communities of Arctic Red River and Fort McPherson, he found 20 and 103 people trapping, representing 16.9 and 14.0% of the respective populations. The Inuit communities of Aklavik and Tuktoyaktuk had 118 and 64 trappers respectively. In terms of proportion, these numbers were very similar, representing 16.1 and 10.0% of their populations. Inuvik, the largest urban centre with the greatest ethnic mix, had a population of 2,891 in 1973. Here, there were 110 trappers or only 3.8% of the population.

Participation in trapping in recent years, 1978-79 and

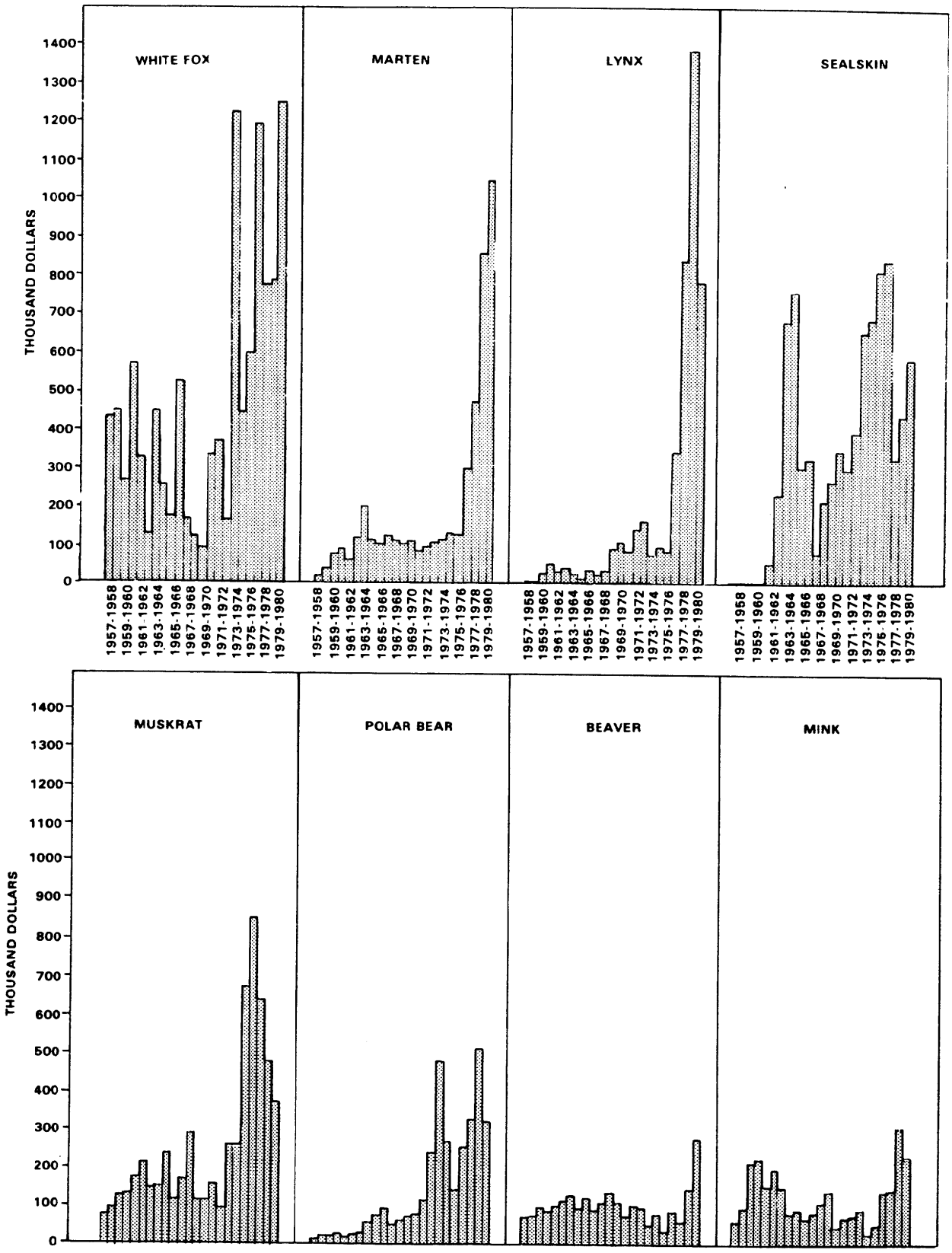


FIGURE 5.2-7 *Value of fur production, N.W.T., selected species: 1957-58 to 1979-80. Source: Wildlife Service, G.N.W.T., Yellowknife, 1981.*

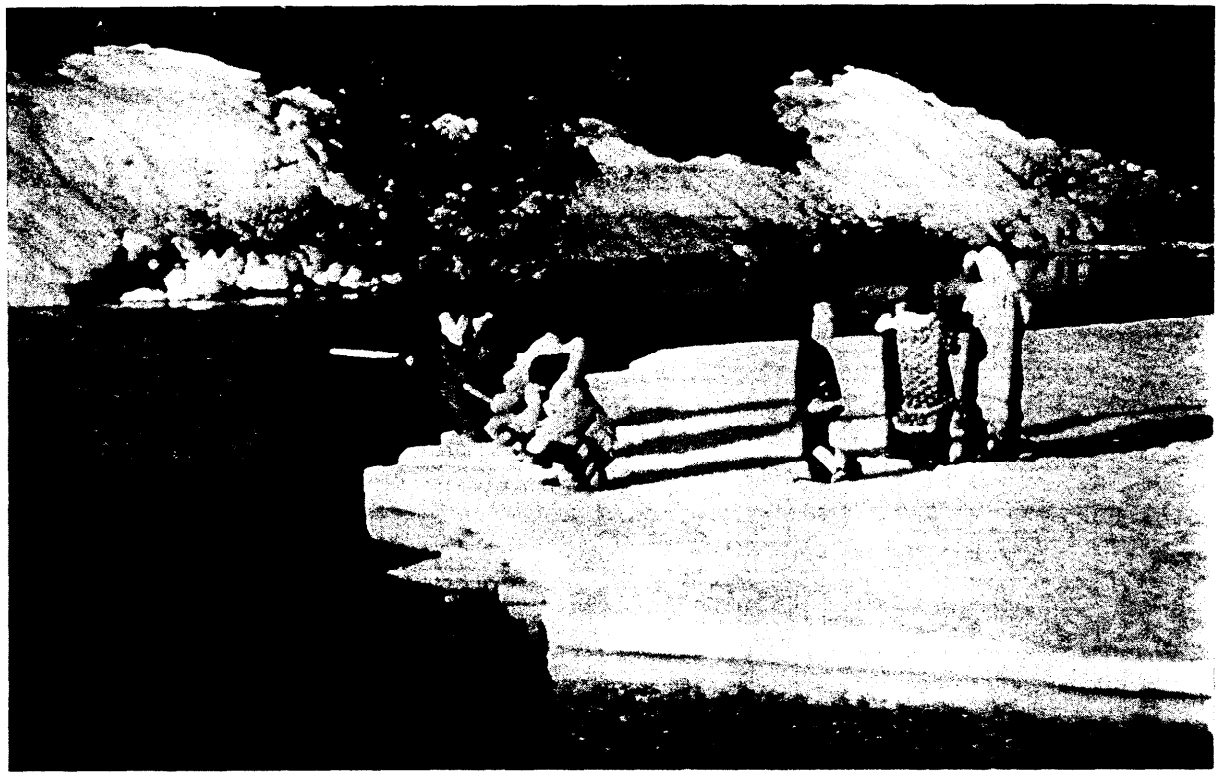


PLATE 5.2-1 *Young and old participate in the traditional economy, with children accompanying adults to camps.*

1979-80, is compared with Bissett's findings (Figure 5.2-8). The proportions have not changed significantly over five years. Of interest is the fact that for all of the communities except Inuvik, about one out of every five persons traps.

As data were available on family size in 1978 for eight of the communities, average family size was calculated and weighted by the proportion of the population engaged in trapping for each community. An estimate of the ratio of families with a member engaged in trapping to total families was made, recognizing the limitation that if more than one member of a family was trapping, the ratio would be larger. Results are shown in Table 5.2-1.

Participation in trapping is the highest in the smallest community, Arctic Red River, followed by Aklavik and Coppermine where for every two families there is at least one trapper. Holman Island, Sachs Harbour, and Fort McPherson are not much different with a ratio of one in two. Inuvik, the largest, most modern urban centre in the region with the best opportunities for wage employment, stands out as having the lowest participation rate, that is, one trapper in 7.3 families. Of course, this is not surprising given that native people are a small proportion of the total population of Inuvik. Tuktoyaktuk seems to be in a transitional stage. Here, the ratio is one trapper in 3.5 families.

Only a few people make enough money to make a living at trapping. Yet, trapping may earn the dollars needed to buy gear for hunting or supplement income from other sources and thus be of major significance to the food provider. Knowledge of income gained through trapping helps place the significance of trapping into perspective. Four income ranges are distinguished in Figure 5.2-9. The first category, "Income under $600", is that used in the Trappers Incentive Program sponsored by the Gov-

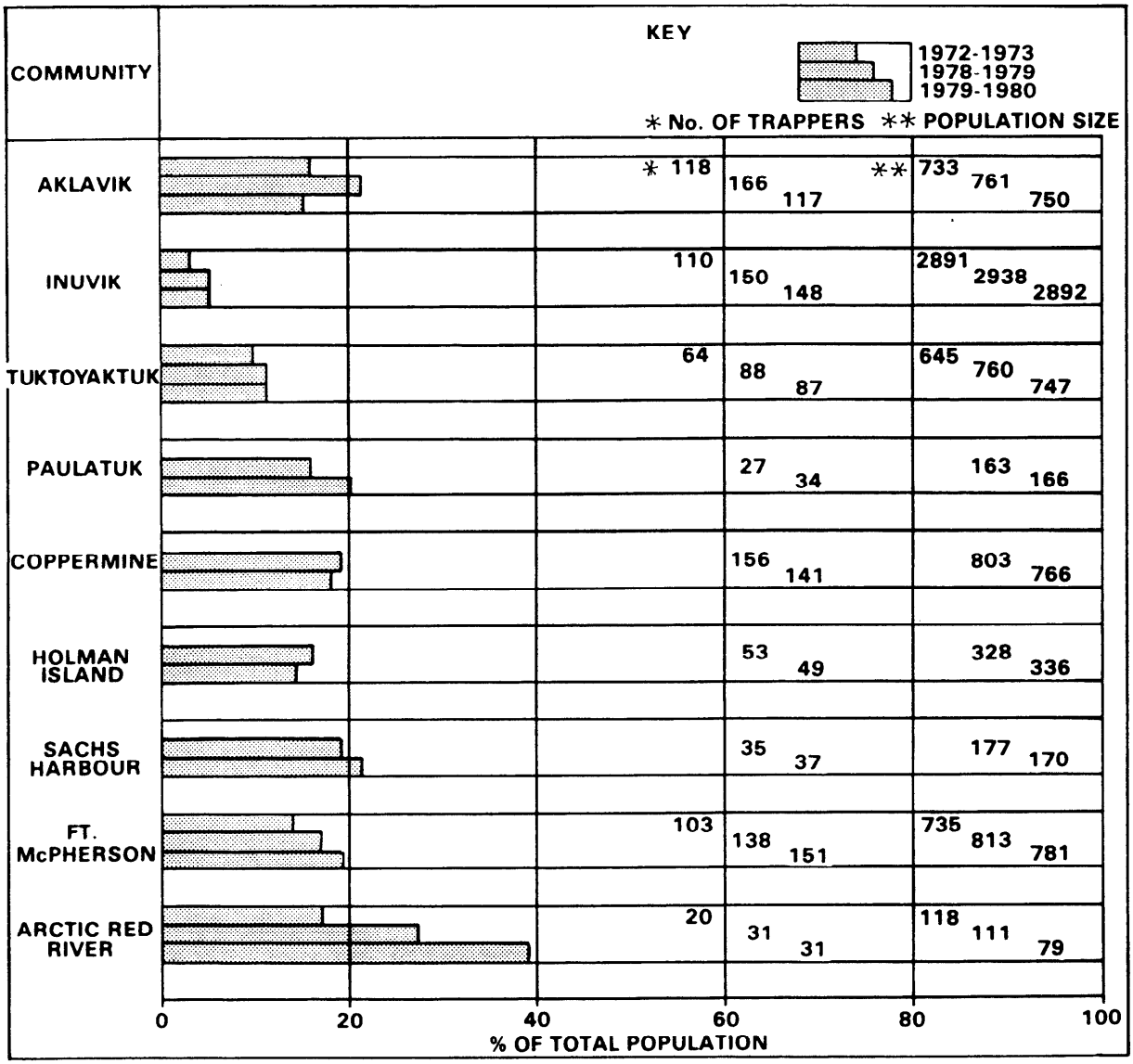


FIGURE 5.2-8 *Level of participation in trapping: Beaufort Sea communities 1972-73, 1978-79, 1979-80. Sources: Bisset D., 1974, Resource harvests - Hunters - Trappers in the Mackenzie Valley DIAND, Ottawa; Wildlife Service, G.N.W.T., Yellowknife, 1981.*

TABLE 5.2-1

ESTIMATES OF THE PROPORTION OF FAMILIES ENGAGED IN TRAPPING FOR THE BEAUFORT SEA COMMUNITIES: 1978-79

Community	% of Pop. Trapping:	Avg. Family Size	Pop. Trapping × Family Size	Ratio of Families that Trap
Aklavik	21.8	2.7	58.9	1 in 1.7
Inuvik	5.1	2.7	13.7	1 in 7.3
Tuktoyaktuk	11.5	2.5	28.8	1 in 3.5
Coppermine	19.4	2.8	54.3	1 in 1.8
Holman Island	16.1	3.1	49.9	1 in 2.0
Sachs Harbour	19.7	2.6	51.2	1 in 2.0
Arctic Red River	27.9	3.0	83.7	1 in 1.2
Fort McPherson	16.9	2.6	43.9	1 in 2.3

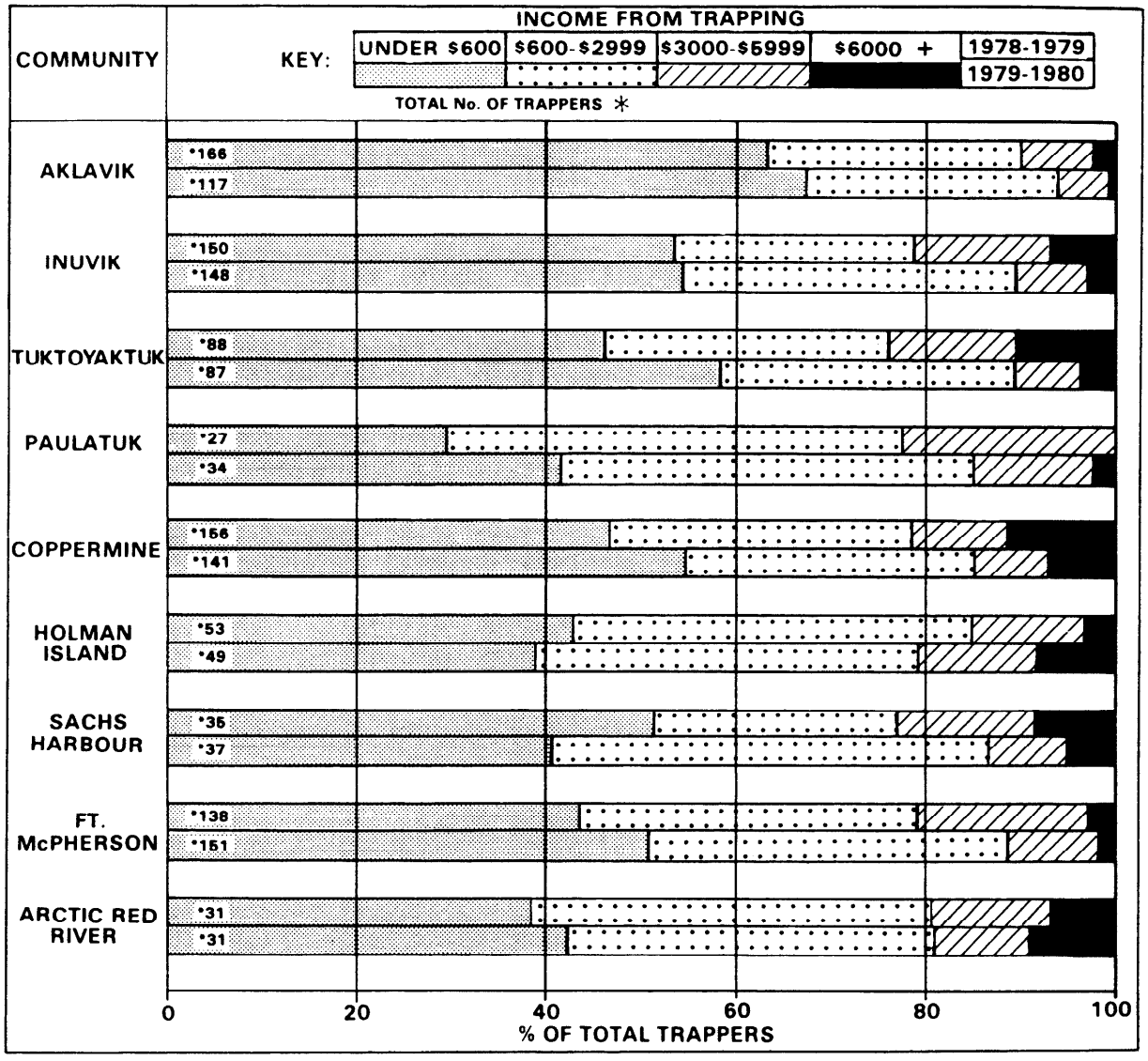


FIGURE 5.2-9 *Income from trapping: Beaufort Sea communities 1978-79 and 1979-80. Source: Wildlife Service, G.W.N.T., Yellowknife.*

ernment of the Northwest Territories. Trappers who earn $600 or more from the sale of pelts receive a cheque from the government for 10% of the value of their furs to a maximum of $300 ($3,000 fur value) and a fuel subsidy. The other groupings were arbitrarily selected to show levels of effort within the range of the data.

Although the percentages vary from one community to another, it is apparent that few people are earning very much money from trapping in the Beaufort Sea region today. In 1979-80, only 12% of all trappers earned $3,000 or more. The majority, 53.5% of all trappers, earned less than $600. The point is that people still want to trap and do trap, but, judging by individual fur revenues, most people can not and do not rely on trapping for making a living. Trapping has a role in every community, including the modern and growing town of Inuvik, where fur revenues have tended to rise and the number of active trappers has increased during the 1970's. (Details are provided in the ensuing community descriptions.) Much of the trapping effort is on a weekend or part-time basis, however, so harvest areas within travelling distance of the communities have become of utmost importance.

Although participation in trapping may be less in both Inuvik and Tuktoyaktuk, the percentage of trappers in each income range does not differ significantly from the distributions for other communities in either 1978-79 or 1979-80. Aklavik stands out from the other settlements as having a smaller proportion of trappers in the $6,000 and over category and a larger population of trappers in the under $600 range, but the numbers are not great enough to be significant at a 95% level. Similarly, it could be observed that in 1978-79, Paulatuk had fewer trappers in the under $600 range but more in the $600 to $5,999 range, and Coppermine had more in the $6,000 and over range. In 1979-80, Sachs Harbour had a smaller proportion of trappers in the under $600 range and more in the $600 to $2,999 range. The variations were not significant at the 95% level. What this means is that regardless of the different total levels of participation in trapping, the commitment to trapping as measured by proportions of people attaining certain income ranges, is similar in all of the Beaufort Sea communities.

The significant point, in terms of probability theory, is that the proportion of trappers in each income range are not what would be expected by chance. In both 1978-79 and 1979-80, the proportion earning under $600 was far in excess, and the proportion earning $6,000 or over was far below, the levels indicated by probability theory. Moreover, a change occurred between 1978-79 and 1979-80. The proportion of total trappers meeting the two highest income categories declined significantly. If this decline is part of a longer term trend, it could mean that people who have considered trapping to be an important component of their income are changing their priorities with regard to how to earn a living. Monetary requirements that are not met by the sale of pelts must be met by other means. These could be wage employment; sales of crafts or personal belongings; government grants, subsidies, and transfer payments; gambling; or bootlegging.

5.2.2.2 Level of Harvest Of Principal Species

Owing to ecological factors and tremendous geographical spread, the composition of the harvest varies between communities. Detailed descriptions follow on harvest trends, principal species, and important harvest areas on a community specific basis. Considering that the real objective is to view present resource utilization and surmise what future hydrocarbon development could do to alter what is currently happening, the focus is on identifying the species of major importance to the economy today, seeing where those species are being harvested today, and using that knowledge to recommend steps needed in resource management and planning.

To this end, then, the six year period from 1974-75 to 1979-80 has been selected for detailed analysis of furbearer harvests. Game statistics have more gaps in recent years, hence data from 1964-65 to the present have been used.

At this juncture, some introductory and summary statements will be made.

When people go out on the land they may have a primary purpose in mind but they often engage in a number of activities. For example, people who are trapping will be hunting and perhaps fishing, and people who are whaling will be fishing, shooting geese, or hunting as opportunities, time, or need dictate. If activities could, in fact, be viewed as belonging to a heirarchy according to purpose, trapping and whaling would be primary and would be followed by hunting and fishing in that order. While waiting for whales one would shoot geese or would fish. Viewed in reverse order, if one were fishing and caribou passed nearby, fishing would likely be abandoned for pursuit of the caribou.

Trapping requires a great deal of preparatory activity, considerable outlay for equipment and supplies, and a more stringent time commitment than the other traditional pursuits. While whaling is a summer activity, trapping for species other than muskrat and beaver is mainly a winter activity that requires knowledge and skill in winter travel, camping, and survival and specialized skill in setting a trapline and handling pelts. For these reasons, it is believed that trends in the harvest of furbearers are as good an indicator as can be found of the degree of commitment residents of a community have toward continuing traditional activities.

Level of harvest may be influenced by a number of factors other than commitment to trapping and hunting. Species abundance and distribution, quirks of fashion and market price, favourability of weather and/or ice conditions, and presentation of opportunities play a part in harvest success. Consequently, peaks and dips in harvest levels must be expected and care needs to be taken that they are not mistakenly construed to be signs of more major upturns or downturns in harvesting activity.

Over the six year period from 1974-75 to 1979-80, revenue from the sale of pelts tended to rise in Inuvik, Tuktoyaktuk, Fort McPherson, Arctic Red River, and Coppermine. Earnings in Aklavik seemed to have levelled off. Here, the trend was upwards measure in current dollars, yet downwards in in terms of 1978 constant dollars. Revenues were widely variable in Paulatuk, Holman Island, and Sachs Harbour. These communities earn much of their fur income from white fox, which are noted for tremendous population fluctuations. Change in white fox abundance was the more likely cause of harvest variations

than trapper interest and effort. These findings lead one to believe that the fur industry is not in decline in the Beaufort Sea communities. People consider trapping to be part of their way of life and will continue to trap despite other opportunities to earn a living. As other income sources fulfill monetary needs, people will need to earn less from trapping, but they will still trap.

Meat production in the Beaufort Sea communities can only be estimated because actual kill statistics are nonexistent. Using an "adequate protein" standard from Health and Welfare Canada and recognizing that native populations "consume much more than the minimum 'adequate' amount of protein" (Science Advisory Board of the Northwest Territories, 1980), assessments were made of the nutritional value of the estimated harvest of all food species. The results of such assessments are likely low, as protein equivalents from fish harvests were not included in them.

Protein production was judged to be adequate in the Beaufort coastal communities — that is, Tuktoyaktuk, Paulatuk, Holman Island, Sachs Harbour, and Coppermine. These communities are self-sufficient through harvesting. This parallels the finding of Kupfer and Hobart (1978) in a study of Coppermine that, "Outside wage work did not eliminate hunting nor reduce the meat supply." Bowles (1981) summarizes:

> "The subsistence hunting supply of meat was not reduced in spite of increased wage and the absence for two-week periods of the wage workers. There was a significant investment of Gulf wages into new equipment and as a result, meat was easier to acquire. Increased use of snowmobiles decreased the need for dogs and the meat necessary to feed them. In addition, the particular pattern of work rotation permitted workers the time to continue the traditional subsistence activities."

The Mackenzie Delta communities of Inuvik, Aklavik, and Fort McPherson were not self-sufficient from meat production but could be a little better off than the analysis suggested owing to the use of fish. Arctic Red River, another Delta community, seemed to be in a marginally sufficient position from meat production. Fishing would make the difference between self-sufficiency and dependence on store-bought food.

People living in the Delta communities rely less heavily on hunting for meat than those residing in more isolated places. However, hunting is still important and care should be taken that prime hunting areas are not adversely affected by industrial development.

Traditional activities are an integral part of life in the Beaufort coastal communities, where people are capable of providing a considerable proportion of their support through meat production, fishing, and trapping. Income from other sources contributes to improving the standard of living and making life more comfortable: view the use of skidoos, boats with outboard motors, trucks, and aircraft as common substitutes for travel by foot and dog team.

Hydrocarbon development will not undermine the role of traditional activities as long as the marine animals, fish, and wildlife resources remain able to sustain the needs of the people. What is not known, and this is crucial to the maintenance of traditional activities in the Beaufort region, is how much harvest pressure the resource can stand. Davis, Finley and Richardson (1980) explain the problem: "In order to actively manage a species or population to permit sustainable harvests, it is necessary to know the size of the population and the sustainable yield (either present, maximum or optimum) of that population. The numbers of individuals available for harvest can then be determined. The foregoing is a simplification. In practical terms several types of information are required." These include geographical distribution of the species over the year, status and size of populations, population structure and dynamics, and kill statistics.

The Science Advisory Board of the Northwest Territories admitted in 1980 that research leading to a better understanding of harvest limits was needed because "the current level of information about stocks, harvests, and population dynamics is inadequate to permit management of any species at the optimum sustained yield level."

It should be added that information about harvests should include an estimation of the number of animals injured or killed but not retrieved. For example, the Science Advisory Board reported: "Losses as high as 50% have been recorded for ringed seal hunted during the open water season." These losses due to sinking or escape after wounding constitute a tremendous wastage of wildlife resources as the animals are likely removed from a breeding population and certainly removed from the traditional economy. Wastage also occurs when people are unable to get meat caches home. Hunters may kill more caribou than they can conveniently transport and cache the extra meat for future removal. If not retrieved in time, the meat will rot. Addressing these research needs for the prevention of overharvesting will be a most important task if traditional activities are to remain a part of the Beaufort lifestyle.

As long as the resource base is healthy, people of the Beaufort coastal communities will continue to hunt, fish and trap. Wage employment will be welcomed as a source of income; a few people will take on full-time

positions; but more people will prefer part-time work on a rotational basis. If harm were to come to the renewable resource base so that people became dissatisfied with their harvests and their lives, it would be difficult to predict what would occur. Some people might take advantage of the government's Outpost Camp Program and move onto the land while others might emigrate from the small communities to seek wage employment in Inuvik. Those remaining in the communities which were still heavily dependent on hunting, trapping and fishing would probably not lead a particularly satisfactory lifestyle.

It is also difficult to predict what would happen to traditional activities after a period of continued wage employment. After earning enough money to buy a boat, outboard motor, skidoo, television set, video recorder, and other desired goods, some people might quit their jobs and return to hunting and trapping until they needed money for something else. Other people might like to further a career and move away from land-based activities. It is important that people in the Beaufort Sea communities will have a choice in the economy of the future.

PLATE 5.2-2 *Beluga are hunted in waters near the Mackenzie Delta. Preserving muktuk.*

5.2.3 COMMUNITY REVIEWS

The foregoing general reviews of harvesting trends in the Northwest Territories and the Beaufort Sea region need to be supplemented by more detailed community by community reviews of harvesting trends in order to enable community specific assessments of the effects of Beaufort development to be made. The following community reviews are presented in considerable detail and may not, therefore, be of interest to the reader who is mainly interested in the more total picture. Such readers would be advised to proceed to Section 8.7, which deals with the consequences of development for resource harvesting by each of the Beaufort communities.

5.2.3.1 Aklavik

Over the 1974-75 to 1979-80 period, the dollar value of total fur production in Aklavik has risen (Table 5.2-2). However, this does not necessarily mean that the fur industry is strong and growing. Pelts are generally becoming more valuable so that a decline in harvest numbers could still result in an increase in revenue. A number of years might pass before revenues reflect a decline in the number of people participating or a decline in level of participation. Additionally, when the effects of inflation are controlled through a conversion of all of the figures to constant 1978 dollars, the trend in value of fur production in Aklavik is downwards rather than upwards.

This decline in real income would have a more serious effect on Aklavik's economy if the people trapping were full-time trappers with no other sources of income. One could suspect from the income levels attained by trappers that most are part-time trappers. The fact that more than 60% of the total trappers in Aklavik make less than $600 and that less than 10% make $3,000 or more (see Figure 5.2-9) supports the contention that most trappers in Aklavik are part-time or weekend trappers and that they must have other sources of income to support their families.

During this six year period, the furbearers that have produced the greatest income for Aklavik trappers are muskrat, mink, lynx, and coloured fox in that order. While marten and white fox harvests were regular, their income contributions were considerably less. This is illustrated in Table 5.2-3.

Caribou and moose are the principal game species taken by residents of Aklavik. Meat supplements come from harvests of geese and ducks, bear, sheep, muskrat, and beaver. The current relative importance of each species cannot be discerned because data are not available on harvests of birds, moose, or sheep for at least three of the years from 1976-77 to 1979-80, and without the data, it looks as if game harvests are declining. However, owing to these data gaps and the fact that in 1977-78, the last year for which General Hunting License records are available, only 1% of the recipients of General Hunting Licenses (four people) reported their kills, no conclusions may be made about the continuing importance of the game harvest in Aklavik. It could be noted that the mean number of caribou killed between 1974-75 and 1980-81 declined to 277, from a mean of 699 between 1964-65 and 1973-74. Using an edible weight equivalent of 100 pounds per caribou, 277 caribou

TABLE 5.2-2

VALUE OF FUR PRODUCTION IN AKLAVIK: 1974-75 TO 1979-80

Year:	1974-75	1975-76	1976-77	1977-78	1978-79	1979-80
Current $ Value	79,844	175,839	229,037	222,965	252,848	83,543
(1978) $ Value*	107,310	216,634	274,844	255,295	252,848	76,024

*Constant dollar figures are derived by multiplying by indices based on the General Wholesale Price Index for animal products as follows:
1974-75 = 1.344 1975-76 = 1.232 1976-77 = 1.200 1977-78 = 1.145
1978-79 = 1.000 1979-80 = 0.910

TABLE 5.2-3

AKLAVIK
VALUE OF PRODUCTION
FOR PRINCIPAL SPECIES:
1974-75 TO 1979-80

Principal Species:	Value (Six Years)*: ($)
Muskrat	636,578.00
Mink	137,820.00
Lynx	109,569.00
Coloured Fox	106,929.00
Marten	23,717.00
White Fox	9,984.00

*Estimated by using the highest harvest numbers between FETR, and TFRB, statistics and weighting by average value per pelt obtained in Aklavik or, if unavailable, the average value obtained in the NWT for each given year.

divided by the population of Aklavik in 1979 (750 persons) yields only 36.9 pounds per person per year or 0.10 pounds per day. Calculating a protein equivalent for this amount of meat using the Science Advisory Board for the Northwest Territories' number of 0.27 (1980), one gets a low 10 pounds of protein per person per year or 0.03 pounds per day.

Whaling has been and continues to be an important activity for Aklavik residents. In the 11 year period from 1969-70 to 1978-79, an average of about 29 beluga whales had been taken every summer with very little year to year variation. Six domestic whaling camps have been used at Niakunak (Figures 8.6-1 and 8.6-2) on Mackenzie Bay stretching from King Point on the west to Tattirgak near the entrance to Shallow Bay. In July 1981, the Wildlife Officer from Aklavik encountered at least nine families in the Bird Camp-Shingle Point area. Two of the men left their families to hunt caribou when word was received that about 2,000 caribou were spotted up the coast by Firth River. While whaling, people also fish and hunt moose up the Babbage, Blow, or Running rivers. Aklavik residents fish all along the coast between Herschel Island and Shingle Point.

Seal and polar bear are not important to Aklavik's economy now. Since the beginning of the polar bear quota system in 1967, Aklavik has not been allocated a community quota from the Northwest Territories. The community has a quota of five from the Yukon Wildlife Branch which applies to bears taken from 134°W longitude to the Alaska border.

Trappers and hunters use a broad area extending in all directions from Aklavik (Fig. 5.2-10). Some areas, however, seem to be key because of a combination of productivity, variety of usable species that may be found there, and accessibility.

The Mackenzie Delta is exceptionally productive for muskrat, beaver, and waterfowl and is used most intensively from April to June for the spring muskrat hunt. Owing to its numerous channels, virtually the entire area is accessible for people with motorboats. "Ratting camps" have been established for seasonal use often in good fishing locations. The main channels of the Delta and the Mackenzie River are very important to anadromous fish. Entire populations from upstream fisheries may migrate to the sea soon after break-up for summer feeding and then return to freshwater for spawning and overwintering (Volume 3A). Other species may run upstream during most of the summer with peaks in late August and September, spawn, then return to the sea by November. People usually stock up with fish during the fall. They may go to "Big Eddy" on Husky Channel or known spawning areas such as "Fish Hole" on the Rat River or "Fish Hole" on Cache Creek for Arctic char. Once there is ice on the river in mid October, people put nets down for Arctic cisco and herring. Ducks and geese use the Delta for breeding and may be hunted here in spring and summer. During the

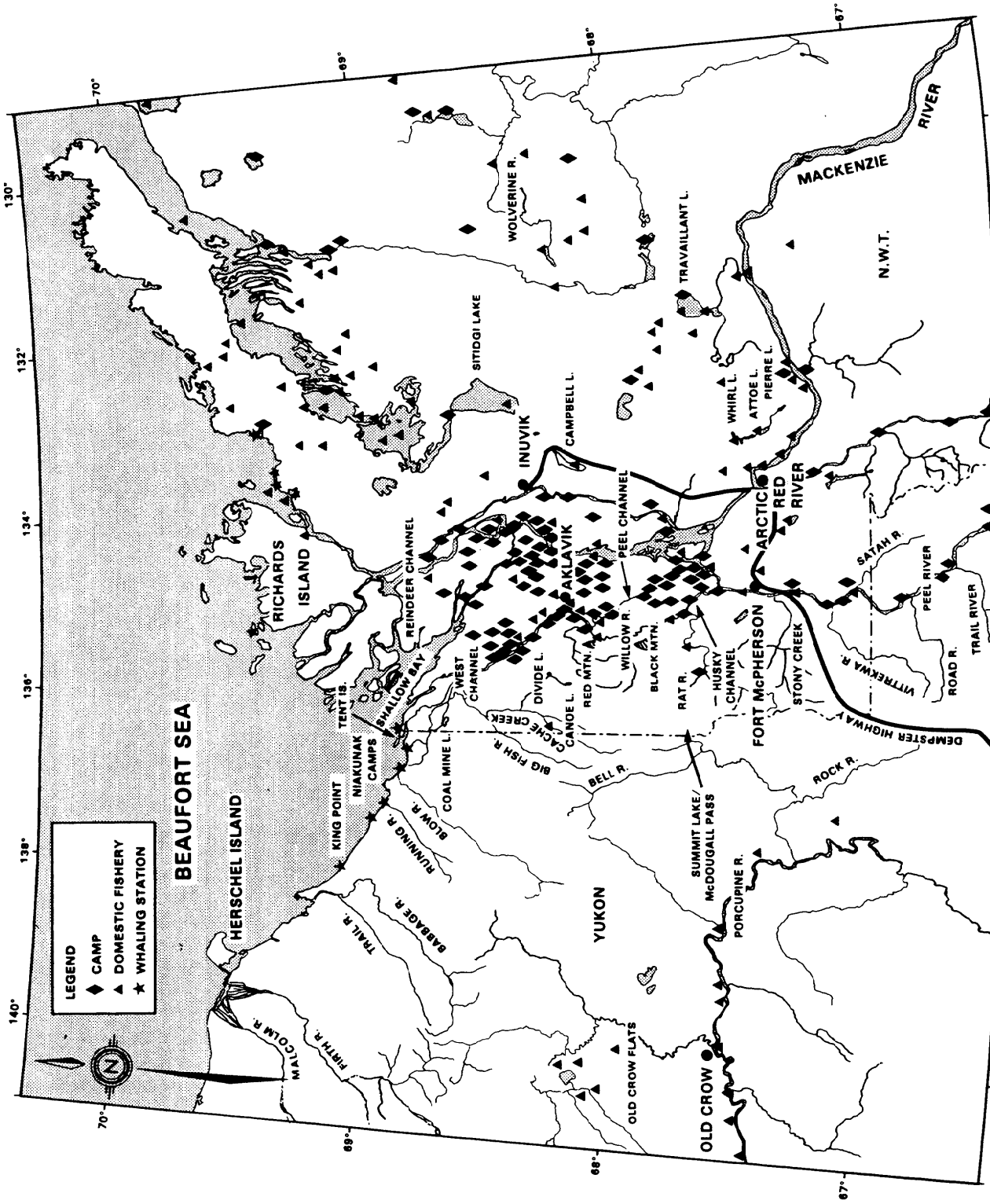


FIGURE 5.2-10 *Resource harvesting sites important to Aklavik, Fort McPherson and Old Crow.*

winter, that is from November to March, when travel must be by snowmobile, truck along the winter road, or dog team, the remainder of the principal species and beaver are trapped and moose are hunted. Most of the people who use camps on the Delta are weekenders. With a skidoo, they may travel 50 km. from town.

Ducks, geese, and swans use the shallow waters around Shallow Bay for breeding, moulting, and staging. In summer, geese are taken by people whaling on Mackenzie Bay and in the fall, when populations are the highest due to staging, geese are hunted on the coastal flats north of Shallow Bay and on the north side of Reindeer Channel. Richards Island is occasionally hunted for muskrat in spring, moose in fall, or trapped for lynx and Arctic fox.

Aklavik residents used to travel to the Travaillant Lake area which is one of the best marten areas in the north. Here, they trapped mink, lynx, and coloured fox along with marten, beaver, and wolverine, and hunted moose and caribou. Today, people occasionally charter a plane to the Wolverine-Anderson rivers area out of the Tuktoyaktuk or Fort Good Hope Registered Group Trapping Areas for marten.

The Campbell-Sitidgi lakes area is occasionally visited for winter hunting and trapping. Mink are trapped here along with white fox, marten, and wolverine and moose, caribou, and grizzly bear may be hunted. Sitidgi Lake is important for lake trout and whitefish; hence traditional campsites may be found on the east shore. Access is from the Delta via the Campbell Lake-Sitidgi Lake Divide or by charter aircraft.

A few men from Aklavik used to travel to the Whirl, Attoe, and Pierre Lakes area east of Arctic Red River in winter for mink and marten and hunt caribou and moose in conjunction with trapping. Travel was by snowmobile or dog team from the Mackenzie River via Tsital Trein Creek or Pierre Creek and the numerous chains of lakes. According to the Wildlife Officer in Aklavik, this is no longer practiced (K. Hickling, pers. comm.).

Part of the Porcupine caribou herd migrates northwards in spring using what is known as the Richardson Route (Volume 3A). The movement is northwards from the southern end of the Richardson Mountains along the nearly snow-free crests to about the level of the Vittrekwa River. From here, there is a broad northwest movement to calving areas in the British and Barn mountains. The animals spend the summer on the North Slope tundra but as the summer progresses, make a slow movement along the coast towards the Delta. The fall migration is southwards through the Richardson Mountains to winter ranges. Aklavik residents hunt caribou year round. Where they go depends on animal availability. If few animals come to Red Mountain, the common name for Mount Gifford, the foothills adjacent to Aklavik, or the Black Mountain (Mount Goodenough) area in the spring, hunters will travel by snowmobile to the coast by Herschel Island. In May or June, people may take boats up to the coast and go as far as Komakuk Beach west of Herschel Island. If there is snow on the coast, they may take a skidoo in the boat. Valleys such as the Babbage River, Running River, or Blow River may be hunted. If hunters return with good news, others will go. Coal Mine Lake, at the edge of the Delta southeast of Tent Island, is a favoured spot in summer. Owing to their proximity and location just west of Aklavik, Canoe Lake, Divide Lake, Willow River, and Martin Creek may be visited throughout the rest of the year. Aircraft are occasionally chartered for hunting trips to the Canoe Lake area if people have money and if there is not enough snow to travel by skidoo.

In 1980-81, the caribou did not come to the Aklavik area. People drove trucks with skidoos to Inuvik then hunted the Bluenose Herd. They harvested about 65 animals.

Moose may be found in many lowland areas where drainage is northwards to Mackenzie Bay such as Firth River Flats, the Trail River, Babbage River, Anker Creek, Blow River, and Cache Creek. Additionally, alluvial flats of the Bell and Rock rivers which flow westwards out of the Richardson Mountains and the Willow River and Stony Creek which flow eastwards support the growth of willow and alder and provide good winter range for moose. The Richardson Mountains are an important winter hunting area for caribou and moose. When caribou are scarce, efforts may be directed to Dall sheep which are found in the most rugged areas where there is good escape terrain. Although numbers are not recorded anywhere, the Wildlife Service estimates that between 10 and 15 sheep are taken per year by Aklavik residents (P. Latour, pers. comm.). Five or six people may travel through McDougall Pass to hunt and trap just north and west of the pass on the western slopes of the Richardson Mountains. Marlen, wolverine and wolf are taken, with access via the Rat River.

Lynx are occasionally taken in the uplands areas between the Delta and the mountains. Some trappers run traplines into the mountains for coloured fox using valleys such as Cache Creek and Big Fish River which are noted for coloured fox.

5.2.3.2 Inuvik

In the period from 1974-75 to 1979-80 the total value of fur production for Inuvik rose (Table 5.2-4).

TABLE 5.2-4

VALUE OF FUR PRODUCTION IN INUVIK: 1974-75 TO 1979-80

Year:	1974-75	1975-76	1976-77	1977-78	1978-79	1979-80
Current $ Value	98,699	214.946	301,227	383,735	616,123	179,464
(1978) $ Value*	132,652	264,813	361,472	439,377	616,123	163,312

*Constant dollar figures are derived by multiplying by indices based on the General Wholesale Price Index for animal products as follows:
1974-75 = 1.344 1975-76 = 1.232 1976-77 = 1.200 1977-78 = 1.145
1978-79 = 1.000 1979-80 = 0.910

Although the trend was basically upwards, statistics show a steady increase in harvest levels to a peak in 1978-79 and a drop the following year. Considering the size of this decline, it is of interest to take a closer look at how individual fur prices have affected harvest levels for each species and to see the extent to which prices may have been responsible for the decline. Fluctuations in trends in price and concurrent harvest levels are shown in Table 5.2-5 for muskrat - the most important species to Inuvik trappers; marten and coloured fox - species bringing in over $200,000 each over the six year period; and mink, white fox, and lynx - species producing well over $100,000 each over the same time period.

PLATE 5.2-3 *Polar bear hunting is an important source of cash to small Arctic communities. Polar bear skin drying at Sachs Harbour.*

The direction of change in harvest follows price changes perfectly for coloured and white fox. On the other hand, some harvest levels continued to rise despite price decreases and some harvest levels declined although prices continued to climb. For example, in 1976-77, the lynx harvest increased 91% (65 from 34 pelts) although prices dropped 3.4% ($182 to $176 = $6) and the following year the marten harvest rose 243% (547 to 1,877) despite a price drop of 10% ($32 to $28 = $4). The 1978-79 muskrat harvest dropped 52% from the previous year (54,328 to 26,348) and continued to drop another 41% (26,348 to 15,516) despite rises in price from $3 to $4 and later $5. Similarly, the marten harvest declined 40% (663 to 398) in 1975-76 and another 71% (2,160 to 626) in 1979-80 despite rising prices from $17 to $23 and later $44 to $46. A 37% increase in the price of mink ($44 to $60) did not stabilize the mink harvest which fell 63% (1961 to 720 pelts) in 1979-80.

If fur prices did influence harvest levels in 1979-80, the only harvests that may have been depressed owing to price were coloured fox, white fox, and lynx. This may have been true in the case of coloured fox, for a finding of the Science Advisory Board of the Northwest Territories (1980) was that, "Colored foxes demonstrate the closest association between catches and prices of any species examined. The probability of getting such high correlations by chance alone is less than one in a thousand. This suggests that trapping effort is related to price . . ."

Statistical analyses of relationships between harvest levels and price for the other species showed that "For most species, prices and numbers fluctuate independently of each other (correlation coefficients not significantly different from zero)." With respect to white fox, the Board remarked, "Statistical tests

TABLE 5.2-5

FLUCTUATIONS IN FUR PRICE AND HARVEST LEVEL: INUVIK

Species:/Year:	1974-75 ($)	1975-76	1976-77	1977-78	1978-79	1979-80
Muskrat:					**	**
Price	1.72	UP	UP	UP	UP	UP
Harvest		UP	UP	UP	DOWN	DOWN
1979-80 Price	5.17					
Marten:		**		*		**
Price	17.60	UP	UP	DOWN	UP	UP
Harvest		DOWN	UP	UP	UP	DOWN
1979-80 Price	45.90					
Coloured Fox:						
Price (Cross)	33.76	UP	UP	UP	UP	DOWN
Price (Red)	32.14	UP	UP	UP	UP	DOWN
Harvest (All)		UP	UP	UP	UP	DOWN
1979-80 Prices	93.97					
	63.14					
Mink:			*			**
Price	29.01	UP	DOWN	UP	UP	UP
Harvest		UP	UP	UP	UP	DOWN
1979-80 Price	60.58					
White Fox:						
Price	18.79	UP	UP	DOWN	UP	DOWN
Harvest		UP	UP	DOWN	UP	DOWN
1979-80 Price	51.36					
Lynx:			*			
Price	80.89	UP	DOWN	UP	UP	DOWN
Harvest		UP	UP	UP	UP	DOWN
1979-80 Price	196.11					

Note: Prices are the average prices obtained in Inuvik for the year according to the TRFB Statistics, Wildlife Services, GNWT.

* Denotes years where the harvest increased despite price drops

** Denotes years where the harvest decreased despite price increases.

show that there is no relationship between the size of the annual catch and the prices per pelt....There is no evidence to suggest that the cause of the decreased catch is decreasing abundance. There is evidence to suggest that trapping efforts have decreased." The latter comment was not expanded upon. Finally, in the case of lynx, the Board concluded that availability of lynx is directly related to population cycles in snowshoe hares and that the "rise and fall of numbers in the harvest is clearly a function of availability, which is totally unrelated to price." The record price in 1978-79 for lynx (Inuvik trappers received an average of $358 per pelt) was a dictate of fashion which was a windfall for Mackenzie Valley trappers.

Other phenomena are thought to have contributed to the decline in fur production in 1979-80. The muskrat population in the Mackenzie Valley was severely decimated in the spring of 1977 by an outbreak of tularemia. With a smaller population and fewer breeding animals, it would be reasonable that catches would be reduced in 1978-79 and later years until the population was able to breed up to previous levels. Explanations are not available from other sources on the decline of the marten harvest in 1979-80. It is plausible that marten were overharvested, particularly between 1977 and 1979, when catches were 1,877 and 2,160, respectively, in contrast to previous years when harvest levels were 663, 398, and 547.

Overall, the recent drop in fur production in Inuvik seems to be the result of a combination of temporary species specific factors such as price, normal population fluctuations, disease, and possible overharvesting.

Although compared to other Mackenzie Delta-Beaufort Sea communities, the level of participation in trapping in Inuvik is the least, there is no conclusive evidence that the industry is declining. There were more active trappers in Inuvik between 1978 and 1980 than Bissett counted in 1972-73 (Figure 5.2-8). Trappers attained higher income levels in Inuvik than Aklavik in both 1978-79 and 1979-80, although the proportions in Inuvik making $6,000 or over, and between $3,000 and $5,999 decreased and seemed to fall into the $600 to $2,999 range in the second year. The upward trend in value of total fur production over the recent six year period points out that trapping is still an important part of Inuvik's economy.

The principal game species taken by Inuvik residents are caribou and moose. Geese, ducks, ptarmigan, and the occasional bear or grouse add variety to the diet. In terms of edible weight, harvests of muskrat often exceed harvests of caribou. It is not possible, however, to estimate from the number of muskrat pelts sold what the actual kill was or how many rats were eaten domestically. The same is true for beaver. Dall sheep have been hunted by Inuvik residents in the past but the Wildlife Service believes that this is not a current activity.

As with Aklavik, recent trends in the relative importance of game species cannot be determined owing to missing information on harvest levels for moose, geese, ducks, ptarmigan, and grouse for three years since 1976-77, and for caribou in 1976-77. General Hunting Licenses were returned by 97 hunters, or 33% of the number of people to whom they were issued in 1977-78, so the problem of underestimation of kill due to reporting is less acute in Inuvik than Aklavik that year.

Game returns available indicate slight upward trends in the harvest of caribou and bear other than polar bear, between 1964-65 and 1979-80, and all birds between 1970-71 and 1977-78; and a small downward trend in the harvest of moose between 1964-65 and 1977-78. Measured in terms of edible weight, trends were downwards between 1974-75 and 1979-80 for the total of all of the birds, caribou, moose, bear, sheep, seal and lynx, excluding muskrat and beaver, and the total including muskrat and beaver. It is probable that trends would be reversed if all kills had been reported in later years. Using the numbers that could be generated to represent edible weight in pounds and the number of hunters returning General Hunting Licenses in 1977-78, that is, 97, a very rough estimate of average returns of meat from hunting and trapping could be obtained (Table 5.2-6). The numbers are not good but show that average returns are well below Bissett's estimate of 1971-72. He estimated that total meat production in Inuvik was 53,229 pounds. Given 25 hunters, the average number of

TABLE 5.2-6

ESTIMATED AVERAGE RETURNS PER HUNTER AND PER CAPITA FROM MEAT PRODUCTION FROM HUNTING AND TRAPPING: INUVIK

Year:	1974-75 (lbs)	1975-76 (lbs)	1976-77 (lbs)	1977-78 (lbs)	1978-79 (lbs)
Edible Weight:*	44,290	29.226	25,887	33,279	27,254
Average Return Given 97 Hunters:	457	301	267	343	281
Weight With Muskrat and Beaver:	72,904	78,105	83,041	62,615	43,058
Average Return Given 97 Hunters:	752	805	856	646	444
Population Size:				2,938	2,892
Per Capital Meat Production:				21.3	14.9

* Weight calculations were made using the following species and edible weight equivalents taken from Bissett, (1974) and modified with the aid of R. Hall and R. Tinling, Wildlife Service, GNWT, August, 1981.

Species and edible weight equivalents in pounds: Ptarmigan (1.0), Geese (3.5), Ducks (1.6), Grouse (1.00, Barren-Ground Caribou (100.0), Moose (450.0), Dall Sheep (75.0), Black or Grizzly Bear (100.0), Seal (31.0), Polar Bear (175.0), Lynx (18.0), Beaver (18.0), and Muskrat (1.0).

pounds per hunter was 2,129 pounds. Given 97 hunters in 1974-75, the estimated average meat production was 752 pounds including muskrat and beaver but only 457 pounds without them.

The seal harvest exceeded 26,000 pounds in 1964-65 but has since dropped drastically so that in the six year period between 1974-75 and 1979-80 there were no harvests recorded in four years and levels were low, 217 pounds and 124 pounds in two years. If the statistics are correct, seal are no longer important to the domestic economy of Inuvik. Polar bear pelts have been exported from Inuvik in six out of the past seven years according to Fur Export Tax Returns. In comparison to other furbearing and game animals, polar bear is not a principal species.

Beluga whaling continues to be an important summer activity for the people of Inuvik who use camps at Kendall Island and on Kugmallit Bay. Over the past six years, the average number of whales taken from Kendall Island and all the camps in the Kugmallit Bay area except Tuktoyaktuk was 52.5 with a standard deviation of 14.5 (Fraker and Fraker, 1981). A 1,500 pound Beluga whale represents about 651 pounds of blubber and muktuk and 239 pounds of meat (Sergeant and Brodie, 1969). The average whale harvest, therefore, yields about 34,178 pounds of blubber and muktuk and about 12,548 pounds of meat. Kittigazuit and East Whitefish Station are also used by Inuvik residents as summer fish camps.

Inuvik residents use some of the same resource areas as Aklavik residents with the same seasonal patterns (Figure 5.2-11). In 1981 there were only five year-round trappers living off the land working out of Inuvik. The rest were mainly weekend trappers with camps on the Delta. People use the Delta intensively in the spring for muskrat, in spring and summer for waterfowl, and in winter for coloured fox, mink, lynx, and beaver. Fishing is very important, Moose may be taken anywhere but the area between the Delta and Husky Lake is noted for being good for moose year-round. Particularly in the fall, geese are hunted north of Reindeer Channel. Ducks, geese, and swans use the shallow shorewaters around Shallow Bay for breeding, moulting, and fall staging.

The Travaillant Lake area has been very important for all of the principal species trapped in winter -particularly marten. One trapper has established a camp at Tenlen Lake which he works by snowmobile using an overland route along the old CN cut line and associated water systems. Another serious trapper has a camp by Caribou Lake and another is well to the northeast of Tenlen Lake. These men may use chartered aircraft to get to their camps in the fall if the ground is not ready for winter travel. Caribou and moose are hunted during the course of the season. Fishing occurs year round at Travaillant Lake, "but often it is intensified in the fall and winter when fish are preserved for winter use by trappers, hunters and dog teams. Gill netting is the primary means of harvesting fish, which are usually dried or frozen for future use. The mouth of the Travaillant River is fished for inconnu, broad and humpback whitefish during open water season. Travaillant Lake is fished year-round for lake trout, broad and humpback whitefish" (NLUIS, 1976).

The Campbell-Sitidgi lakes area is occasionally used in winter. Marten, mink, and white fox may be trapped here along with wolverine. Caribou, moose, grizzly bear, and wolf are hunted. As noted before, Campbell and Sitidgi lakes are important fisheries. Whitefish and Arctic grayling are taken for domestic and commercial purposes in Sitidgi Lake and lake trout are sport fished. Access from Inuvik is along the Campbell Lake-Sitidgi Lake Divide but there is some use of chartered aircraft.

Inuvik trappers used to travel further east to the Crossley Lakes region for marten. Some prime areas that have been noted are Hyndman Lake, the confluence of the Anderson and Carnwath rivers, and the area east of the Anderson River.

Marten and mink were also trapped and caribou and moose were hunted in the Whirl, Attoe, and Pierre lakes area. Some trappers took lynx in the upland area between the Delta and the foothills of the Richardson Mountains and some ran traplines into the mountains for coloured fox.

The Richardson Mountains are not as important now for winter hunting of caribou and moose. Like residents of Aklavik, Inuvik hunters may charter aircraft to visit the Canoe Lake area. Some people take boats out towards Shingle Point for caribou after break-up using Reindeer Channel to get to the west side of the Delta. Caribou are hunted in the Coal Mine Lake area in summer as they tend to be abundant there if anywhere.

5.2.3.3 Tuktoyaktuk

The value of fur production rose in Tuktoyaktuk between 1974-75 and 1979-80. During this period one could note, as with Aklavik and Inuvik, a marked escalation of revenue in 1978-79, followed by a drop to pre-1977 levels in the most recent year for which statistics are available (Table 5.2-7).

The most important furbearing species to Tuktoyaktuk's economy during the entire period are listed in rank order in Table 5.2-8 together with revenue earned.

As previously discussed in the case of Inuvik, it is known that a decrease in the price paid for coloured

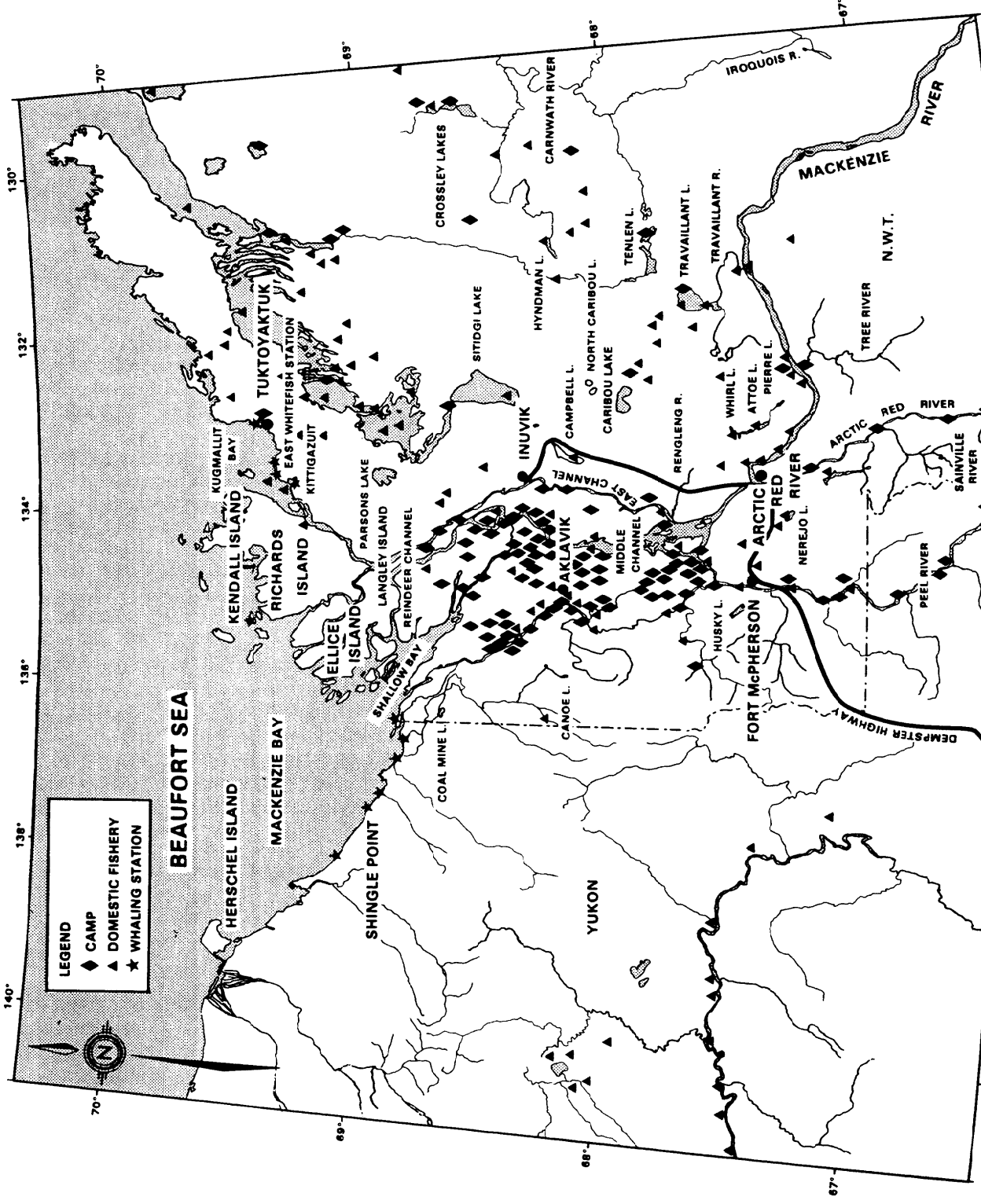


FIGURE 5.2-11 *Resource harvesting sites important to Inuvik and Arctic Red River.*

TABLE 5.2-7

VALUE OF FUR PRODUCTION IN TUKTOYAKTUK: 1974-75 TO 1979-80

Year:	1974-75	1975-76	1976-77	1977-78	1978-79	1979-80
Current $ Value	35,694	82,821	118,163	95,121	210,876	107,965
(1978) $ Value*	47,973	102,036	141,796	108,914	210,876	98,248

*Constant dollar figures are derived by multiplying by indices based on the General Wholesale Price Index for animal products as follows:
1974-75 = 1.344 1975-76 = 1.232 1976-77 = 1.200 1977-78 = 1.145
1978-79 = 1.000 1979-80 = 0.910

TABLE 5.2-8

TUKTOYAKTUK VALUE OF PRODUCTION FOR PRINCIPAL SPECIES: 1974-75 TO 1979-80

Principal Species:	Value (Six Years)*: ($)
White Fox	224,398.00
Coloured Fox	155,745.00
Polar Bear	98,683.00
Marten	95,656.00
Muskrat	52,941.00
Wolf	10,979.00

*Estimated by using the highest harvest numbers between FETR, TFRB, and Game Management Division statistics and weighting by average value per pelt obtained in Tuktoyaktuk or, if unavailable, the average value obtained in the NWT for each given year.

fox correlates well with the number of pelts taken. Tuktoyaktuk trappers did receive lower prices for coloured fox and did harvest fewer in 1979-80. This made a significant mark on total revenue as coloured fox rank second in terms of dollar value in the Tuktoyaktuk fur harvest. Although the Science Advisory Board (1980) found no relationship between the harvest of white fox and price, and suggested that trapping efforts were more influential on the size of catch, it should be noted that the price for white fox also declined in 1979-80 from the previous year. The harvest dropped from 1,037 to 594 pelts.

Prices paid for polar bear pelts dropped from $1,450 to $1,100 in Tuktoyaktuk but because the number taken has been stabilized by the Game Management Division's quota system, revenues do not change enough from year to year to significantly affect the total value of fur production. Tuktoyaktuk's regulation quota has been 22 since 1973-74 and the number of polar bears taken has ranged from 17 to 22 throughout that period. Residents of Tuktoyaktuk have four additional special tags from the GNWT and an additional quota of four polar bear from the Yukon for the area west of 134°N longitude, provided the animals are shot on the sea ice rather than on the shore.

Prices paid for marten increased from around $19 in 1974-75, to $40 in 1978-79 and $47 in 1979-80. The size of catch escalated to numbers like 805 and 919 in 1977-78 and 1978-79, when prior levels had been 83,198, and 109 between 1974-75 and 1976-77. The reduced catch in 1979-80, 587 pelts, does not parallel the trend in price and could reflect, as the Science Advisory Board suspects, a depletion of stock. Biological information is not available, however, to confirm this.

There is evidence that trapping effort declined in Tuktoyaktuk between 1978-79 and 1979-80. The number of trappers remained about the same (88 to 87) and the proportion of the population trapping remained the same (11.5% to 11.6%). What changed was level of participation. Whereas in 1978-79, 10 trappers made $6,000 or over and 12 made between $3,000 to $5,999, the following year only three made $6,000 or over and six attained the second category. On the other hand, the number of people earning under $600 increased from 40 to 51. It is not known if trappers made less money because they tried as hard but were less successful, they tried as hard but the prices were down, or they did not try as hard and spent less time. It is plausible that trapping efforts

were depressed owing to increased wage employment opportunities in Tuktoyaktuk.

Information about the harvest of moose, geese, ducks, ptarmigan, and grouse by Tuktoyaktuk residents is incomplete for three years since 1976-77 as it is for other communities. Under-estimation of actual kill due to a low proportion of returns is a lesser problem than for Aklavik or Inuvik as 52% of the General Hunting Licenses issued in 1977-78 were returned. The numbers are considered to be low, nevertheless, and inferences from the data must be made with great caution.

Caribou is the staple in the diet. In 1979-80, caribou were estimated to supply 155,500 pounds of edible meat to the community. On a per capita basis, if the meat were shared equally amongst the population which numbered 747 in 1979, this represents 208 pounds per person for the year or 0.57 pound per day per person. Given the protein content of caribou is 0.27 (Science Advisory Board of the Northwest Territories, 1980), daily protein intake from caribou alone is 0.15. This amount exceeds Health and Welfare Canada's standard for daily "adequate" protein intake of 0.077 pounds. In that the overall trend in caribou harvest since 1964-65 is upwards, one may conclude that country food continues to be important to the residents of Tuktoyaktuk despite changes in the ability to pay for store-bought food brought on by more wage employment opportunities.

Although harvest levels for geese, ptarmigan, and ducks in 1977-78 were less than half the numbers taken in 1975-76, the overall trend in harvest since 1970-71 is upwards. Ptarmigan are taken at any time of year as opportunities arise but special efforts are made for shooting geese and ducks. Families anticipate the spring arrival of waterfowl and combine bird shooting with "ratting" at that time of year.

Prior to 1974-75, there were regular reports of moose kills every year, with the numbers reaching as many as 35 (an edible meat equivalent of about 15,750 pounds) in 1967-68. Since 1974-75, only three moose have been reported killed - all in 1977-78. The Wildlife Service has estimated that between March of 1978 and June of 1979, three other moose were harvested by Tuktoyaktuk residents. If an average of three moose were taken a year and if the meat were shared equally within the community, this would reduce to a per capita share of (3x450/747) 1.8 pounds - an insignificant amount compared to caribou. The moose harvest was found to have declined since 1964-65, but not many moose were ever taken in the area.

The number of muskrat pelts traded as recorded in the FETR or TFRB statistics is not a good estimation of the actual harvest, the amount of meat available for domestic consumption, or the amount of meat actually consumed. More rats are killed than the number of pelts traded - the difference being a result of nonretrieval, domestic use of the pelt, or ruining of the pelt by poor handling. On the other hand, not all of the muskrats killed for pelts can be eaten owing to difficulties of putting the meat up and preserving it for future use while operating out of a camp. It must suffice to say that muskrat is an important food item, that the harvest has been on an upswing since 1964-65, but that the numbers taken by Tuktoyaktuk residents are much lower than those taken in the Delta.

When the first beluga whales of the year are spotted, it is a time for great excitement in Tuktoyaktuk. Whaling is conducted out of Tuk Harbour itself or from other whaling stations in Kugmallit Bay. In the eleven year period from 1969-70 to 1979-80, an average of 48.2 whales, with an edible weight equivalent of 31,378 pounds of blubber and muktuk and 11,520 pounds of meat, has been taken (Fraker and Fraker, 1981). The year to year variability is high (a standard deviation of 22.5 gives a coefficient of variation of 46.7%) because whale movement patterns are dependent on ice conditions which may allow or prevent whales from entering Kugmallit Bay and the Tuktoyaktuk area.

According to the number of skins trading, sealing has declined in importance for Tuktoyaktuk as it has throughout the Northwest Territories since "there was almost a total collapse in the sealskin market during 1977-78" (Science Advisory Board of the NWT, 1980). Since 1974-75, the yearly sale of sealskins in Tuktoyaktukhas been less than 20 and has averaged at 8.8 with a standard deviation of 6.1. In the ten year period prior to 1974-75, the average was much higher at 80.1 with a standard deviation of 112.2. Information is not available on the current domestic use of seal, but it is recognized that the meat, oil and skin have had traditional importance.

Overall, food production from hunting and trapping in Tuktoyaktuk shows an upward trend between 1974-75 and 1979-80 as does the value of fur production. It will be important to monitor these trends over the next few years to see if changes will occur as a result of more wage employment in the vicinity of the community. Even though people may have less time to hunt and trap, harvests may continue to rise. Trappers and hunters may become more effective with the purchase, rental, or charter of more sophisticated weapons and equipment. Snowmobiles and aircraft may take a higher toll of animal populations. Harvests may also decline if more people decide not to go out on the land.

Following the decline of the fur trade and the beginning of DEW line construction in 1955, there was a reduction in the area used by Tuk residents for hunt-

ing and trapping. Introduction of the snowmobile led to a subsequent reoccupation of territory that inspired Usher (1976) to say, "This temporary abandonment and subsequent reoccupation of range is perhaps more evident and dramatic in the Tuktoyaktuk area than anywhere else in the western Arctic."

As in the past, the coastal area between Pelly Island and Cape Bathurst continues to be a major trapping and hunting zone (Figure 5.2-12). It is the chief winter trapping area for the most important furbearer, white fox, and encompasses the edge of the ice floe where seals may periodically find open water in winter and spring, where polar bear may hunt them and where men may hunt both seal and polar bear. The northeast coast of Cape Bathurst is known to be particularly good for hunting polar bear because the floe edge may be as near to shore as 8 to 16 kilometres but people do not go that far anymore. One family resides at North Star Harbour on Harrowby Bay which has traditionally been known to be good for seal hunting. Nearer to the community, the strip between the north tip of Richards Island and McKinley Bay is known to be good for hunting polar bear. People will go particularly if they hear that bear are around. Seal hunting used to entail camping but nowadays people take a run up to Toker Point by skidoo. In summer, whaling takes place in the rich and shallow waters of Kugmallit Bay near the mouth of the east branch of the Mackenzie River and from Tuktoyaktuk itself. Geese are hunted all along the coast in this zone and further west to the channels and coastal flats of the lower Mackenzie Delta. The most intensively used areas are, however, within 40 km of the community, that is, from Kittigazuit to Warren Point and on the Eskimo (Husky) Lakes.

The Bathurst Peninsula has been becoming increasingly important as the prime area for hunting caribou. Animals of the Bluenose Herd calve and summer in the peninsula, along its base, and to the east in the Smoking Hills, while the area from the Mason River to the mouth of the Horton River is noted for caribou at calving time. The people of Tuktoyaktuk rarely travel as far as the Bathurst Peninsula now. Weekenders use the area south of Liverpool Bay - that is, the Rufus Lake-Kaglik Lake area - and the Moose and Smoke rivers area for caribou and moose hunting. Wolves are also hunted in the Rufus Lake area. Owing to the problem of differentiating caribou from reindeer, there are restrictions on caribou hunting nearer the settlement within the Mackenzie Reindeer Grazing Reserve. Only General Hunting License holders may hunt caribou within the reserve. The season is open for six weeks between the Eskimo (Husky) Lakes and the Kugaluk River in the months of November and December but year-round within the reserve east of the Kugaluk River.

The Husky Lakes area has great social significance to the community for spring muskrat hunting; goose (yellowlegs), swan, and duck shooting; and recreational fishing. In a report to DIAND in 1977, Interdisciplinary Systems Ltd. commented, "From all reports, the annual spring trek to Eskimo Lakes, to 'jiggle' for trout, is an event looked forward to with much anticipation by the people of Tuktoyaktuk. It heralds the coming of spring and is regarded as their holiday. There is therefore a strong and undeniable emotional attachment to this area similar to the attitude towards parks and favoured recreation areas that one might expect to find among residents of most southern Canadian communities." The lakes support domestic and commercial fishing and may be under greater pressure for sport fishing in the future as a resident of Tuktoyaktuk has established a tourist camp by one of the middle lakes.

In contrast to the "coast" people, the "bush" people of Tuktoyaktuk trap marten and coloured fox inland in the vicinity of and east of the Kugaluk River. The area north of the Wolverine River, particularly Crossley (Slavey) Lakes, and the Anderson River area are excellent marten habitat. (1976) Usher made some remarks about Tuktoyaktuk trappers in these areas. He said, "Formerly it was the practice to run marten lines straight from Tuktoyaktuk into that region (as well as from Kugaluk and Stanton, when those camps were occupied), although mainly coloured foxes were taken on the northern or northwestern part of those lines. Now, marten trappers go to the prime marten area in the fall, staying until Christmas, and run short lines out of their camps in that area. Whereas trappers of white foxes on the coast tend to run the same lines year after year, because martens are a more sedentary species, marten trappers rotate their lines over the years to avoid overtrapping. There are about five active marten trappers in Tuktoyaktuk, all of them among the most active trappers and hunters in the community and among thsoe most dependent on the land. They are extremely concerned about adequate environmental protection for their area."

Muskrats may be trapped in the area north of the Wolverine River and geese may be spring hunted in the Smoke River area. Moose and caribou may be hunted along the traplines in the entire area. The lower parts of the valleys of the Miner and Kugaluk rivers and the Smoke and Anderson river areas are good moose winter range.

Usher (1976) also reported that:

> "Fish have traditionally been an important part of the diet for both people and dogs at Tuktoyaktuk. The harbour at Tuktoyaktuk itself is a prime source of fish, and virtually no family fails to set nets in the harbour during the whitefish run."

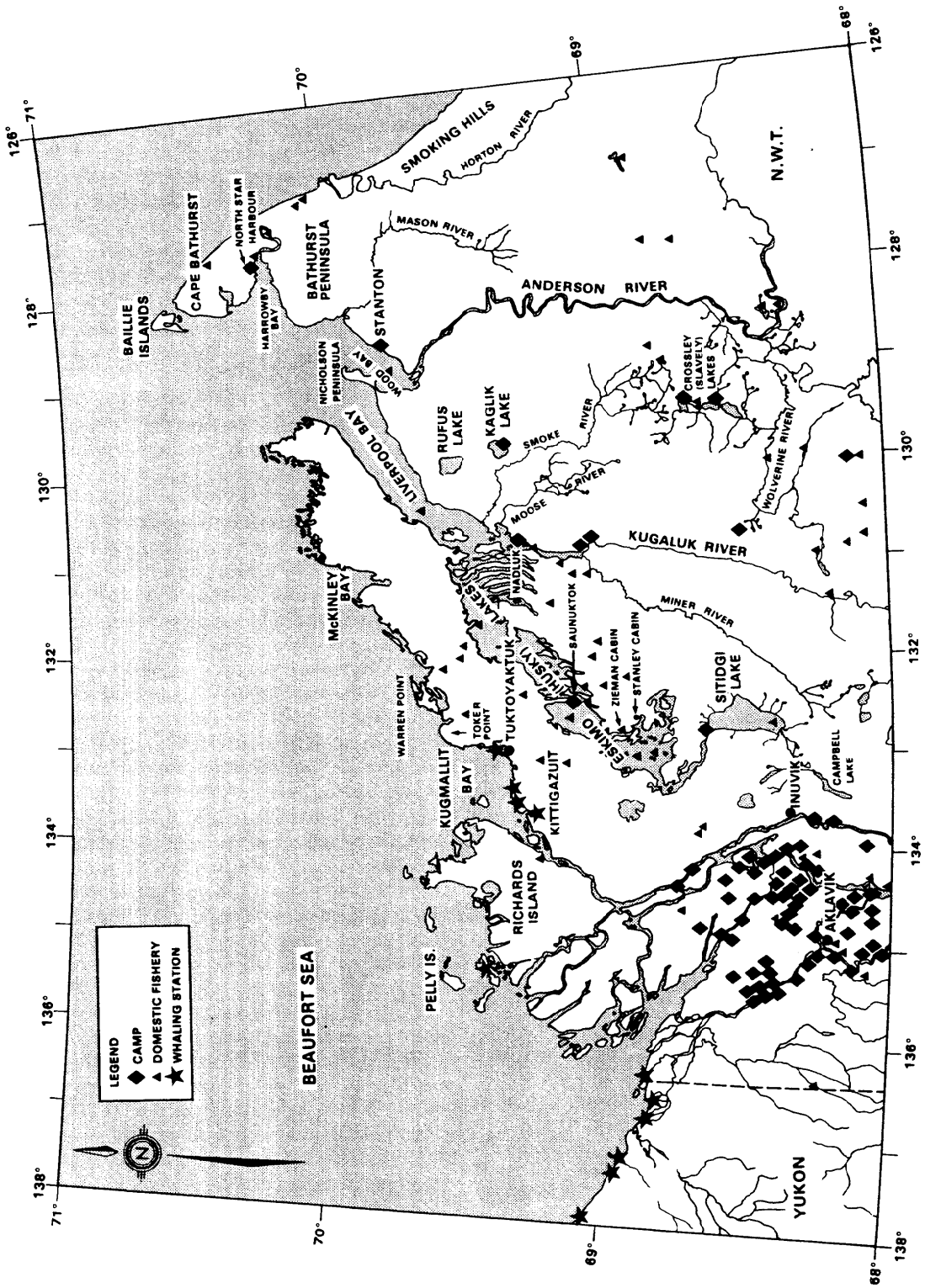


FIGURE 5.2-12 *Resource harvesting sites important to Tuktoyaktuk.*

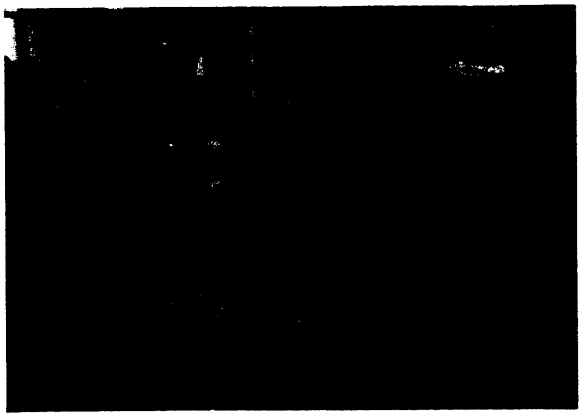


PLATE 5.2-4 *Fur garment shop, Tuktoyaktuk. Some of the furs trapped in the Beaufort region are made into parkas, tapestries, slippers and other craft items.*

Tuktoyaktuk Harbour is a year-round domestic fishery protected from commercial competition by a regulation banning commercial fishing within 16 km of Tuktoyaktuk. "Domestic fisheries" include "all subsistence fishing by Indian, Inuit, or persons of mixed blood utilizing traditional methods to provide food for himself, his family, or his dogs" (Fisheries and Environment Canada regulations, 1977). Anadromous fish run out to the estuaries, Husky Lakes, Liverpool Bay, and Kugmallit Bay in early July where the mixing of fresh and salt water creates favourable feeding conditions. They run back upstream to spawn during the summer with a main run occurring in late August -early September. In the fall, sea herring move into Tuk Harbour, Liverpool Bay, and Husky Lakes. Whitefish and cod are found throughout the area.

> "In addition, many small lakes on Tuktoyaktuk Peninsula have been used over the years, as well as the upper parts of Husky Lakes. Fishing in the latter area is now limited to a few main spots, the most important being Saunuktok, Zieman Cabin, and Stanley Cabin, and is normally done by jigging through the ice in spring" (Usher, 1976).

Tuktoyaktuk residents fish for lake trout, inconnu, whitefish, cisco, sea herring, and Arctic grayling in the Husky Lakes. Many of the smaller lakes were fished for whitefish and trout to support trapping but this activity has declined in importance with increased use of the snowmobile. Usher (1976) concludes by saying:

> "Crossley Lakes, some other lakes in the area, and a particular spot on Wolverine River, are crucially important to the marten trappers, who must obtain a supply of dog food before trapping. There are also some excellent and well used fishing lakes on Cape Bathurst, north of Horton River."

5.2.3.4 Paulatuk

Between 1974-75 and 1979-80, the average value for fur production per year in Paulatuk was $42,423 in current dollars and $46,950 in constant (1978) dollars (Table 5.2-9). There were wide variations from year to year amounting to a range of about 55% of the mean in the current dollar calculation and 47.5% of the mean in the constant dollar calculation.

The 1978-79 peak makes the trend appear to be upwards, but the constant dollar conversion shows revenue levels to be in the $30,000 a year range with a jump and subsequent return every second year. When one looks at the harvest species by species, this revenue pattern is more easily understood. The reason for the 1978-79 peak in fur revenue is a high catch of coloured fox. Trappers made special efforts to take coloured fox in response to an escalation in prices offered for them (Table 5.2-10).

Coloured fox eat small mammals, birds and bird eggs, insects, and berries and prefer to live in open spaces bounded by protective stands of trees and brush. Good habitat for them in the vicinity of Paulatuk is inland where the boundary of the tree line stretches with a northwest - southeast alignment from west of Langton Bay towards Horton Lake (Volume 3A). When efforts to catch coloured fox intensified in 1978-79, more inland traplines may have been set. This would account for higher harvests this year of species normally found near the tree line such as marten and wolf and additional, perhaps accidental, harvests of mink, lynx, and wolverine -species not recorded as harvested in the previous four years. The polar bear was up to 17 in 1978-79, in comparison to two the previous year and two the following year. Being the most valuable pelt - eight sold for an average of $1,540 in 1978-79 - polar bear made a significant contribution to the peaking of revenue from fur production.

High harvests of polar bear in 1974-75 and white fox in 1976-77 account for the smaller peaks in value of fur production shown in Table 5.2-9.

It becomes apparent that, since 1974-75, the most important furbearers to Paulatuk's economy have been white fox, coloured fox, and polar bear. Revenue comparisons are give in Table 5.2-11.

Between 1978 and 1979 Paulatuk's population grew from 163 to 166 and the number of active trappers increased from 27 to 34. It is interesting to note how the distribution of trapping revenue changed over

TABLE 5.2-9

VALUE OF FUR PRODUCTION IN PAULATUK: 1974-75 TO 1979-80

Year:	1974-75	1975-76	1976-77	1977-78	1978-79	1979-80
Current $ Value	31,909	25,682	47,929	26,360	87,279	35,381
(1978) $ Value*	42,886	31,640	57,515	30,182	87,279	32,197

*Constant dollar figures are derived by multiplying by indices based on the General Wholesale Price Index for animal products as follows:
1974-75 = 1.344 1975-76 = 1.232 1976-77 = 1.200 1977-78 = 1.145
1978-79 = 1.000 1979-80 = 0.910

TABLE 5.2-10

AVERAGE PRICES RECEIVED AND HARVEST LEVELS FOR COLOURED FOX IN PAULATUK: (1974-75 TO 1979-80)

Year:	1974-75 ($)	1975-76 ($)	1976-77 ($)	1977-78 ($)	1978-79 ($)	1979-80 ($)
Average Price:*						
Blue Fox	39.66	27.50	30.60	45.00	95.00	64.00
Cross Fox	50.00	79.71	103.72	135.00	156.81	130.40
Red Fox	30.66	53.26	67.81	62.66	98.37	78.74
Silver Fox	—	68.75	70.00	95.00	106.33	113.00
No. Harvested	17	102	99	97	303	221

*Average price paid in Paulatuk as reported in the TFRB Statistics, Wildlife Service, GNWT.

TABLE 5.2-11

PAULATUK VALUE OF PRODUCTION FOR PRINCIPAL SPECIES: 1974-75 TO 1979-80

Principal Species:	Value (Six Years)*: ($)
White Fox	104,156.00
Coloured Fox	80,819.00
Polar Bear	56,721.00
Wolf	28,871.00
Seal	11,626.00

*Estimated by using the highest harvest numbers between FETR, TFRB, and Game Management Division statistics and weighting by average value per pelt obtained in Paulatuk or, if unavailable, the average value obtained in the NWT for each given year.

two seasons. During the peak production year (1978-79) no trapper made $6,000 or over and only six people (22%) made between $3,000 and $5,999. The greatest number, 13 people, made between $600 and $2,999 and the remainder, eight people, made less than $600 (Figure 5.2-9). In 1979, when prices generally dropped from their peak levels, the number of trappers actually increased by seven and changes occurred in level of participation. Two trappers moved out of the $3,000 to $5,999 income bracket; one moved into the over $6,000 bracket; two moved into the $600 to $2,999 bracket; and six entered the under $600 bracket. If earning less than $3,000 could be considered to be indicative of part-time trapping, one could say that at least 78% of the trappers in Paulatuk (21 out of 27) were part-time in 1978 and that at least 85% (29 out of 34) were part-time in 1979.

Residents of Paulatuk are dependent on fishing and the successful hunting of caribou, muskoxen, seal, geese, and polar bear for food. Judging by the harvest records from 1964-65, notwithstanding some

gaps, levels are up for caribou and geese, down for seal, and strongly variable, although controlled by quota, for polar bear. The muskoxen harvest is estimated at being around 25 animals a year (D. McWatt, pers. comm.). Owing to the problem of underestimating harvests because only 3% of the people issued with General Hunting Licenses submitted returns in 1977-78 (which could be indicative of all the harvest data), lack of information on harvests of geese for three out of the four years from 1976-77, and problems of estimating the number of seal used domestically for the entire period, it is not possible to assess the relative importance of each species in terms of total food production. Caribou is the staple, however. It is estimated that in 1978-79, caribou provided 37,500 pounds of edible meat to the community but in the following year the amount was less at 23,000 pounds. Divided equally among the population regardless of age or sex, these amounts represent a per capita consumption of 230 pounds per person for the year or 0.63 pounds per day in 1978-79 and 139 pounds per person for the year or 0.38 pounds per day in 1979-80. At 0.38 pounds per day, and with a protein content from caribou of 27% of this, Health and Welfare Canada's standard for daily "adequate" protein intake is more than met.

The most important harvest areas to residents of Paulatuk are the base of the Parry Peninsula, where a subherd of the Bluenose caribou herd spends the entire year, and the lower reaches of the Hornaday River which are plentiful in fish (Figure 5.2-13). Other areas which are used are the plains east of Langton Bay; coastal areas of and waters off the Parry Peninsula and South Darnley Bay; Amundsen Gulf; and some inland areas such as Billy Lakes and Biname Lake. Caribou are so abundant in the Paulatuk area, however, that they are often found very close to if not in the settlement. Muskoxen may also be found near town.

PLATE 5.2-5 *Fish drying. Subsistence dependence on renewable resources is a deeply ingrained part of northern culture. Development of oil and gas resources will not fundamentally interfere with the native economy.*

White fox are trapped in winter along the north and east coasts of the Parry Peninsula, around Clapperton Island, and along the coast of Darnley Bay past the Hornaday River Delta and Brock River Delta as far east as Pearce Point. As Usher (1976) notes, in former times "... there were occasional forays inland, usually toward the Horton River mouth and west of Langton Bay. Some coloured foxes are taken on the inland lines. Recently, some Paulatuk trappers began marten trapping in the Tsoko Lake and Ewariege Lake area. Some wolves and wolverines are trapped or shot in the area south of Paulatuk." If coloured fox prices continue to be attractive, it is expected that inland traplines will be set. The area south of Paulatuk may grow in importance and more upland furbearers may be reported in future community harvests.

Although there has been some shrinkage in harvest areas since 1976, Usher's descriptions of harvest areas for seal, polar bear, caribou, geese, and fish are worth repeating here. Usher (1976) says:

> "Bear and seal hunting sometimes occur in association, especially in winter and spring. Since the abandonment of camp life, and particularly of those camps on the west side of the Parry Peninsula, both activities have shifted almost entirely to the east side of the peninsula. Bears are now usually taken north and east of Cape Parry, and off Pearce Point. There has been a considerable northward expansion of the bear hunting range in recent years, and it now overlaps with that of Banks Island residents (ice conditions permitting), so that virtually all of Amundsen Gulf is potential bear hunting area. Seal hunting occurs anywhere on the ice in winter, but sealing is most common in summer during open water. The main seal hunting areas are now the south part of Darnley Bay near Paulatuk, along with the more traditional sealing areas on the east side of the peninsula, such as Letty and Brown's harbours and Cape Parry."

> "Caribou hunting formerly occurred over a wide range. In earlier years, many people spent the entire summer inland, with no fixed camp but following the herds on foot and with pack dogs. At that time, caribou were rare on Parry Peninsula. Since then there has apparently been an increase in the caribou herd (the Bluenose herd), and a subherd has formed that spends the entire year on the flats at the base of the peninsula. With caribou now more abundant and much closer at hand, the hunters no longer need to travel far inland, hence a reduction in area of the caribou

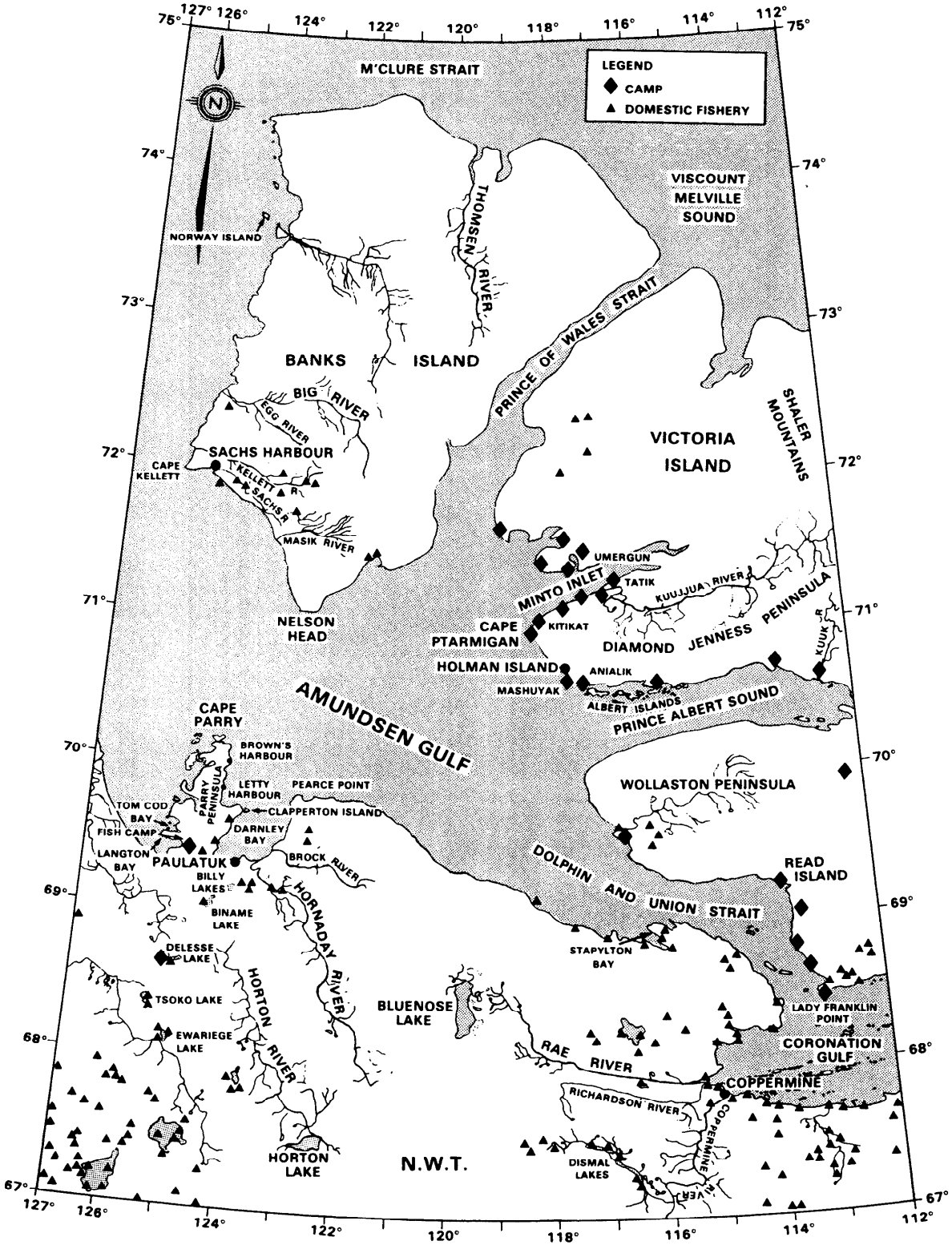


FIGURE 5.2-13 *Resource harvesting sites important to Paulatuk, Holman Island and Sachs Harbour.*

hunting range has occurred. The Paulatuk people feel there should be as little disturbance of the new Parry Peninsula herd as possible; their practice is to make brief trips to the edge of the herd, obtain a few animals and leave, thus avoiding prolonged activity in and around the herd. Moose are very occasionally taken, formerly in the Horton River valley and more recently in the Tsoko Lake area." [There were no moose kills recorded between 1964-65 and 1979-80.]

"The main fishing places are on Hornaday River. There is a char run at the mouth of the river in August, and in October many people fish in the deep holes some miles upstream. The char winter in various deep holes below La Ronciere Falls. A number of lakes have been used in the past and Tom Cod Bay has traditionally been a plentiful source of the fish after which it is named. These are taken by jigging through the ice in winter. Currently, spring fishing is still important to the people of Paulatuk. Some people go to "Fish Camp" at the base of the Parry Peninsula where they will fish and shoot geese when they arrive."

"Geese are taken on the flats at the mouths of Hornaday and Brock rivers, on the plains east of Langton Bay, and at Cape Parry. Other birds are of minor importance."

5.2.3.5 Holman Island

Fur production at Holman peaked once and dipped once in the period between 1974-75 and 1979-80. Excluding these extreme years and using a constant 1978 dollar, the average value of fur production was estimated to be $134,184 with a standard deviation of $13,073. Including the extremes, the average value of fur production was $134,487 with a standard deviation of $58,573 in current dollars or $154,183, with a standard deviation of $74,481, in constant 1978 dollars (Table 5.2-12).

The value of fur production appears to be lower in recent years, particularly if one looks at the figures in terms of constant 1978 dollars. However, the data are too variable for a trend to be determined. Exceptionally high harvests of seal and white fox accounted for the peak revenue in 1976-77. Lesser harvests of these two species in combination accounted for lower returns in 1978-79. When seal production was low in 1977-78, white fox harvests were still high and compensated for the lower revenues from sealing. This held in 1979-80 as well. Next to white fox and seal, the other principal furbearer to Holman Islanders is polar bear (Table 5.2-13).

TABLE 5.2-13

HOLMAN ISLAND
VALUE OF PRODUCTION
FOR PRINCIPAL SPECIES:
1974-75 TO 1979-80

Principal Species:	Value (Six Years)*: ($)
White Fox	406,189.00
Seal	289,823.00
Polar Bear	90,559.00
Coloured Fox	11,790.00

*Estimated by using the highest harvest numbers between FETR, TFRB, and Game Management Division statistics and weighting by average value per pelt obtained in Holman Island or, if unavailable, the average value obtained in the NWT for each given year.

TABLE 5.2-12

VALUE OF FUR PRODUCTION IN HOLMAN ISLAND:
1974-75 TO 1979-80

Year:	1974-75	1975-76	1976-77	1977-78	1978-79	1979-80
Current $ Value	106,711	106,165	250,059	126,972	88,293	128,594
(1978 $ Value*	143,419	130,795	300,071	145,382	88,293	117,020
White Fox $ Value	37,152	35,961	122,558	95,105	35,436	79,976
Seal $ Value	56,991	58,745	116,286	15,394	26,290	16,117

*Current dollar figures are derived by multiplying by indices based on the General Wholesale Price Index for animal products as follows:
1974-75 = 1.344 1975-76 = 1.232 1976-77 = 1.200 1977-78 = 1.145
1978-79 = 1.000 1979-80 = 0.910

Coloured fox brought more income than the remaining species during this six year period. It is noticeable that in 1978-79, when coloured fox prices were very high, there was no concomitant trapper effort to take coloured fox as in some of the other Beaufort Sea communities. Records show that marten, lynx, mink, and weasel were trapped in 1977-78 but in no other year. It is unconfirmed but conceivable that this mixed harvest was taken on one inland trapline.

Although the population of Holman Island grew from 328 to 336 between 1978 and 1979, the number of active trappers decreased by four from 53 to 49. Judging by changes in numbers of trappers in different income categories, the people who dropped out may have been part-time trappers. The number of trappers attaining the highest income category, that is, $6,000 or over, doubled from two to four; and the number earning between $3,000 and $5,999 remained the same at six. Two people were lost from the $600 to $2,999 bracket and four left the under $600 bracket.

Residents of Holman Island have traditionally relied on seal and caribou for meat and have used fish, ducks, polar bear and muskoxen to supplement their diet. An accurate estimate of the total edible weight of the harvest cannot be obtained for recent times as information on the harvest of caribou and birds is lacking for three out of the last four years. Additionally, numbers are recorded for 1977-78 but these are known to be lower than the actual harvest, because only eight General Hunting Licenses were returned out of the 42 issued. A very rough estimate of average yearly meat production between 1964-65 and 1979-80 may be made by taking the average harvests of seal, caribou, ducks, and polar bear for that period (Table 5.2-14).

Using the 1979 population, meat production is 338.3 pounds per person per year of 0.93 pounds per person per day. Excluding duck, the protein content of this harvest is 100.3 pounds per person per year or 0.27 pounds per day. It should be noted that these numbers can be poor approximations and, even if

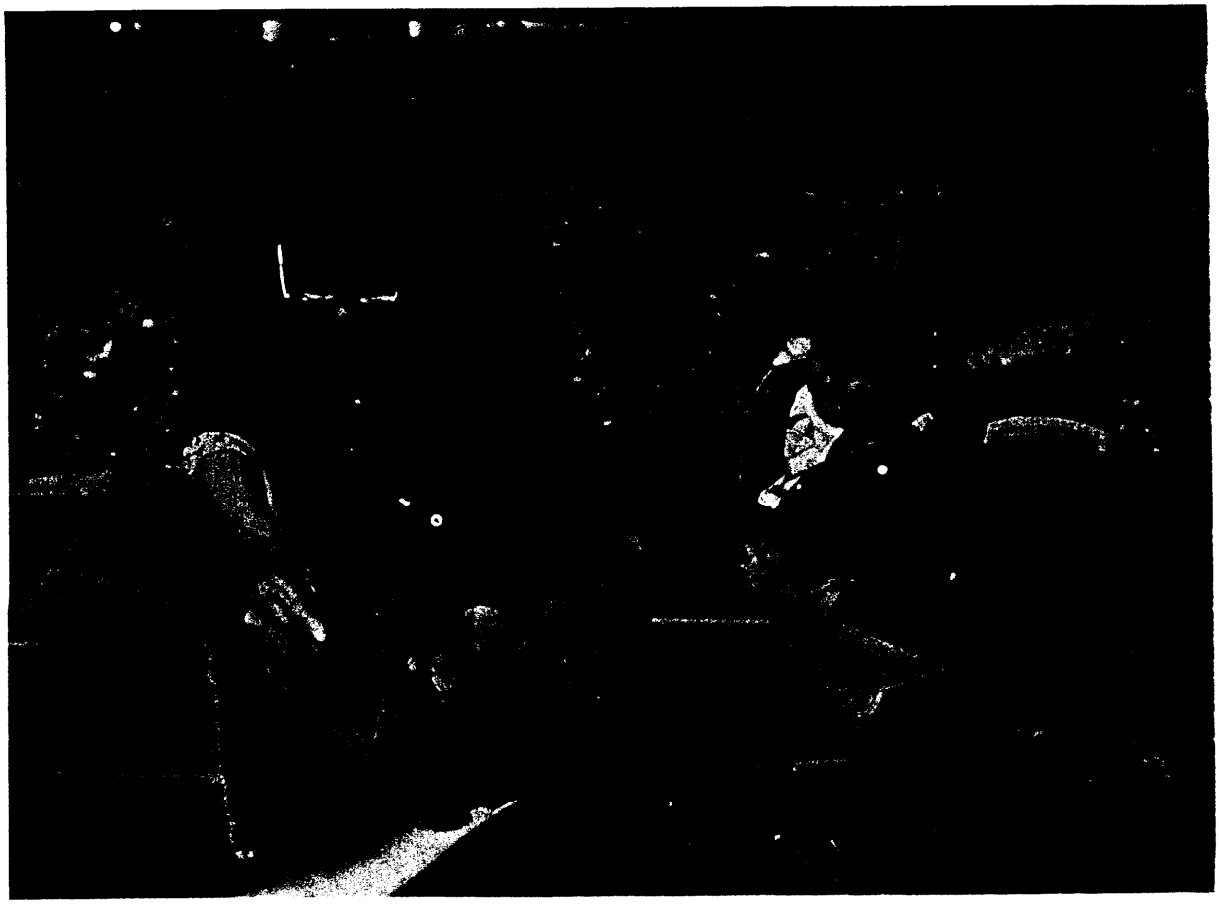


PLATE 5.2-6 *Cleaning Arctic char. In the smaller communities, "country food" comprises a very important part of peoples' nutritional needs.*

TABLE 5.2-14

AN ESTIMATE OF AVERAGE YEARLY MEAT PRODUCTION FOR HOLMAN ISLAND: 1974-75 TO 1979-80*

Species:	Average Harvest:	Edible Weight (Lbs.)		Protein Content (Lbs.)	
Caribou	333.7	@ 100.0	33,370.0	@ .27	9,009.9
Seal	2411.7	@ 31.0	74,762.7	@ .32	23,924.1
Ducks	1649.5	@ 1.6	2,639.2	(Not Known)	
Polar Bear	16.5	@ 175.0	2,887.5	@ .26	750.8
Total			113,659.4		33,684.8

Population in 1979 = 336
Per capita meat production = 338.3 pounds per year or .93 pounds per day
Per capita protein production = 100.3 pounds per year or .27 pounds per day

* This estimation is subject to the limitations of using a mean when the data are very variable and incomplete. The purpose of the calculation was to obtain an impression of overall harvest level. The numbers should not be misused.

they were good approximations, do not represent what each person gets to eat considering there is deliberate and accidental non-utilization, spoilage, and wastage, and because meat is not shared equally by family, age, and sex. Some meat is redistributed to relatives and friends outside the community and is not available for consumption by local residents. Nevertheless, even if the per capita poundage were halved, meat production from hunting and trapping is twice Health and Welfare Canada's standard. The Science Advisory Board of the Northwest Territories (1980) estimated the amount of protein "required to provide an 'adequate' diet, as defined by Health and Welfare Canada" to be 35 grams or 0.077 pounds per day for people over the age of four. It is known that the native population consumes much more than a minimal "adequate" amount of protein. With the addition of fish to the diet, one could surmise that the community is self sufficient in protein products.

The duck harvest shows a significant upward trend between 1964-65 and 1979-80. The caribou harvest is up a little, the seal harvest is down, and the polar bear harvest is level - probably owing to the effects of the quota system. The quota has remained at 16 bears per year since 1973-74. An additional four Red Tags have been allowed since 1978-79.

Holman Islanders use snowmobiles and boats for their harvest activities and travel extensively out into Amundsen Gulf and up Prince of Wales Strait between Victoria Island and Banks Island, along the coast of Victoria Island, and inland depending on the season (see Figure 5.2-13). People live in the settlement and trap from there during the winter but in spring, many move to seasonal camps which they use as bases for fishing and hunting.

Caribou come to the peninsula close to Holman Island in early spring and are hunted along the coast to the east as far as the Kuuk River and to the north along the south side of Minto Inlet and up the Kuujjua River. Basking seals are taken at this time on the ice, as in winter, throughout Minto Inlet and in most of Prince Albert Sound. Fish are jigged in many of the inland lakes of the peninsula north of Holman. As observed by Usher (1976), "Bird hunting is perhaps more popular than before. The spring camps are all located near the travel routes, feeding grounds, or nesting areas of migratory birds and are often close to good seal hunting areas." Ducks are taken at the mouth of the Kuujjua River; at Umergun across Minto Inlet; at Kitikat, a camp near Cape Ptarmigan; and at Mashuyak and Anialik, to the south and east of the settlement. Geese may also be shot at Kuujjua and sandhill cranes may be hunted at Cape Ptarmigan.

In summer, people use boats to hunt seal in open water and caribou along the coasts. Ducks are taken in conjunction with these activities. Others fish from camps by the lakes or sea near Holman and the Albert Islands.

The major fishery, Tatik, near the mouth of the Kuujjua River, is the focal point of activity in the fall. "During fall, this place and nearby lakes and rivers are fished intensively, and almost the entire local population moves there for two or three weeks" (Usher, 1976). People continue to hunt caribou along the coast in fall. These may be cached for a later pickup by snowmobile.

When winter comes, families are back in the settlement. Hunters take snowmobiles inland north of Minto Inlet, east of Minto Inlet as far as the Shaler

Mountains, or along the south coast of the Diamond Jenness Peninsula east of Holman past the Kuuk River. Trappers set lines for fox which may extend out past the shore onto the sea ice. The entire coast is trapped from Walker Bay through Minto Inlet and around to the north coast of Prince Albert Sound. Some trappers go inland from Minto Inlet, others travel as far east of Holman as the Kagloryuak River, and others use parts of Wollaston Peninsula. Usher (1976) noted that "These people still hunt seals in winter, sometimes with a harpoon. Seal hooks are still used here and are usually put out near the settlement or, occasionally, where a trap line crosses the sea ice." Polar bears are hunted far to the west in Amunsden Gulf and northwards along Prince of Wales Strait.

TABLE 5.2-16

SACHS HARBOUR VALUE OF PRODUCTION FOR PRINCIPAL SPECIES: 1974-75 TO 1979-80

Principal Species:	Value (Six Years)*: ($)
White Fox	781,089.00
Polar Bear	85,244.00
Seal	18,870.00
Coloured Fox	15,779.00

*Estimated by using the highest harvest numbers between FETR, TFRB, and Game Management Division statistics and weighting by average value per pelt obtained in Sachs Harbour or, if unavailable, the average value obtained in the NWT for each given year.

5.2.3.6 Sachs Harbour

The value of fur production rose then fell between 1974-75 and 1979-80 in Sachs Harbour (Table 5-2-15). Exceptionally high harvests of white fox, coloured fox, and seal accounted for the peak in 1976-77, while comparatively low harvests of these three species accounted for the low value of fur production in 1979-80.

The principal furbearer in Sachs Harbour's economy is white fox. Fluctuations in harvest must be expected owing to the cyclic nature of white fox abundance which is, in turn, believed to be related to the cycle of small rodent abundance. Revenue from polar bear, the next important species, was only 11% of the return from white fox over the six year period. The polar bear return does not vary significantly because of the quota and special tag system in place which allows residents of Sachs Harbour to take only 22 animals a year. The returns from seal and coloured fox were less than 3%, respectively, of the white fox harvest (Table 5.2-16). Between the peak year for seal, 1976-77, and 1979-80, the market price in Sachs Harbour fell about 59% from $44 to $18. This drop reflected the general collapse of the northern sealskin market which the Science Advisory Board to the Northwest Territories (1980) believed to be a result of reduced pelt quality and the anti-sealing campaign "directed at the annual controversy over the harvest of harp seal pups." Until market problems are solved, Sachs Harbour hunters are not expected to benefit to the same degree in the sale of sealskins, as in the past.

Between 1978 and 1979, the population of Sachs Harbour decreased from 177 to 170. At the same time, the number of active trappers increased from 35 to 37 and levels of participation changed. People moved from the higher and lowest income ranges into a moderate income bracket. That is, one trapper

TABLE 5.2-15

VALUE OF FUR PRODUCTION IN SACHS HARBOUR: 1974-75 TO 1979-80

Year:	1974-75	1975-76	1976-77	1977-78	1978-79	1979-80
Current $ Value	81,375	160,031	305,373	199,412	124,422	81,230
(1978) $ Value*	109,368	197,158	366,448	228,326	124,422	73,919

* Constant dollar figures are derived by multiplying by indices based on the General Wholesale Price Index for animal products as follows:
1974-75 = 1.344 1975-76 = 1.232 1976-77 = 1.200 1977-78 = 1.145
1978-79 = 1.000 1979-80 = 0.910

left the "$6,000 and over" group; two left the "$3,000 to $5,999" group; three left the "under $600" group; and eight moved into the "$600 to $2,999" group. Since only 13.5% of all trappers (5 out of 37) earn $3,000 or more, it is reasonable to infer that the majority of trappers in Sachs Harbour are part-time trappers. The data show that more than half the trappers making under $2,999 earn more than $600. If white fox was the only species trapped, given the 1979-80 price paid in Sachs Harbour, $50, the trapper making between $600 and $2,999 would need to catch, prepare and sell between 13 and 60 fox pelts.

Caribou is the staple game species for Banks Islanders. Since the recovery of the muskoxen population, hunting is again allowed under a quota system. Vincent and Gunn (1981) commented:

> "Hunting of muskoxen was prohibited from 1917 until 1976 when limited quotas were issued to specified zones. The quota of 25 muskoxen for Banks Island was raised to 150 in 1978 but only 96 muskoxen were killed. In 1979, the Wildlife Ordinance was amended to allow commercial sale of muskox meat, and provision was made for sport-hunting of bulls under the quota."

Owing to the rapid growth of the muskoxen population, the quota was raised to 2,000 with no sex distinction in 1980. It is believed that the herd numbers between 18,000 and 20,000 animals and that culling is needed to keep the population from tumbling.

Other food species include seal, polar bear, and geese. Although the other birds are of minor importance, it should be noted that ptarmigan are ubiquitous and can be taken opportunistically. Usher (1976) notes: "Arctic hares are also fairly common and may be taken when seen. They are particularly abundant on hill sides in the Masik River valley in spring, and special trips are sometimes made to hunt this species there." Fishing occurs although fish are not abundant on Banks Island.

The same problems occur with Sachs Harbour as the other Beaufort Sea communities when one attempts to assess the domestic importance of the harvest. Game harvest records are not available for three of the four years from 1976-1977. In the only year for which statistics are available, 1977-78, three General Hunting Licenses were returned out of the 63 issued. This 5% return does not come close to approximating the level of the real harvest. Considering these limitations, it is not possible to ascertain with any accuracy how much food the community obtains through traditional activities. A rough estimate of the level of food production that could be attained yearly is presented in Table 5.2-17 using average harvest figures for each species from 1974-75. Years with missing data are not included in the calculations as it is probable that harvest levels are not zero. The figure used for muskoxen was the average of the amount of the 1978 harvest reported by Vincent and Gunn and the amounts of the 1979-80 and 1980-81 harvests reported by D. McWatt (pers. comm.).

The estimate of per capita protein production from hunting and trapping is three times the amount defined by Health and Welfare Canada to be "adequate." The protein equivalent could be reduced to account for non-utilization or redistribution outside

TABLE 5.2-17

AN ESTIMATE OF AVERAGE YEARLY MEAT PRODUCTION FOR SACHS HARBOUR: 1974-75 TO 1979-80*

Species:	Average Harvest:	Edible Weight (Lbs.)		Protein Content (Lbs.)	
Caribou	213.7	@ 100.0	21,370.0	@ .27	5,769.9
Seal	83.5	@ 31.0	2,588.5	@ .32	828.3
Polar Bear	19.7	@ 175.0	3,447.5	@ .26	896.4
Goose	318.0	@ 3.5			
Muskoxen	115.3	@ 200.0	23,060.0	@ .25	5,765.0
Total			51,579.0		13,259.6

Population in 1979 = 170
Per capita meat production = 303.4 pounds per year or .83 pounds per day
Per capita protein production = 78.0 pounds per year or .21 pounds per day

* This estimation is subject to the limitations of using a mean when the data are very variable and incomplete. The purpose of the calculation was to obtain an impression of overall harvest level. The numbers should not be misused.

the community, yet augmented to account for the contribution of fish and species not included in the calculation. By a reasonable Canadian standard, it is thought that meat production from hunting in Sachs Harbour is high enough to sustain the present community.

Since 1964-65, the seal harvest has declined significantly but the caribou, polar bear, and goose harvests have remained at about the same level. Musk-oxen kills are, as yet, under the quota. Higher harvests will benefit the community, particularly as the dressed weight of muskoxen is greater than that of any other species currently harvested. Since, 1961, all of the inhabitants of Banks Island have lived in Sachs Harbour. The main harvest areas are near the settlement and in the south end of the island owing to wildlife abundance, but the residents have made the entire island a Group - Registered Trapping Area (see Fig. 5.2-13). Usher (1976) explains:

> "They consider the north end of the island an important area for the breeding and supply of both foxes and caribou, and hence regard the protection of the north end to be just as important as the protection of the areas in which they actually hunt. They make no attempt to hunt and trap systematically in the north end, owing partly to its distance from Sachs Harbour, but also because the trappers feel the area should be left largely alone to serve as a sanctuary for the ecological well-being of the island."

White fox are trapped throughout the southern part of the island and along its coasts. Unlike Holman Islanders, Sachs Harbour trappers do not venture far out on the sea ice to set traps, although they will travel into Amundsen Gulf to hunt polar bear and seal. The polar bear quota has been 18 since 1973-74 and four Red Tags have been allowed since 1978-79.

> "Bear hunting is an important activity, and Banks Island is the chief denning area for polar bears in the western Arctic. When bears are common, the greatest number are taken within 20 miles of Sachs Harbour, generally in the direction of Cape Kellett (to the west). However, special trips are sometimes made farther afield, chiefly to Nelson Head and some distance offshore to the south, and also toward Norway Island.... After 1961, most seal hunting took place off the southwest coast of Banks Island, both at the floe edge in winter and by boat in summer. Seal hunting has declined since the advent of the snowmobile, but it still occurs" (Usher, 1976).

Trappers shoot caribou and muskoxen in conjunction with their activities throughout the south portions of the island.

> "Caribou may still be taken anywhere along the trap lines, but most are taken closer to Sachs Harbour. During the 1960's, the Big River valley was the main area for fall caribou hunting, but in recent years caribou have been so abundant that a hunter rarely has to travel more than 20 miles from Sachs Harbour to obtain a winter's supply of meat. Since the permanent closed season on musk-oxen was terminated in 1970, an increasing number of trips, most of them to the north-central part of the island, have been made especially for this species. Musk-oxen might, however, be taken anywhere, if seen along the trap lines" (Usher, 1976).

Spring is a time for fishing and hunting geese. A favourite family fishing spot is to the southeast of the settlement at Fish Lakes. The geese come to this area as well, so people may camp to fish and hunt concurrently.

In the fall, there is a small char run at the mouth of the Sachs River. People may fish here or in a few lakes near Kellett River where there are char and trout. Owing to the relative scarcity of fish on Banks Island compared to areas around other Beaufort Sea communities, it is important that fish stocks are preserved where they may be found.

5.2.3.7 Fort McPherson

The total value of fur production has steadily increased in Fort McPherson since 1974-75 (Table 5.2-18).

Similar to Inuvik but not Aklavik, there was a sudden peak in 1978-79. This is attributable to good prices for and high harvests of all of the principal species, namely: muskrat, marten, lynx, and mink, and other species such as coloured fox, wolverine, beaver, and squirrels. The following year, revenues continued to rise for marten, coloured fox, beaver, and squirrels. However, the total value of fur production dropped, owing to large reductions in muskrat and lynx production and a lesser reduction in mink production. The relative importance of the principal species taken by trappers is illustrated in Table 5.2-19.

Muskrat is the predominant species taken by hunters and trappers in Fort McPherson. The value of production increased steadily from $32,418 in 1974-75 to $155,180 in 1978-79, after which there was a muskrat population crash. Since the population decline was attributed to overharvest, the Wildlife Service has been closing the season two weeks early; that is, at the end of May rather than June 15, to give the animals a chance to breed. John A. Snowshoe of the Wildlife Service commented that shooting a female was like killing 13 muskrats. It is believed that the muskrat population is recovering.

TABLE 5.2-18

VALUE OF FUR PRODUCTION IN FORT McPHERSON: 1974-75 TO 1979-80

Year:	1974-75	1975-76	1976-77	1977-78	1978-79	1979-80
Current $ Value	40,489	71,810	137,047	184,019	281,795	187,930
(1978) $ Value*	54,417	88,470	164,456	210,702	281,795	171,017

*Constant dollar figures are derived by multiplying by indices based on the General Wholesale Price Index for animal products as follows:
1974-75 = 1.344 1975-76 = 1.232 1976-77 = 1.200 1977-78 = 1.145
1978-79 = 1.000 1979-80 = 0.910

TABLE 5.2-19

FORT McPHERSON VALUE OF PRODUCTION FOR PRINCIPAL SPECIES: 1974-75 TO 1979-80

Principal Species:	Value (Six Years)*: ($)
Muskrat	567,487.00
Marten	160,548.00
Lynx	84,911.00
Mink	64,730.00
Coloured Fox	16,060.00

*Estimated by using the highest harvest numbers between FETR, TFRB, and Game Management Division statistics and weighting by average value per pelt obtained in Fort McPherson or, if unavailable, the average value obtained in the NWT for each given year.

The lynx population peaks about once every ten years in direct relationship to the abundance of showshoe hares. The combination of a population peak and a record price - calculated to be $344 per pelt in Fort McPherson resulted in a windfall for trappers in 1978-79. In the following season, the average price per pelt dropped to $199. The harvest fell from 140 to 46 animals, a number still larger than the average for the four years prior to the population peak, that is, 32.5.

Marten harvests have been exceptionally high for the three years since 1977-78 (Table 5.2-20). The Science Advisory Board of the Northwest Territories (1980) recommends that a careful watch be kept on stocks and harvests so that "local stocks are not depleted, as has happened in the immediate vicinity of several Mackenzie River communities."

Mink production fluctuated widely, although the market price generally rose between 1974-75 and 1979-80. In that the low price in 1977-78 coincided with the peak harvest year in this short time period, one may concur with the Science Advisory Board that harvest levels have no relation to price for this species. Harvest levels were highest between 1977 and 1979, the years preceding the muskrat population crash. This is reasonable as mink "appear to be most abundant in areas of high populations of muskrats, which are their principal prey, and are trapped in the greatest numbers there."

It is worth noting that the squirrel harvest escalated from numbers below 50 prior to 1978-79, to 304 and 828 after that time. This increase in harvest raises the question of whether or not more families have been on the land since 1978-79 because children are the main trappers of squirrels.

In 1972-73, there were 103 active trappers in Fort McPherson. Although this number rose to 138 in the peak year, 1978-79, and rose again to 151 in 1979-80, the increase is in weekend trappers rather than more serious trappers. Between 1978-79 and 1979-80 the number of trappers making $6,000 and over decreased from 4 to 3; the number making between $3,000 and $5,999 decreased from 24 to 14; the number earning between $600 and $2,999 increased from 50 to 57; and the number earning under $600 increased from 60 to 77.

Caribou and moose are the principal game species taken by the residents of Fort McPherson. Ducks, geese, bear, and muskrat are the main meat supplements along with fish. Considering that 81 of the 190 General Hunting Licences issued in 1977-78 were returned (43%), harvest statistics are still an underestimation of actual kill. Ducks and geese are shot out of season in the spring for fresh meat. These

TABLE 5.2-20

HARVEST LEVELS AND AVERAGE PRICES RECEIVED FOR MARTEN AND MINK IN FORT McPHERSON: 1974-75 TO 1979-80

Year:	1974-75	1975-76	1976-77	1977-78	1978-79	1979-80
Marten:						
No. Harvested	186	385	413	1206	1285	1125
Average Price* ($)	16.69	21.74	29.70	26.24	40.29	48.05
Mink:						
No. Harvested	64	282	195	1007	537	372
Average Price* ($)	17.17	21.54	38.04	11.65	38.63	49.68

* Average price paid at Fort McPherson as reported in the TFRB Statistics, Wildlife Service, GNWT.

numbers are rarely recorded. Gaps in the data, particularly since 1976-77, are great enough to prevent an accurate assessment of trends in the game harvest. Without knowing how many pounds of meat are used from muskrat, beaver, lynx, fish and other species, it is difficult to say anything definitive about the domestic importance of country food in Fort McPherson. Considering these limitations, an estimate of meat production made by using average harvest figures from 1974-75 (Table 5.2-21) must be accepted as being very rough indeed.

Protein content from the harvest illustrated in Table 5.2-21 does not meet Health and Welfare Canada's standard for daily "adequate" protein intake for people over four years of age. The standard is 0.077 pounds of protein per day which is the equivalent of about 4.6 ounces of caribou. Even though the actual harvest is believed to be higher than what the recorded numbers depict and the method of estimation has its shortcomings, production is low enough to make one suspect that the community is not self sufficient in meat. There would be some spoilage, wastage, or non-utilization within the population as a result of redistribution.

According to General Hunting License returns in the Northwest Territories and figures kept by the Yukon Wildlife Branch on the Porcupine caribou herd, the caribou harvest has declined considerably since 1964-65 with the most dramatic drop occurring since 1974-75. The average harvest between 1974-75 and 1979-80 was 318 in comparison to 614 between 1964-65 and 1973-74. Recorded moose and bear kills have

TABLE 5.2-21

AN ESTIMATE OF AVERAGE YEARLY MEAT PRODUCTION FOR FORT McPHERSON: 1974-75 TO 1979-80*

Species:	Average Harvest:	Edible Weight (Lbs.)		Protein Content (Lbs.)	
Caribou	318.2	@ 100.0	31,820.0	@ .27	8,591.4
Moose	17.8	@ 450.0	8,010.0	@ .26	2,082.6
Bear	4.0	@ 100.0	400.0	@ .26	104.0
Ducks	557.0	@ 1.6	891.2		
Geese	54.0	@ 3.5	189.0		
Total			41,310.2		10,778.0

Population in 1979 = 781
Per capita meat production = 52.9 pounds per year or .14 pounds per day
Per capita protein production = 13.8 pounds per year or .03 pounds per day

* This estimation is subject to the limitations of using a mean when the data are very variable and incomplete. The purpose of the calculation was to obtain an impression of overall harvest level. The numbers should not be misused.

remained about the same since 1974-75. The average moose harvest is 18 and the average bear harvest is four.

The southern part of the Mackenzie Delta is the most intensively used harvest area by residents of Fort McPherson (see Fig. 5.2-10). In April and May, people go out to their ratting camps to shoot muskrats and the occasional beaver, to fish a bit, and to shoot migratory geese and ducks when they arrive. In October 1981, the Wildlife Service had 16 permanent camps consisting of either cabins or tent frames marked on a map of the Delta. Caribou may be hunted in the spring. For example, the Wildlife Officer's harvest estimates show 200 Porcupine caribou taken in April and 79 taken in May of 1978. It was noted that many of these were harvested close to the Dempster Highway on both sides of the Northwest Territories and Yukon border. During the winter of 1981-82 many caribou were killed on the Dempster Highway.

After the ratting season is over, people generally take a holiday. In summer, fishing is good for herring, whitefish, and inconnu. Mobility is high as people may travel throughout the Delta or down the Peel or Mackenzie rivers by boat. There is a char run on Husky Channel in August.

In the fall, the mouth of the Peel River on the Mackenzie River is fished for whitefish and cisco. Ducks and geese are plentiful here but may be hunted anywhere on the Delta. Hunters go to the foothills for caribou moving south in the high country of the Richardson Mountains from Coal Mine Lake. A permanent camp on the Rat River is used by caribou hunters working the area. The area around Destruction City, that is, where the Rat River meets the Delta is known to be good for caribou and the upper reaches of Stony Creek are also noteworthy. According to John A. Snowshoe of the Wildlife Service, people do not go through McDougall Pass as they did in the past nor do they hunt Dall sheep in the mountains. A new activity is to take a truck with skidoo or dog team along the Dempster Highway towards the mountains and the Yukon border. Hunting is based from the road but is governed by a new regulation that bans all hunting within one mile of the highway. People may move meat by skidoo or three-wheeled Honda along the road but need a transport permit to move meat by truck or car.

Twenty-one moose were shot in the fall of 1981; 12 of these up the Peel River and the remainder in the Mackenzie Valley, Rat River, and Stony Creek areas. Prior to freeze-up at this time of year, travel is along the water courses by boat. As soon as there is enough snow, skidoos are used.

In the late fall, people begin to think about getting their camps ready for winter trapping. Cabins up the Peel River are mainly those of people trapping the fine fur species, that is, marten and mink. In October 1981, 11 camps were marked along the Peel near junctions of the Snake, Caribou, Trail, Road, Satah, and Vittrekwa rivers. The fine fur trapping season ends by the first of March and people return to town with their pelts to get ready for spring trapping.

5.2.3.8 Arctic Red River

Revenue from fur production has been increasing significantly in Arctic Red River since 1974-75 (Table 5.2-22).

Harvest levels have escalated for marten, the most important species, and have generally risen for lynx, mink, and coloured fox. Despite the muskrat kill being down since 1977-78, muskrat is still the second ranking revenue producing species (Table 5.2-23).

The proportion of the population actively trapping has grown to 39% in Arctic Red River, owing to an increase of 11 in the number of people trapping and a population decline since 1972-73. This is the highest participation level in trapping found in all of the Beaufort communities. There were no significant changes in level of trapping effort between 1978-79 and 1979-80. The total number of active trappers remained constant at 31: six people earned $3,000 or over and 25 earned less.

When a large percentage of a community is engaged in trapping, one expects a relatively high level of hunting activity. Game harvest statistics compiled for Arctic Red River from General Hunting License returns are almost nonexistant and the numbers that do exist seem to be severe under-estimations. There were no General Hunting License returns in 1974-75 or 1976-77. In 1977-78, two out of 28 General Hunting Licenses (7%) were returned. Waterfowl harvest records since 1974-75 show no more than 23 ducks being shot in a year - which seems improbable for a population of 31 trappers and 28 General Hunting License holders. Since 1978, Wildlife Officers have been making monthly estimates of big game harvests based on interviews with local hunters and trappers

Despite data gaps and problems of high variability about the mean (average), it is possible to make a rough estimate of yearly meat production by finding the average harvest level for each species from 1977-78 (Table 5.2-24).

Despite the omission of food production from ducks and geese, muskrat and beaver, lynx, and fish, protein content of the annual harvest in Arctic Red River approaches Health and Welfare Canada's standard for daily "adequate" protein of 0.077 pounds per day. Country food is still important to the domestic economy of Arctic Red River.

TABLE 5.2-22

VALUE OF FUR PRODUCTION IN ARCTIC RED RIVER: 1974-75 TO 1979-80

Year:	1974-75	1975-76	1976-77	1977-78	1978-79	1979-80
Current $ Value	13,179	25,254	31,630	52,218	66,190	66,662
(1978) $ Value*	17,712	31,113	37,956	59,790	66,190	60,662

*Constant dollar figures are derived by multiplying by indices based on the General Wholesale Price Index for animal products as follows:
1974-75 = 1.344 1975-76 = 1.232 1976-77 = 1.200 1977-78 = 1.145
1978-79 = 1.000 1979-80 = 0.910

TABLE 5.2-23

HARVEST LEVELS FOR THE PRINCIPAL SPECIES TAKEN IN ARCTIC RED RIVER: 1974-75 TO 1979-80

Year:	1974-75	1975-76	1976-77	1977-78	1978-79	1979-80
Marten ($142,001)*	414	370	351	985	1286	1146
Muskrat ($ 65,644)	2436	4073	4834	5310	1711	1154
Lynx ($ 15,084)	5	1	8	12	21	10
Mink ($ 13,232)	3	51	36	90	201	386
Coloured Fox ($ 11,356)	17	23	26	17	36	32

* Total value of the harvest for this species over the six year period. Estimated by using the highest harvest numbers between FETR, TFRB, and Game Management Division Statistics and weighting by average value per pelt obtained in Arctic Red River or, if unavailable, the average value obtained in the NWT for each given year.

The main harvest areas for residents of Arctic Red River are the lowlands of the Arctic Red and Mackenzie rivers, the Mackenzie Delta, and the vicinity of the Dempster Highway leading both towards Fort McPherson and Inuvik (see Fig. 5.2-11). Travel towards Inuvik on the Dempster Highway is dependent upon operation of the Mackenzie River ferry in summer and safety of the ice crossing in winter.

The cycle of activities in Arctic Red River is similar to that of the other Delta communities. Fall is a time for fishing - a favoured place being west of the settlement where the Arctic Red River joins the Mackenzie River. From early October to mid November there are heavy downstream runs of fish between this point and the Delta as the Arctic Red River is a summer feeding area for numerous fish such as Arctic grayling, broad whitefish, northern pike, and inconnu. Before freeze-up, boats may be used on the Mackenzie River for hunting of moose and caribou. Trappers move out to their camps to get ready for winter trapping. Permanent camps for winter trapping are located up the Arctic Red River as far as the junction of the Sainville River, up the Mackenzie River by the Tree River confluence, and down on the Delta.

Marten and lynx are the main species trapped up the

TABLE 5.2-24

AN ESTIMATE OF AVERAGE YEARLY MEAT PRODUCTION FOR ARCTIC RED RIVER: 1977-78 to 1980-81*

Species:	Average Harvest:	Edible Weight (Lbs.)		Protein Content (Lbs.)	
Caribou	36.3				
Bluenose (69%)	25.0	@ 100.0	2,500.0	@ .27	675.0
Woodland (31%)	11.3	@ 170.0	1,921.0	@ .27	518.7
Moose	5.0	@ 450.0	2,250.0	@ .26	585.0
Bear	7.7	@ 100.0	770.0	@ .26	200.0
Total			7,441.0		1,978.7

Population in 1979 = 79
Per capita meat production = 94.2 pounds per year or .26 pounds per day
Per capita protein production = 25.0 pounds per year or .07 pounds per day

* This estimation is subject to the limitations of using a mean when the data are very variable and incomplete. Caribou were apportioned to the "Bluenose" or "Woodland" category according to proportions recorded in the 1978-79 harvest.

Arctic Red River and Tree River drainages between November and March. One trapper goes overland by skidoo to the Travaillant Lake area from his camp by the Mackenzie River opposite the Tree River junction. This is one of the best marten trapping areas in the north. Mink, lynx, coloured fox, and some beaver and wolverine are also trapped in the Travaillant Lake and Tree River areas and moose and caribou are hunted in conjunction with trapping. Mink, lynx, coloured fox, and beaver are the main species taken by trappers with winter camps on the Mackenzie Delta.

With the end of the fine fur season in early March, people get ready for the spring muskrat hunt. Skidoos are used until the first channels open and boats may be taken out on the Delta. Ducks and geese are shot for fresh meat and spring fishing begins. When the ratting season is over, equipment is repaired over the summer and people may go fishing.

5.2.3.9 Coppermine

There was an upward trend in the total value of annual fur production in Coppermine between 1974-75 and 1979-80 (Table 5.2-25).

Cyclicity in the white fox harvest has a marked effect on fur revenues in Coppermine. The rise in revenue in 1976-77 is mainly attributable to a peak in the white fox catch in combination with a rise in price paid in Coppermine; whereas the decrease in revenue the following year reflects the fall in harvest from

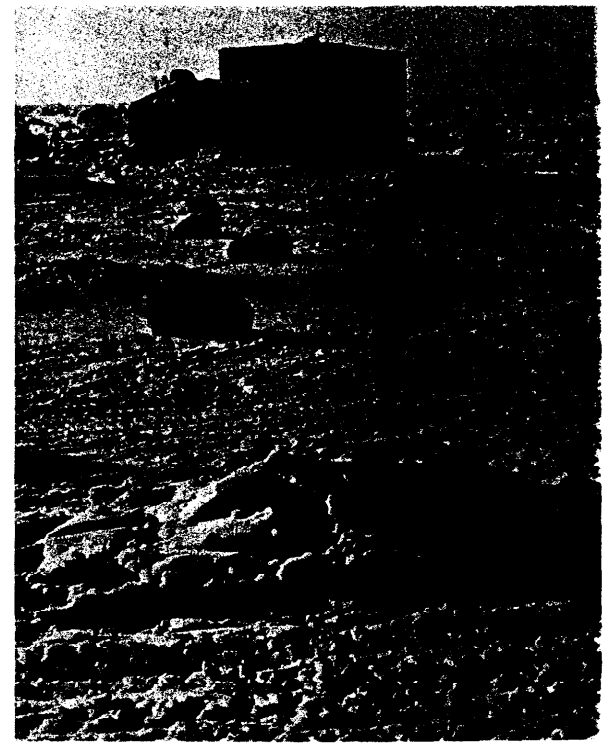


PLATE 5.2-7 *Though not as widely used as in former times, dogs are still an important part of hunting and trapping in Arctic communities.*

TABLE 5.2-25

VALUE OF FUR PRODUCTION IN COPPERMINE: 1974-75 TO 1979-80

Year:	1974-75	1975-76	1976-77	1977-78	1978-79	1979-80
Current $ Value	62,617	104,517	166,609	80,749	326,153	232,523
(1978) $ Value*	84,157	128,766	199,931	92,458	326,153	211,596

*Constant dollar figures are derived by multiplying by indices based on the General Wholesale Price Index for animal products as follows:
1974-75 = 1.344 1975-76 = 1.232 1976-77 = 1.200 1977-78 = 1.145
1978-79 = 1.000 1979-80 = 0.910

106,899 to 28,720 pelts. Trappers did very well in 1978-79 as high prices for coloured fox, an extraordinary abundance of wolves, and a revival of white fox provided incentives for a record harvest.

The principal furbearing species taken by residents of Coppermine are white fox, wolf, seal, coloured fox, and polar bear (Table 5.2-26). Since 1974-75, harvest trends have been upward for white and coloured foxes, wolves, and seal and about the same for polar bear. It should be noted that when viewed over a longer time period, e.g. from 1964-65, the seal harvest is declining.

TABLE 5.2-26

COPPERMINE VALUE OF PRODUCTION FOR PRINCIPAL SPECIES: 1974-75 TO 1979-80

Principal Species:	Value (Six Years)* ($)
White Fox	369,561.00
Wolf	239,179.00
Seal	179,354.00
Coloured Fox	142,797.00
Polar Bear	19,075.00

*Estimated by using the highest harvest numbers between FETR, TFRB, and Game Management Division statistics and weighting by average value per pelt obtained in Coppermine or, if unavailable, the average value obtained in the NWT for each given year.

The number of trappers in Coppermine decreased from 156 to 141 between 1978-79 and 1979-80. Trapping became more of a part-time activity as the number of trappers earning under $600 increased from 72 to 77. The number of people earning between $600 and $2,999 decreased from 51 to 43, the number earning $3,000 to $5,999 decreased from 15 to 11, and the number earning $6,000 and over decreased from 18 to 10.

Game harvest statistics from 1976-77 are incomplete for Coppermine as they are for other Beaufort Sea communities. Numbers for 1977-78 are comparatively good, however, as 95 or 168 (57%) General Hunting Licenses were returned. By calculating the average annual harvest for caribou, seal, moose, polar bear, and birds for the years since 1974-75 for which statistics are available, a rough estimate of meat production may be obtained (Table 5.2-27). This estimate may well be an underestimation. The community has a muskoxen quota of 24 animals with a fifty-fifty sex distinction to complement the meat supply. Fish are also important to diet.

Considering that the estimate may be low rather than high because of non-reporting and omissions, one could conclude that hunting and trapping activities yield enough protein for the people of Coppermine to be self-sufficient in meat. Health and Welfare Canada's standard for daily "adequate" protein intake is 0.077 pounds.

Traditional activities are still important to the people of Coppermine despite the attraction of wage employment. Upward trends in harvests of caribou, ducks, geese and ptarmigan from 1964-65 to 1977-78 show that people are still keen on hunting and are successful in hunting. Fur revenues have risen in spite of tendencies for people to trap part-time rather than full-time.

Owing to the distance between Coppermine and the locations of proposed oil and gas activity, it is not expected that development will have any direct

TABLE 5.2-27

AN ESTIMATE OF AVERAGE YEARLY MEAT PRODUCTION FOR COPPERMINE: 1974-75 TO 1979-80*

Species:	Average Harvest:	Edible Weight (Lbs.)		Protein Content (Lbs.)	
Caribou	1,737.7	@ 100.0	173,770.0	@ .27	46,917.9
Seal	1,867.8	@ 31.0	57,901.8	@ .32	18,528.6
Moose	10.3	@ 450.0	4,635.0	@ .26	1,205.1
Ptarmigan	1,729.7	@ 1.0	1,729.7		
Geese	443.7	@ 3.5	1,553.0		
Ducks	892.3	@ 1.6	1,427.7		
Total			241,017.2		66,651.6

Population in 1979 = 766
Per capita meat production = 314.6 pounds per year or .86 pounds per day
Per capita protein production = 87.0 pounds per year or .24 pounds per day

* This estimation is subject to the limitations of using a mean when the data are very variable and incomplete. The purpose of the calculation was to obtain an impression of overall harvest level. The numbers should not be misused.

effects on resource harvest areas. Nevertheless, changes in land use will occur as the people of Coppermine change. Harvest areas have been shrinking for all of the Mackenzie Delta-Beaufort Sea communities as people have become more dependent on skidoos, boats, and trucks and as people have taken employment, become busier, and found themselves with less time to be out on the land. Yet, the serious trappers have been able to work the distant parts of the Registered Group Trapping Areas by chartering aircraft to get to their camps in time for winter trapping. A long-term effect of increased income from wage employment may be a reoccupancy of areas presently abandoned, providing interest in trapping and being out on the land continues.

A detailed description of harvest activities will not be given for Coppermine. Harvest areas as they were known around 1976 are shown in Figure 8.6-3. Information from the Inuit Land Use and Occupancy Project and the Northern Land Use Information Map Series was not updated although it is known that there have been shrinkages in the territory used, for example, in the direction of Dismal Lakes. Specific concerns about land use conflicts in the Coppermine area will be addressed as they arise.

5.2.3.10 Old Crow

Old Crow has been included as a Beaufort Sea com-Beaufort Sea community even though people from the community do not travel extensively to the Yukon coast or the Mackenzie Valley. Harvest areas used by residents of Old Crow are not likely to be directly affected by activities of the petroleum industry if tankers are used in the Beaufort Sea or if a pipeline is constructed to the south along the Mackenzie Valley from North Point. Population growth in the Mackenzie Delta may, however, promote change in Old Crow. Young people from Old Crow may be attracted by the urban lifestyle of Inuvik, hunters or recreationists from Inuvik may start to explore the Richardson Mountains and parts of the Old Crow Registered Group Trapping Area, and land use conflicts may develop.

The most valuable furbearer to residents of Old Crow is muskrat. Families move out to camps on the Old Crow Flats for spring ratting, duck and goose hunting, and spring fishing (see Figure 5.2-10). The ratting season ends on June 30 each year.

Lynx, marten, beaver, coloured fox, and mink are also taken on the flats during winter trapping. "Although trapping may be undertaken anywhere within the Registered Group Trapping Area, activity is concentrated within the vicinity of Old Crow. The intensity and areal extent of trapping from year to year is difficult to predict. 'Day' or 'weekend' traplines, extending from the village, are common" (NLUIS, 1976).

Caribou and moose are hunted along the flats of the Porcupine River and its tributaries, with most activity concentrating near the settlement. Major hunts are conducted in the spring and fall when members of the Porcupine caribou herd migrate past Old Crow. Skidoos are used when snow or ice conditions permit and boats with outboard motors may be used in the open water season to extend the range of hunting.

Between 1964-65 and 1979-80, the trend in the caribou harvest was upwards. During this period, the mean annual harvest was 588 caribou with a standard deviation of 172.

These harvest areas are marked on Figure 8.6-1. As for Coppermine, the information on the 1976 Northern Land Use Information Map Series has not been updated. It is believed that the following comment, taken from the NLUIS (1976), still holds:

> "During the 1950's and 1960's many people who previously were dispersed throughout this area established permanent residence in the settlement of Old Crow. However, many people still frequent various parts of this region throughout the year to trap, fish, or hunt. The most important and intensively used resource areas in the Old Crow region are the Old Crow Flats and the Porcupine River system. The level of trapping activity has decreased in recent years due in part to widely fluctuating fur prices, the availability of wage employment, and transport problems resulting from policies of centralization and the less frequent use of dog teams. Currently, however, there seems to be a revival of interest in the traditional Indian lifestyles and this may be reflected in renewed activity. In addition, new patterns of land use may be emerging as the snowmobile provides the means for greatly increased mobility. For a number of complex reasons, the areas used and the intensity of activity are very difficult to predict from year to year. Thus, it is rarely possible that a line on a map will represent an exact statement of the limits of hunting and trapping activity or a precise boundary between intensively used and less important areas. Rather, patterns of land use are constantly shifting and the boundaries indicated on this map should be interpreted as generalized. It is therefore recommended that land-use activities planned for the area be brought to the attention of the local band council to avoid the possibility of resource-use conflicts."

CHAPTER 6

THE BEAUFORT REGION WITHOUT DEVELOPMENT

Concern about the possible negative effects of proposed projects, or the type or scale of development they represent, has given considerable impetus to the search for alternatives to such projects. For example, proposals to build nuclear reactors for the generation of power has stimulated interest in energy technology that is perceived to contain fewer environmental and social risks. In the case of the Canadian north, proposals for major hydrocarbon projects have been a factor in encouraging interest in small-scale, localized development based on renewable resources (animals, forests, scenic areas, etc.). A frequently stated rationale for such development is that it would be closer, culturally, to the preferences and lifestyles of northern peoples.

The Industry does not want to enter into debates around this matter. The role that renewable resources could play in the future northern economy has now been addressed in several studies, and the consensus is that there is a potential for development based on such resources. (Special Staff Group, 1975, Berger Vol. II). Indeed, such development is already a factor in several locations, and most notably in Tuktoyaktuk, where the commercial reindeer herd is now at last on a solid commercial footing*. However, how effectively such development could support population growth in a world of increasing income expectations and rising material standards is open to question. It is suspected that it would have limitations in this regard.

The view taken here is that there is a place for small-scale localized industry in the north, but that sustained economic growth able to support larger populations must ultimately depend on something that provides an expanding market for goods and services that can be produced locally, including the goods produced from renewable resources. Oil and gas development offers the prospect of an expanding regional market, as well as offering sources of capital for investment in that market. The Industry would propose, therefore, that oil and gas development should be viewed as complementary to, and not conflicting with, other regional economic possibilities.

What if oil and gas development did not occur. It would seem appropriate to speculate on the future of the Beaufort region if the basis for growth offered by the exploitation of its hydrocarbon resources failed to materialize:

- The absence of large-scale development based on the extraction of oil and gas resources would not mean that no development would take place. It is likely that exploration for oil and gas would continue, perhaps based on the need to further define reserves for eventual production. It is also probable that there would be some continuing improvement to the quality of regional infrastructure and services. Some continued development might also be based on renewable resources; for example, reindeer, musk oxen and fishery resources. However, investment, employment and income from all such sources would not likely grow rapidly enough to fully meet the needs of the region's population, and the subsidy component of regional income would probably increase considerably during the next two decades.

- A proportion of the non-native population has moved to the region in the expectation of major development. If there were no major development in the foreseeable future, much of this population might leave. Whether this would mean a decline in the non-native population would, however, depend on whether government services would have to be increased to compensate for the decline in private investment and employment opportunities. A higher subsidy element in regional income could mean a requirement for more government administrators and community service workers, many of whom would likely come from the south.

- It should be recalled from previous material that the native population of most communities shows a marked bias towards younger age groups, raising the possibility of rapid future population growth. There would be limits to the number of native people that the renewable resources of the region could support. One recent study suggests that fish and big game resources could support a maximum of double the 1976 native population and that fur resources appear to have less elasticity (Fuller and Hubert, 1981). In the more populous regions, such as the Mackenzie Delta, resource limitations could be even more restrictive. There could also be limits to the extent to which native people, with rising material expectations, would want to depend on the land. During the next two decades, it would appear that a growing number of native people would either have to rely on increased subsidization or periodic and perhaps full-time employment outside of the region. Poverty and substandard living conditions would be unavoidable in some cases.

- A growing problem of the traditional economy could be an increasing difficulty to provide the

* See the Appendix to this chapter for a discussion of the current status and prospects of the Mackenzie Delta reindeer herd.

capital on which the economy depends - skidoos, boats, rifles, etc. Cash is needed for such capital and a prime source of such cash is wage employment. In the absence of the kinds of employment opportunities provided by oil and gas development, the productivity of the traditional economy could decline because of capital shortages. Again, the prospect is for an increasing reliance on welfare.

- There could also be a considerable decline in the kinds of skills needed for wage employment, since such skills must be used to be maintained. Because of a general stagnation in the industrial sector, younger native people would have little reason to aspire to higher levels of training or education, especially if they chose to remain in the Beaufort region. If, and when, industrial activity finally did materialize on a significant scale, the people of the region would probably be less ready for it than they are now.

The foregoing suggests a picture of economic wind-down, drift and stagnation. However, this does not mean that industrial development would be a panacea without problems. Such development would be stressful, and could at times press the people of the region to the limits of their ability to cope. Yet the foregoing strongly suggests that the absence of development could also be stressful and in social and economic terms, perhaps disastrous because it would offer little hope for a better future. It could put the region back into the position that it was in during the early 1960's, when the trapping economy had declined and there was little that the semiskilled and unskilled labour force could turn to.

The foregoing also emphasizes, once again, the interdependence of the traditional and industrial sectors of the regional economy. It reinforces the premise that, while the traditional sector may have to give way somewhat to the advance of the industrial sector, the health of the traditional sector is not independant of the industrial sector in the modern Arctic. By providing native people with casual and seasonal employment, the industrial sector can become an important source of capital needed to sustain productivity in the traditional sector or to expand and diversify that sector. By providing labour that is surplus to the traditional sector with a place to seek alternative employment and income, and perhaps careers, the industrial sector can help ensure that the traditional sector is not carrying a redundant load of unproductive people. By providing a growing market for goods and services, the industrial sector could help to provide a basis for putting renewable resource development on a commercial footing.

Some aspects of the foregoing argument could be stated more strongly. The young-age group bias of the Mackenzie Delta-Beaufort Sea communities suggests a much larger indigenous population for the region in twenty and even ten years time. Quite apart from the question of whether regional renewable resources could support this population, there is the matter of how many of these people will actually want to trap or retain partial dependence on the land for food and animal products. Many young people living in the region right now do not seem strongly oriented to traditional pursuits. Nor would it seem, however, that many have the educational and attitudinal grounding for industrial careers. The problem of a young population which is suited neither for traditional nor modern work could therefore grow. The only alternative to either the traditional economy or the modern one, with its industrial, commercial and government components, is a way of life depending on continuous, and increasing, subsidization. Whether by means of heavily subsidized housing or services, or by means of direct payments, "welfare" is already strongly entrenched in the regional economy. Reducing dependence on subsidies and other forms of income transfer would require an expanding economy, such as the oil and gas sector could provide. It could, however, also require a major reorientation in attitudes toward education and self-reliance, especially among the young.

Given a prolonged economic wind-down, young people and their families would likely see fewer reasons for continued school attendance, even at the current low attendance levels. The incidence of young people leaving school prior to completion would be unlikely to improve and the drop-out rate might even increase. Those interested in pursuing education and wage employment would increasingly find it necessary to migrate south for such opportunities. With such migration would come more difficult cultural adjustments for the individuals and families involved, in addition to the loss of potential future community leadership.

Given the existing expectations in the area regarding resource development, if such development does not occur, distrust of other future developments would likely increase. Communities might become discouraged from planning and preparing for growth in advance of any other proposals, leaving them in a position of "catch-up" if rapid growth did occur from some other type of development. The region's past experience with boom-bust would be reinforced, and the past lessons learned about the value of long-term planning could become discredited, as might the reputation of leaders who have attempted a more farsighted approach.

CHAPTER 7

BEAUFORT REGION - DEVELOPMENT SCENARIO

The development plans which have been used in the preparation of this EIS are described in Volume 2. For each plan, there are specific assumptions concerning reservoirs, their development, and the transportation of oil and gas, and Volume 2 should be referred to with respect to them. The main concern in the present volume is with matters of socio-economic relevance; especially with the size and character of the Beaufort Sea labour force and with the incremental population growth that may be induced by oil and gas development. Particular development plans are referred to only insofar as they shed light on these matters.

The purpose of this chapter is to present a description of the Beaufort Sea labour force in terms of its broad functions, skill structure and areas of primary residence; a translation of the labour force into regional population growth; and an assessment of options that the Industry may have with respect to locating personnel in Beaufort communities, rotating personnel north-south, and building new communities. All personnel numbers used in the discussion are taken directly from forecasts produced for particular development plans known collectively as the "Beaufort Industrial Benefits Planning Model (1982)." An outline of this model and printouts containing predicted values of a wide range of variables are published as support documents to the EIS. It must be emphasized that these forecasts are preliminary and are still under review.

7.1 BEAUFORT SEA LABOUR FORCE - MAIN CONSIDERATIONS

Each of the development plans referred to in Volume 2 contains different values for variables describing personnel requirements.* In this section, some of the main characteristics of personnel requirements will be examined. For this purpose it would seem unnecessary to consider all of the development plans and the analysis therefore proceeds on the basis of three of them; a high production pipeline case, a high production tanker case, and an intermediate production tanker case. One of these cases would rely on overland pipelines for the transportation of both oil and gas. The other two would transport oil by tanker but would rely on pipeline for the transportation of gas. In the Beaufort Industrial Benefits Planning Model, these three cases are entitled High Reserves, 1987 Pipeline, 42 Inch Case (2); High Reserves, Delayed Marine Scenario (2); and High Reserves, Expected Marine Case (2).*

Tables 7.1-1, 7.1-2 and 7.1-3 show projected "on-site" personnel requirements for the three development plans by major component and by total for the 1981-2000 period. The on-site labour force includes all personnel at the worksite whether they are actually on the job or resting. It should not be confused with "shift personnel," used later in this chapter, which refers to total personnel employed, including on-site personnel and personnel on rest and recreation status away from the worksite. The relationship between on-site and shift personnel is expressed by a factor known as a "shift multiplier." It would have been desirable to have used "shift personnel" throughout, but yearly estimates of shift personnel of the kind required were not available.

A first point that should be noted from the tables is that Beaufort personnel requirements will be high. Also especially noteworthy is the major role pipelines play in each plan. In the pipeline case, there are two distinct peaks due to pipeline construction. During the first of these, which occurs in 1985 when the main oil pipeline is assumed to be built, pipeline construction accounts for fully 85% of predicted on-site jobs.[4] During the second, which occurs in 1991 and relates to the construction of a gas pipeline, pipeline construction accounts for 60% of such jobs. In the marine cases, construction of a gas pipeline would also account for about 60% of on-site jobs during 1990, the peak activity year in each case.

The data in Tables 7.1-1 to 7.1-3 are grouped into pipeline and non pipeline components and are shown graphically in Figures 7.1-1 to 7.1-3. The non pipeline component includes both field development (including continuing exploration) and marine jobs.

From the figures, the peaks created by personnel requirements for pipeline construction are clearly evident. In Figure 7.1-1, the peak due to construction of the main oil line is followed, with a lag of 6 years, by the peak due to gas pipeline construction. In the

*Values used in this chapter for personnel refer to full-time, year-round positions and man-years of employment. Where figures for northern employees are given, they should be understood as not the actual number of workers, some of whom would be employed for only part of the year, but as their equivalent in man-years.

*The EIS support document, as published, refers to the high cases as "technically achievable" cases and the the expected case as an "intermediate" case.

TABLE 7.1-1
PROJECTED TOTAL ON-SITE PERSONNEL
HIGH PIPELINE CASE

Year	Drilling & Marine Operations	Construction & Operation Gas Pipeline	Operation Main Oil Pipeline	Beaufort Production Operations	Beaufort Construction Operations	Total
1981	1170	0	0	0	0	1170
82	1410	0	0	0	0	1410
83	1810	0	2860	0	0	4670
84	2150	0	6880	0	0	9030
85	2350	0	13490	0	0	15840
86	2900	0	8940	150	130	12120
87	3560	30	1030	360	210	5190
88	4080	160	160	570	210	5180
89	4640	1240	160	760	220	7020
1990	5080	6950	160	920	130	13240
91	5390	9750	160	1140	210	16650
92	5690	7830	160	1360	210	15250
93	5800	3250	160	1430	70	10710
94	6030	950	160	1590	130	8860
95	6410	880	160	1900	270	9620
96	6660	630	160	2110	210	9770
97	6910	630	160	2270	130	10100
98	7880	630	160	2420	130	11220
99	8110	630	160	2490	70	11460
2000	8270	630	160	2500	0	11560

Source: High Reserves, 1987 Pipeline, 42 Inch Case (2), April 27, 1982.

TABLE 7.1-2
PROJECTED TOTAL ON-SITE PERSONNEL
HIGH MARINE CASE

Year	Drilling & Marine Operations	Construction & Operations Gas Pipeline	Beaufort Production Operations	Beaufort Construction Operations	Total
1981	1170	0	0	0	1170
82	1430	0	0	0	1430
83	1830	0	0	0	1830
84	2180	0	0	100	2280
85	2720	0	150	240	3110
86	3160	30	210	70	3470
87	3830	160	420	210	4620
88	4410	1240	640	210	6500
89	5000	6950	820	220	12990
1990	5550	9750	1140	130	16570
91	5790	7830	1210	130	14960
92	6120	3250	1430	210	11010
93	6320	950	1590	70	8930
94	6670	880	1750	130	9430
95	7080	630	2060	270	10040
96	7360	630	2120	210	10320
97	8340	630	2270	130	11370
98	8670	630	2430	130	11850
99	8930	630	2500	70	12130
2000	9120	630	2500	0	12250

Source: High Reserves, Delayed Marine Scenario (2), April 28, 1982

TABLE 7.1-3
PROJECTED TOTAL ON-SITE PERSONNEL
INTERMEDIATE MARINE CASE

Year	Drilling & Marine Operations	Construction & Operations Gas Pipeline	Beaufort Production Operations	Beaufort Construction Operations	Total
1981	1170	0	0	0	1170
82	1430	0	0	0	1430
83	1830	0	0	0	1830
84	2180	0	0	100	2280
85	2720	0	150	240	3110
86	3070	30	210	70	3380
87	3260	160	270	70	3770
88	3880	1240	490	210	5820
89	4270	6950	550	70	11850
1990	4650	9750	710	130	15240
91	5030	7830	930	210	14000
92	5430	3250	1150	210	10050
93	5490	950	1160	0	7600
94	5650	880	1310	130	7990
95	5680	630	1380	70	7770
96	5820	630	1380	0	7830
97	6660	630	1530	130	8960
98	6860	630	1530	0	9030
99	6900	630	1600	70	9210
2000	7030	630	1600	0	9270

Source: High Reserves, Expected Development Marine Case (2), May 16, 1982

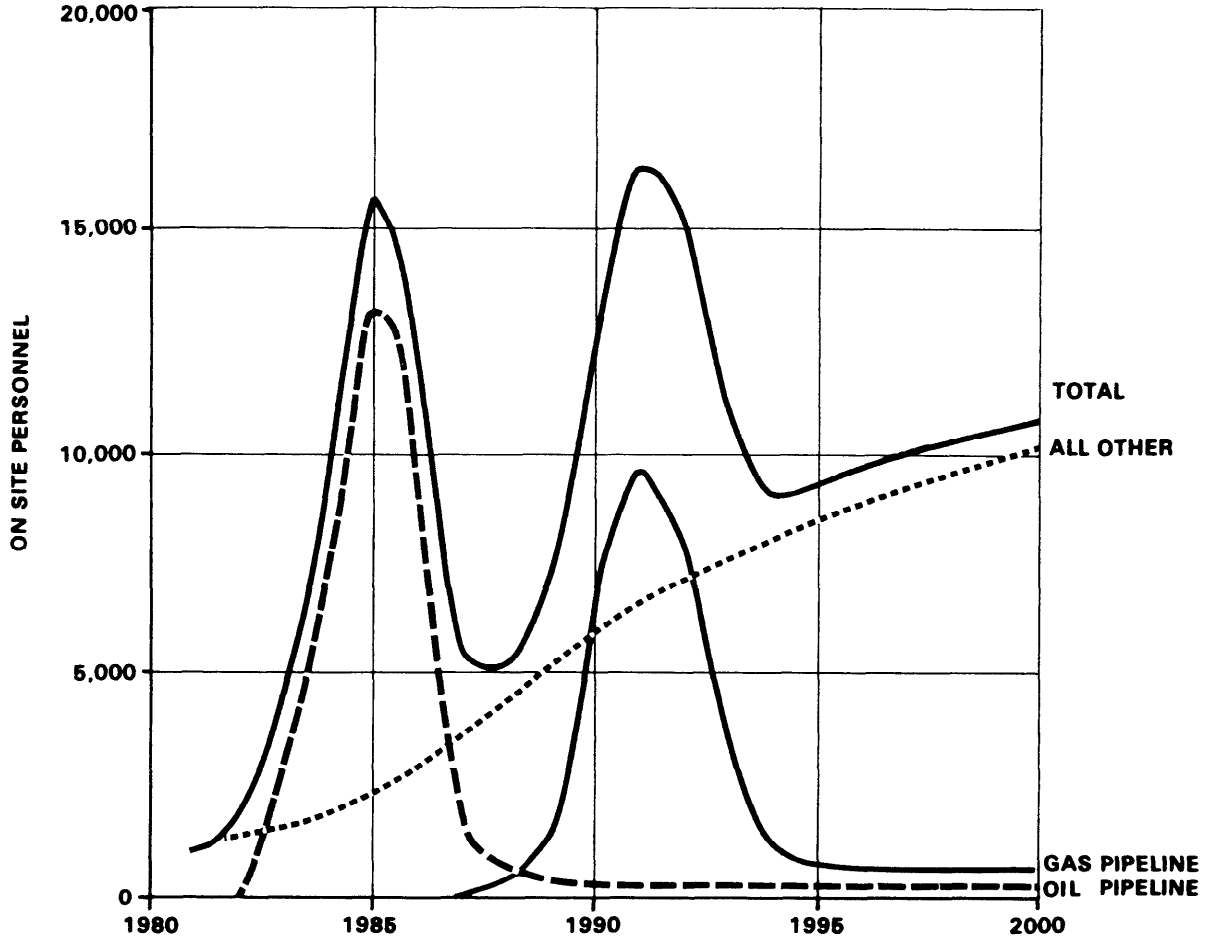


FIGURE 7.1-1 *High pipeline case: projected pipeline, other and total on-site personnel, 1981-2000.*

marine cases, only gas pipeline construction is a factor, but the single peak is nevertheless a pronounced one. In both the pipeline and marine cases, personnel requirements for purposes other than pipeline construction rise gradually.*

Only a small proportion of the on-site personnel engaged in pipeline construction would be located in the Beaufort Sea region. Most personnel would be located on several pipeline spreads in isolated camps along the right-of-way of each pipeline. Most on-site labour not engaged in pipeline construction would, in comparison, be located at on and offshore facilities in the Beaufort Sea region and in the region's principal communities.

*In addition to these overall peaks, there would be significant peaking due to the seasonal nature of construction activity. When this volume was written, planning was not sufficiently advanced to fully assess these peaks.

The development of the Beaufort's oil and gas resources will require a very wide range of professional, administrative, trades and general personnel including geologists, geophysicists, engineers, production personnel, marine crew, electricians, crane operators and labourers. Only a few general points concerning such personnel will be made here. In the marine cases, there will be a consistently high demand for personnel in categories such as marine officers and crew; cooks, helpers and supply workers; production and workovers personnel; and, by the mid 1980's, production operators. There will also be a lesser, though significant demand for trades people such as electricians, machinists, millwrights, and iron and boiler workers. There will not, however, be a strong demand for basically unskilled and inexperienced people. The pattern is similar in the pipeline case, although somewhat more work may be available to unskilled people on pipeline construction crews.

Personnel for Beaufort Sea development will be

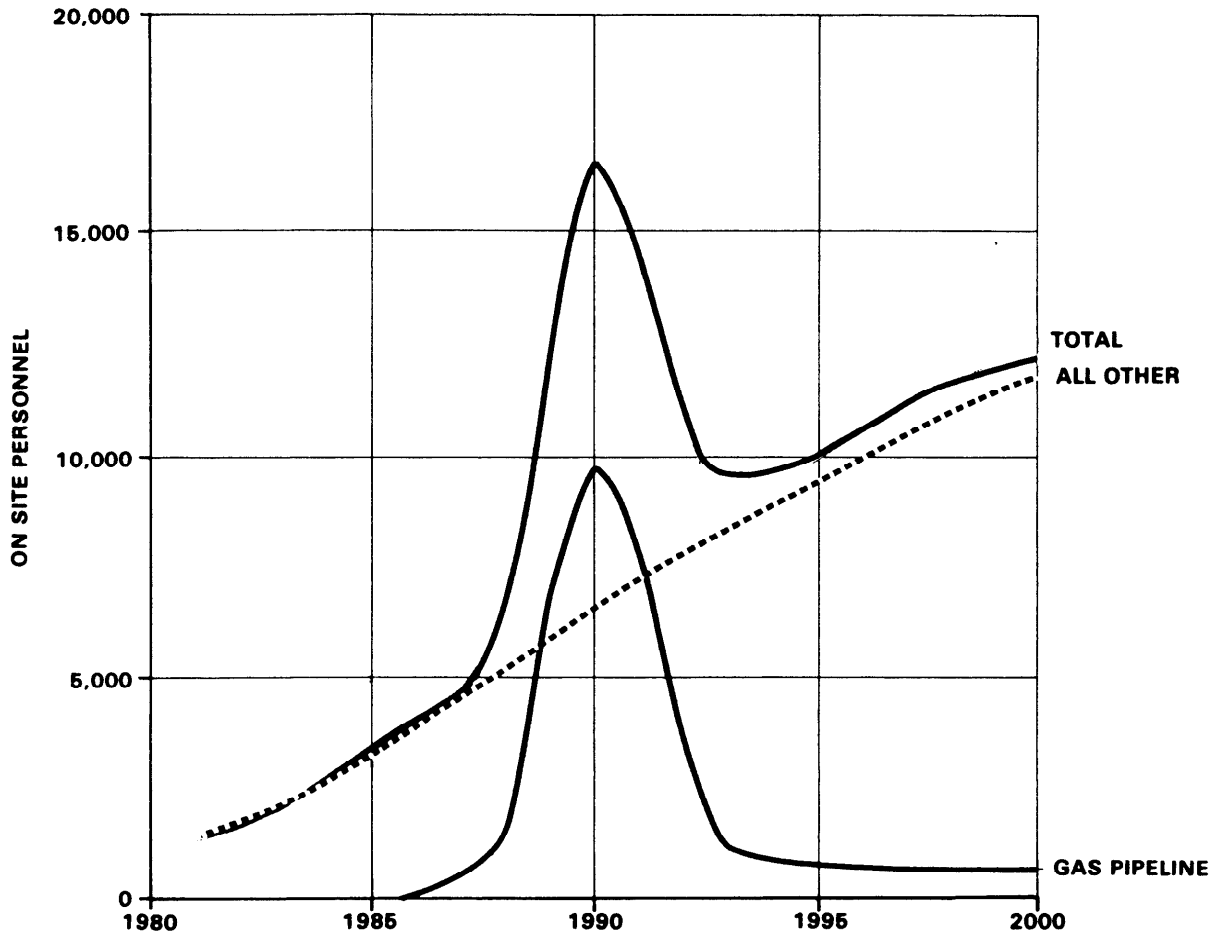


FIGURE 7.1-2 *High marine case: projected pipeline, other and total on-site personnel, 1981-2000.*

drawn from all over Canada and from abroad. Tables 7.1-4 to 7.1-6 illustrate this for the development plans under consideration. It should be noted that the tables refer to "shift personnel," that is, to total Beaufort Sea personnel and not just to on-site personnel.

Several factors are evident from the tables. At the most general level, personnel will be drawn from all over Canada, and major regions - the north, the west and the east - will all be represented in Beaufort development. The tables refer only to the direct employment of personnel who work in the Beaufort region and do not include employment in activities such as ship construction and pipe fabrication, which will involve thousands of additional people. Material on Canadian benefits in Volume 2 should be consulted on these matters.

It should be noted that the regional figures mask some factors which should be highlighted. For example, the provinces of Alberta, Ontario, Nova Scotia and British Columbia are expected to be more prominent than other provinces in providing personnel to Beaufort Sea construction and operations. As well, in all of the tables, the north's share of the total labour force rises over time. This increasing share would be accounted for in two ways. Firstly, the Industry will employ more people who already live in the northern territories, as their skills and qualifications increase. Secondly, some Industry personnel who would normally live in the south will move to the Beaufort region, and perhaps other northern regions such as southern Yukon and the Great Slave Lake area. As a further point, it should be noted that the "foreign" component in the labour force is not expected to be large and is expected to decline as a percentage of total personnel during the

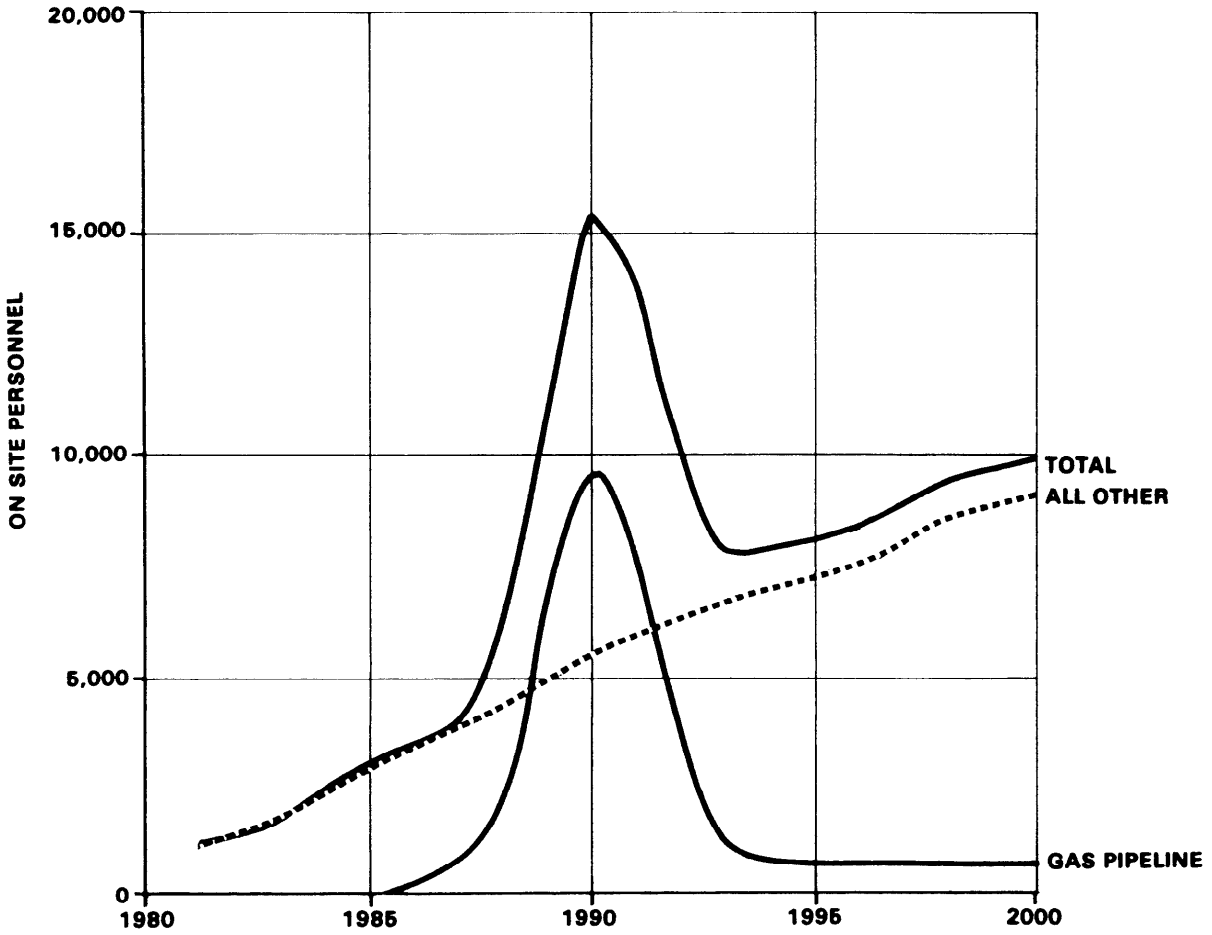


FIGURE 7.1-3 *Expected marine case: projected pipeline, other and total on-site personnel, 1981-2000.*

TABLE 7.1-4

PROJECTED BEAUFORT SEA PERSONNEL
HIGH PIPELINE CASE
AREA OF PRIMARY RESIDENCE
(SHIFT PERSONNEL)

	Northern Canada		Western Canada		Eastern Canada		Foreign		Total
	No.	%	No.	%	No.	%	No.	%	
1981	190	10	860	51	670	36	94	5	1,800
1985	2,210	13	9,681	54	5,230	30	260	1	17,380
1990	3,340	17	9,620	49	6,250	32	380	2	19,520
1995	4,460	24	7,640	41	6,170	33	360	2	18,500
2000	6,780	30	8,240	36	7,470	33	340	1	12,650

Source: Beaufort Industrial Benefits Planning Model, (1982)
Note: Numbers may not add to total or 100% due to rounding.

TABLE 7.1-5

PROJECTED BEAUFORT SEA PERSONNEL
HIGH MARINE CASE
AREA OF PRIMARY RESIDENCE
(SHIFT PERSONNEL)

	Northern Canada		Western Canada		Eastern Canada		Foreign		Total
	No.	%	No.	%	No.	%	No.	%	
1981	190	10	860	51	670	36	90	5	1,800
1985	720	14	2,460	46	1,970	37	210	4	5,330
1990	3,760	16	11,120	49	7,860	34	440	2	23,090
1995	4,650	24	7,600	39	6,790	36	440	2	19,290
2000	7,140	30	8,480	35	8,280	34	420	2	24,040

Source: Beaufort Industrial Benefits Planning Model, (1982)
Note: Numbers may not add to total or 100% due to rounding.

TABLE 7.1-6

PROJECTED BEAUFORT SEA REGION
EXPECTED MARINE CASE
AREA OF PRIMARY RESIDENCE
(SHIFT PERSONNEL)

	Northern Canada		Western Canada		Eastern Canada		Foreign		Total
	No.	%	No.	%	No.	%	No.	%	
1981	190	11	860	48	670	37	90	5	1,800
1985	720	14	2,460	46	1,970	37	210	4	5,330
1990	3,330	16	10,110	49	7,030	34	360	2	20,740
1995	3,620	24	5,940	39	5,310	35	350	2	15,050
2000	5,240	25	6,380	35	6,350	35	320	2	18,050

Source: Beaufort Industrial Benefits Planning Model, (1982)
Note: Numbers may not add to total or 100% due to rounding.

1981 to 2000 period. This is in keeping with the Industry view that Beaufort jobs should go to Canadians to the maximum extent possible.

7.2 METHOD FOR TRANSLATION INTO POPULATION GROWTH

As in the analysis of the previous section, this and subsequent sections, which deal with population growth in the Beaufort Sea communities, will rely on data pertaining to the high pipeline case and the high and intermediate marine cases.

For the purposes of this section, two components of the personnel required for Beaufort development will be emphasized. These are Regional Resident Personnel (RRP) and North-South Rotational Personnel (NSRP). The RRP will consist of Industry employees who will live in permanent communities in the Beaufort region. Although, in some cases, these communities will also be the worksites, most members of the RRP will be transported to and from worksites away from communities on a rotational basis. The shift multipliers applying to RRP would therefore be similar to those applying to NSRP.

With respect to the NSRP, not all of its members will normally live in the south. A proportion will be northern residents, but they will come from other northern regions distant from the Beaufort Sea; for example, Yukon, the Mackenzie Valley and the eastern Arctic. Northern resident personnel have already been shown in Tables 7.1-4 to 7.1-6 and it is assumed here that RRP equalled 80% of such personnel in 1981, will equal 70% in 1985, and 60% in each of 1990, 1995 and 2000. These percentages are reasonable if it is considered that: a) The regional labour force of the Beaufort is small and qualified people willing to take jobs with the oil and gas industry would quickly be absorbed (that is; it is being assumed that the qualified local labour force will be fully employed); b) the rate at which people can be relocated to the Beaufort region would be limited by constraints such as the availability of housing and services; and c) personnel from other northern regions could increasingly respond to rotational Beaufort employment over the course of time. Values for RRP and NSRP are shown in Tables 7.2-1 to 7.2-3.

TABLE 7.2-1

PROJECTED BEAUFORT SEA REGION
RESIDENT AND ROTATIONAL PERSONNEL
(TOTAL SHIFT PERSONNEL)
HIGH PIPELINE CASE

	Northern Personnel				
	Northern Resident Personnel	Percent Living in Beaufort	Regional Resident Personnel	North/ South Rotational Personnel	Total Personnel
1981	190	80	150	1,650	1,800
1985	2,210	70	1,550	15,830	17,380
1990	3,340	60	2,000	17,520	19,520
1995	4,460	60	2,680	15,820	18,500
2000	6,780	60	4,070	18,580	22,650

Source: Table 7.1-4.

TABLE 7.2-2

PROJECTED BEAUFORT SEA REGION
RESIDENT AND ROTATIONAL PERSONNEL
(TOTAL SHIFT PERSONNEL)
HIGH MARINE CASE

	Northern Personnel				
	Northern Resident Personnel	Percent Living in Beaufort	Regional Resident Personnel	North/ South Rotational Personnel	Total Personnel
1981	190	80	150	1,650	1,800
1985	720	70	500	4,830	5,330
1990	3,760	60	2,260	20,830	23,090
1995	4,650	60	2,740	16,550	19,290
2000	7,140	60	4,280	19,760	24,040

Source: Table 7.1-5.

TABLE 7.2-3

PROJECTED BEAUFORT SEA REGION
RESIDENT AND ROTATIONAL PERSONNEL
(TOTAL SHIFT PERSONNEL)
EXPECTED MARINE CASE

	Northern Personnel				
	Northern Resident Personnel	Percent Living in Beaufort	Regional Resident Personnel	North/ South Rotational Personnel	Total Personnel
1981	190	80	150	1,650	1,800
1985	720	70	500	4,830	5,330
1990	3,330	60	2,000	18,740	20,740
1995	3,620	60	2,170	12,880	15,050
2000	5,240	60	3,140	14,910	18,050

Source: Table 7.1-6.

Regionally resident and rotating personnel are translated into the incremental regional population attributable to oil and gas development simply by multiplying RRP by 4.4 and NSRP by 0.2. These multipliers were derived as follows:

(1) Multiplier applied to RRP (4.4) has been rounded from 4.379 which was derived as follows:

$$4.379 = 2.071\ [(0.88 \times 3.74)/1.65) + 0.12]$$

Where: 2.071 is the multiplier which, when applied to people employed directly, yields the number of personnel dependent on oil and gas industry generated income flows, including people in indirect and induced employment roles.

0.88 represents the proportion of the RRP, plus persons in induced and indirect employment roles, that is married and therefore needs to be multiplied by a family factor;

3.74 represents the number of persons per family;

1.65 allows for 65% of spouses and other family members, not considered the primary breadwinner, being employed. It is the average number of persons per family who are working (the breadwinner plus 0.65 others).It is a divisor in the equation - to the extent that wives and other family members work, additional employees will not have to be brought in from the South.

0.12 represents the proportion of the RRP that is single. (Simply, if 88% of personnel are married, 12% must be single.)

(2) Multiplier applied to NSRP (0.2) has been rounded from 0.219 which was derived as follows:

$$0.219 = 0.05(2.071[(0.88 \times 3.74)/1.65 + 0.12])$$

Where: the only new factors are 0.05, which recognizes that NSRP will have a regional population effect of the same general type as RRP, but of a very much smaller scale. It has been assumed here that the effect of NSRP will be one twentieth that of RRP.

Details on the assumptions which were used in deriving the multiplers are contained in the Appendix to 7.2 found at the end of this Volume. The reader should be cautioned that although the foregoing multipliers have been worked out with considerable care, the personnel projections to which they are being applied will likely undergo further development. It is also possible that the multipliers could change and perhaps fall over time, and no allowance has been made for this. It follows that the population projections of the next section should not be viewed as final estimates, but as the best ones that can be made at the present time.

In general terms the multipliers present the assumed case that members of the RRP and people who work in induced and indirect employment roles will in most cases be married and have families. Wives (or husbands, if the wife is a member of the RRP) will for the most part also be active in the labour force. Older children may also be active in employment. The factors further indicate that the population effect of the RRP will be very much greater than the effect of the NSRP. This would be expected since, as will be proposed later, members of the NSRP will be housed in offshore facilities or in self-contained camps away from regional communities.

A methodological issue which arises at this point concerns the treatment of pipeline workers. Should they be included in the base used to derive population? It has been concluded that they should because, even though most pipeline construction will take place away from the Beaufort Sea region, it is likely to have an impact on regional activity and population growth. In the present analysis the population effects of pipeline construction are small. Since virtually all pipeline workers will be members of the NSRP rather than the RRP, a multiplier of only 0.2 is applied to them. Pipeline workers, like other north-south rotational employees, will thus have some effect on population growth in the Beaufort region, but far less than Industry employees who will actually live there.

7.3 REGIONAL POPULATION GROWTH

Using the foregoing factors and the estimates for RRP and NSRP in Tables 7.2-1, 7.2-2 and 7.2-3, it is possible to estimate incremental population growth for the Beaufort Sea region. Estimates for each of 1981, 1985, 1990, 1995 and 2000 are shown numerically in Tables 7.3-1, 7.3-2 and 7.3-3, and graphically in Figure 7.3-1. Estimates for 1981 are hypothetical, since it cannot really be known how much of the present population lives in the region because of oil and gas development. However, the 1981 oil and gas induced population of 990 (in each table) is about 14% of the total regional population, and it is certainly possible that one-seventh of this population

TABLE 7.3-1

PROJECTED BEAUFORT SEA REGION INCREMENTAL POPULATION DUE TO OIL AND GAS DEVELOPMENT HIGH PIPELINE CASE

	Population due to: Regional Resident Personnel	North/South Rotational Personnel	Total Oil and Gas Induced Population
1981	660	330	990
1985	6,820	3,180	10,000
1990	8,800	3,500	12,300
1995	11,790	3,160	14,950
2000	17,910	3,720	21,630

Source: Table 7.2-1

TABLE 7.3-2

PROJECTED BEAUFORT SEA REGION INCREMENTAL POPULATION DUE TO OIL AND GAS DEVELOPMENT HIGH MARINE CASE

	Population due to: Regional Resident Personnel	North/South Rotational Personnel	Total Oil and Gas Induced Population
1981	660	330	990
1985	2,200	970	3,170
1990	9,940	4,170	14,110
1995	12,060	3,310	15,370
2000	18,830	3,950	22,780

Source: Table 7.2-2

TABLE 7.3-3

PROJECTED BEAUFORT SEA REGION OIL AND GAS INDUCED POPULATION GROWTH INTERMEDIATE MARINE CASE

	Population due to: Regional Resident Personnel	North/South Rotational Personnel	Total Oil and Gas Induced Population
1981	660	330	990
1985	2,200	970	3,170
1990	8,800	3,750	12,550
1995	9,550	2,580	12,130
2000	13,820	2,980	16,800

Source: Table 7.2-3

has now established a strong dependence on oil and gas activity.

This raises the question of the future relationship between the incremental population induced by oil and gas development and the population that would normally reside in the region, whether such development took place or not, termed here the "normal" population. Oil and gas induced population would have to be added to the normal population to obtain total regional population for any given year. Despite some room for doubt about the current population effects of oil and gas activity, an approximation of the present normal population may be obtained by subtracting 1981 estimated oil and gas induced population from 1981 regional total population, which was 7,100. Subtracting 990 from 7,100 leaves a 1981

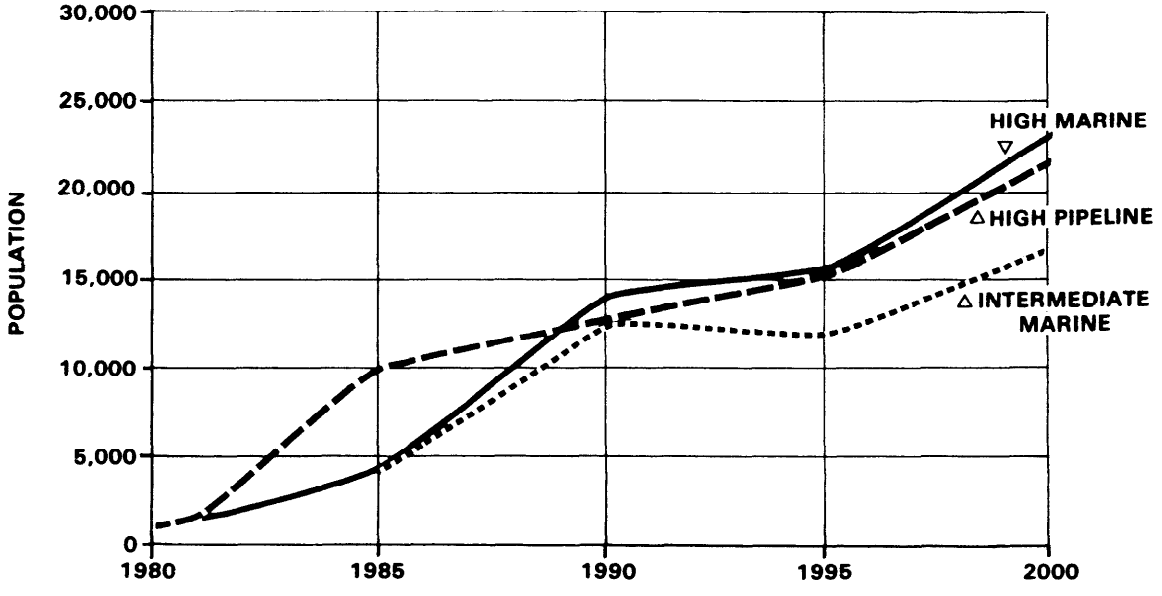


FIGURE 7.3-1 *Beaufort Sea region projected incremental population growth induced by oil and gas development.*

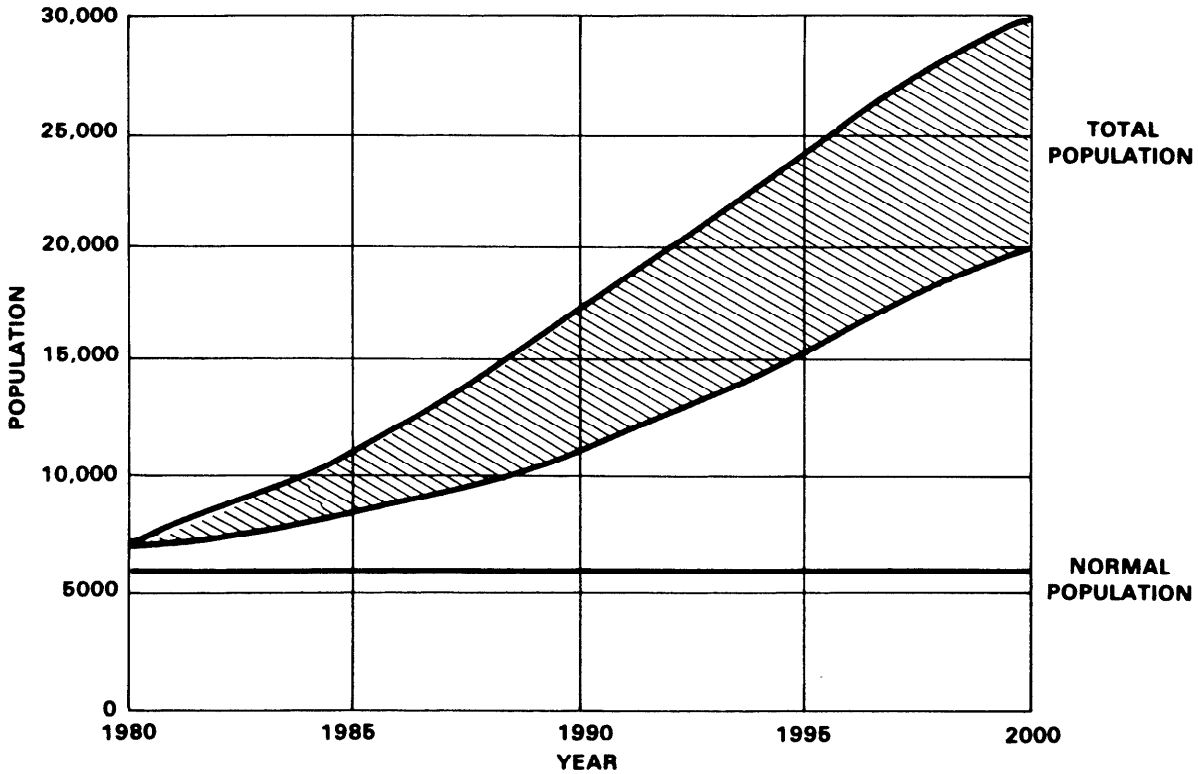


FIGURE 7.3-2 *Projected Beaufort Sea region population growth range.*

normal population of 6,110, which can be rounded off to 6,000.

It is proposed that, for reasons already given in Chapter 6, this normal population is not likely to change very much over the next twenty years. It can be viewed as the population that would reside in the Beaufort Sea region if there were no further oil and gas development; a population that would be subject to mixed trends. As has already been proposed, with more limited industrial activity, there would be fewer jobs, and members of the regional labour force would probably have to leave the region to seek jobs elsewhere. Many business people, who had moved to the region in the expectation of development, would also likely leave. The government component of the population could increase somewhat, however, as more civil servants were moved in to administer welfare programs and to attempt to shore-up a declining regional economy. Given such possible trends, it has been assumed that the normal population will remain constant at its 1981 value to the year 2000.

Three points need to be made with respect to the numbers in Tables 7.3-1 to 7.3-3 and the curves in Figure 7.3-1. One is that, whichever development plan is assumed, incremental population growth would be considerable. Another is that there would be periods of more rapid growth. A third point is that there is really considerable uncertainty around the whole question of growth. The predicted incremental populations are based on particular assumptions; other assumptions would have yielded somewhat different results. Nevertheless, even minimum cases would yield population levels well above those presently in the region.

What all of this would suggest is that, insofar as is possible, growth should occur within a range which, as a matter of policy, both government and the Industry would endeavor to maintain. Such a range is depicted as the shaded area in Figure 7.3-2, which, when oil and gas induced and normal populations are combined, indicates growth up to population levels ranging between 20,000 and 30,000 people in the year 2000. Maintaining relatively smooth growth within such a range requires a strategy which ensures that rapid population increases could be moderated by having a higher proportion of personnel rotate between the north and the south, and a lower proportion living in the Beaufort Sea region, if this were deemed desirable. It is really up to government and the residents of the communities to decide how fast the population of the Beaufort region should grow. The Industry is willing to give consideration to a variety of possible strategies.

7.4 INDUSTRY OPTIONS

While the Industry is willing to encourage regional growth, the general course of its planning will be based on making only a limited number of its personnel residents of the Beaufort region. In determining this number, the Industry will depend greatly on the views expressed by regional residents and decisions reached by government. Personnel not resident in the Beaufort region — the majority of the Industry's Beaufort labour force — would continue to commute between homes in the south (or elsewhere in the north) and worksites in the Beaufort region.

That some Industry personnel, and a growing number over time, will be resident in the Beaufort region raises the question of how and where these people will be accommodated. There would seem to be two general options: fitting them into existing communities and building new towns. With respect to existing communities, it must be considered that some communities, especially Inuvik, have a well developed infrastructure and an extensive base of land for new housing and other buildings. Furthermore, some communities, again especially Inuvik, have waited a long time for economic growth. Such considerations indicate that much of the population growth could occur at Inuvik. Tuktoyaktuk, which has already developed a dependence on oil and gas activity, could also experience some further growth. On the other hand, there could be grounds for considering new community development, and the Industry feels it must keep its options open on the matter.

PLATE 7.4-1 *Dome's Tuk Base. Shorebase and other facilities will accommodate the bulk of Beaufort personnel, with only a minority becoming resident in existing northern communities.*

CHAPTER 8

BEAUFORT REGION - EFFECTS OF DEVELOPMENT

Population and activity growth of the order dicussed in Chapter 7 will have important implications for the present population of Beaufort Sea communities and for the northern territories as a whole. There will be a requirement for large investment in the area. Changes will occur in the ethnic composition of the regional population, and in regional and territorial political balances. There could be added pressures on regional fish, fur and game resources.

Present residents of the Beaufort communities will need to play effective roles in planning, if their interests are not to be overwhelmed by complex, rapid change and the many new people who will move to the region. The people in current leadership positions already have many demands on their time and cannot be expected, by themselves, to carry the substantially increased burden of decision-making necessitated by development and community growth far beyond levels previously experienced. Emphasis will have to be placed on increasing the political awareness of community residents, and broadening the base for participation and leadership among them.

The following discusses the major changes which could occur in the Beaufort Sea region during the next 20 years, and of the opportunities and problems that may arise as a result. Policy and planning measures that may be required are, at times, indicated in general terms, but are more thoroughly discussed in Chapter 9.

8.1 INCREASES IN COMMUNITY CAPITAL AND HUMAN RESOURCES

Growth of the predicted magnitude will require a major expansion of social capital. Housing, education services, public institutions, municipal services and facilities will all be affected and must be prepared for the loadings they will have to carry. Because the horizon of this study is a lengthy 20 years, the projections provided here are intended only as an indication of what may be required, and are not intended to be precise or definitive. Some of the infrastructure that the region will require during the expansion of population and activity is already in place.

There are three parts to this section: The first deals with requirements at Inuvik, where most of the growth associated with Beaufort development is expected to occur. The second discusses Tuktoyaktuk, the other Beaufort community which is expected to grow significantly. The third addresses other regional communities which, even though they will be isolated from the kinds of pressures that Inuvik and Tuktoyaktuk will experience, will nevertheless be affected by some aspects of regional growth.

It should be noted that the Industry has alternatives to expansion at established Beaufort communities if such expansion should raise problems or be viewed as undersirable by local residents. It could, for example, put all personnel except local people on north-south rotational status, or develop new communities at locations such as King Point. While there are no plans with respect to such options, they are nevertheless open to consideration.

8.1.1 INUVIK

The bulk of the growth that is forecast for the Beaufort Sea region is expected to occur at Inuvik, where the population could grow at an average rate of about 10% per year between 1981 and the year 2000. This growth rate is well above rates experienced by the community during the late 1970's, although it is considerably less than the 17% which occurred at Fort McMurray during the same period. By 1990, the population of Inuvik could be above 10,000 and it could be in the order of 18,000 to 24,000 by the year 2000. For present purposes, it has been assumed to be 21,000 in the latter year.*

The most important change in the age distribution of the population during the 1980 to 2000 period is expected to be a substantial increase in the population group aged 20 to 34. This age group contains the prime workforce component of the population and its growth is crucial to the availability of employable persons in the future. Changes could also occur in the proportions of men and women in the total population. As is characterisitic of rapidly growing com-

* Although the growth rate is projected at 10% for the whole of the 1981-2000 period, it is above this rate between 1981 and 1990 and below it between 1990 and 2000.

munities on the frontier, there is likely to be a larger male component as population grows rapidly in the earlier to mid-years of the forecast period, but a return to a more equal balance as growth slows toward the year 2000.

8.1.1.1 Accommodation

There are currently just over 1,000 housing units in Inuvik. To accommodate the rapidly increasing population, there will be a need for a substantial increase in housing construction, of both single and multiple dwelling types, within a relatively short period. Given a population of about 21,000 by the year 2000, some 7,500 accommodation units would be needed to shelter Inuvik's residents at that time. The figure of 7,500 dwelling units implies about 3 persons, on the average, per household, a figure much lower than the 4.8 person occupancy ratio deemed desireable by the NWT Housing Corporation. However, the figure is justifiable in that Inuvik will become a high-income, relatively transient community with family size and configuration not corresponding to conventional norms. Table 8.1-1 outlines an approximate distribution of dwelling units by type required during the 1985 through 2000 period. Estimates of the various types of dwelling units are based on the experience of Fort McMurray as that community underwent rapid growth during the 1970's. The estimated 7,500 accommodation units would require approximately 250 hectares of serviced residential land, in addition to land which has already been developed and serviced.

Inuvik's population will be distributed among mobile homes, apartments, townhouses, semi-detached and single family dwellings, in a manner determined primarily by the availability of various types of dwellings. If Inuvik's accommodation mix resembled that of Fort McMurray, the approximate distribution of residents among different types of dwellings would be as is shown in Table 8.1-2.

TABLE 8.1-1

DWELLING TYPES BY NUMBER OF UNITS
INUVIK 1985-2000

	1985	1990	1995	2000
Mobile Homes	520	850	1000	1470
Apartments	410	780	1400	1930
Townhouses	70	540	850	1010
Semi-detached	120	320	300	720
Single Family	630	1100	1450	2370
Other	50	10	0	0
Total	1800	3600	5000	7500

Source: MRA Calculations.

Method:
Proportions of various accommodation types are based on experience at Fort McMurray between 1976 and 1980.

With respect to the availability of commercial leaseable space and land suitable for commercial and industrial development, it is estimated that the current supply of such land would serve an Inuvik population of approximately 6,000 persons. At the rate of growth that is likely to occur, this population could be achieved by the mid 1980's. If shortages of space are to be avoided, early planning for the expansion of commercial space should be encouraged.

8.1.1.2 Infrastructure

With the growth of Inuvik's population, increased pressure will develop on the delivery and maintenance of municipal services. The water and sewer system, which can currently handle a population of approximately 5,000, would require expansion by about 1985. The community plan prepared by Underwood McLellan & Associates recommends the instal-

TABLE 8.1-2

POPULATION BY DWELLING TYPE
INUVIK 1985-2000
(percentages in brackets)

	1985		1990		1995		2000	
Population	5,000		10,000		14,000		21,000	
Mobile Homes	1,450	(29)	2,200	(22)	2,800	(20)	3,780	(18)
Apartments	750	(15)	1,400	(14)	2,660	(19)	3,570	(17)
Townhouses	200	(4)	1,600	(16)	2,660	(19)	3,150	(15)
Semi-detached	350	(7)	1,000	(10)	980	(7)	2,310	(11)
Single Family	2,100	(42)	3,700	(37)	4,900	(35)	7,980	(38)
Other	150	(3)	100	(1)	0	(0)	0	(0)

Source: MRA Calculations.

lation of a permanent Mackenzie River water intake when the population has grown to 5,000. Such a facility would only allow the water system to handle a 6,000 person community, and the system would therefore soon require further expansion. Beyond the 6,000 person level, the sewage lagoon would also become inadequate and would require replacement by primary settling and long-term storage lagoons. Additional treated water storage would also be needed. Periodic additional upgrading or expansion of water and sewage facilities would be required beyond the mid to late 1980's, as population continued to grow. Any facilities built in the near term to expand or replace existing facilities should therefore be built with the prospect of further expansion in mind. Projections of water and sewer needs are shown in Table 8.1-3.

The Inuvik airport is currently operating considerably below capacity. Transport Canada estimates that the existing runway and taxiway configuration has a practical annual capacity of 65,550 air traffic movements. Present use runs to less than 30,000 movements per year, or approximately 40% of capacity (Table 8.1-4). When expansion is required due to increased air traffic volumes, the construction of additional facilities should not pose major problems. Expansions in air traffic control services could be required as traffic increased.

The road system in Inuvik handles current vehicular traffic adequately, but will require expansion as the community grows. With the addition of new subdivisions to accommodate an increasing population, distribution roads would have to be constructed within the subdivisions, but major arterials would also require expansion and improvement.

TABLE 8.1-4

AIR TRAFFIC VOLUMES
INUVIK 1978-1980

Year	Total	Itinerant	Local
1980	26,843	23,725	3,118
1979	23,857	21,565	2,292
1978	27,208	23,174	4,034

Source: Transport Canada.

8.1.1.3 Education Services

Population increases in Inuvik will mean that the school age population will expand. The Department of Education, Government of the Northwest Territories, was approached to provide estimates of the growth of educational facilities and staff needed to accommodate the increased student population that would accompany the general population increase. The department provided some basic student teacher ratios, which made it possible to project enrollment and the number of teachers required throughout the forecast period. This information is provided in Table 8.1-5.

In the descriptive material in Chapter 4 it was mentioned that the educational facilities already in place in Inuvik could accommodate a considerable increase

TABLE 8.1-3

WATER AND SEWER
INUVIK

Year	Population	Expansion*
1985	5240	- Hidden Lake, used as water supply during spring breakup and fall freezeup, has capacity up to population of 4770. AESL recommendation - permanent Mackenzie River Water Intake be constructed.
1986	5886	- At population of 5000-6000 present sewage lagoon should be abandoned and replaced by primary settling and long term storage lagoons on the west bank.
		- Need additional treated water storage
1988	7428	- At population level of 8000 the water treatment plant will require expansion at the filter/booster stage.
1989	8344	

*Source: Underwood, McLellan & Associates, Town of Inuvik General Plan. UMA did not project requirements beyond the 8000 population level.

TABLE 8.1-5

ENROLLMENT AND TEACHERS INUVIK 1985-2000

	1985	1990	1995	2000
Enrollment:				
Grades K-6	800	1600	2300	3400
7-9	300	600	900	1300
10-12	300	500	800	1100
	1400	2700	4000	5800
Teachers:				
Grades K-6	40	70	100	150
7-9	20	30	50	80
10-12	20	30	50	80
	80	130	200	310

Source: MRA Calculations

in student enrollment before much expansion was required. It is likely however, that, despite present excess capacity, additional facilities will be needed before the year 2000. A change in the variety of training and education offered at Inuvik could pose a further demand for additional facilities. For example, if Inuvik becomes a centre for post-secondary technical and vocational training, as would seem logical in view of prospective Beaufort development, an expansion of existing educational facilities or entirely new facilities would have to be considered.

8.1.1.4 Health Services

Medical services in Inuvik are provided through the 120-bed regional hospital which could service a much larger local and regional population before major expansion was required. The hospital is currently operating only 55 beds. If wards had to be expanded or increased in the short to medium term future to provide for more beds, facilities supporting the wards would probably be adequate for the time being. However, given the vital role the Inuvik hospital will have to play in the Beaufort Sea region as regional population grows, planning concerning total hospital and health needs should not be delayed.

8.1.1.5 Social Services

As the population of Inuvik grows, social services and the requirements placed on social service workers should change in two basic ways. Firstly, the need for social services will increase and the number of workers required to administer them will have to grow. Currently, there are five social service workers per 1,000 people in Inuvik. If this ratio held, there would be a need for some 50 such people before 1990, and perhaps as many as 80 by the year 2000. However, the ratio is not expected to hold; it would undoubtedly fall as population grew, and the number and variety of community voluntary organizations grew with it. Secondly, the requirement for social services will undergo important qualitative changes. Between the present and the year 2000, initial to mid-period population growth would be rapid and could be characterized by a considerable amount of transience and dislocation. At a later stage (toward the year 2000), the community will have become considerably more settled. Initial to mid-period social services would, then, have to focus more on transience and its effects; later period social service work will focus on the needs of a more mature community.

8.1.1.6 Law Enforcement

Law enforcement services are currently being provided by a 15-man detachment which serves as a regional subdivision headquarters. If current ratios were maintained, police manpower requirements would have to be expanded from the present level to in excess of 150 by the year 2000. As in the case of social services, it is probable that the ratio of enforcement officials to residents would fall as population grew. Enforcement requirements would also likely fall as crime began to reflect the more complex character of a more mature community.

8.1.2 TUKTOYAKTUK

The Industry intends that the growth of its own personnel and that of support and service companies will be limited in Tuktoyaktuk, and population growth is not expected to exceed 5% per year during the 1980 - 2000 period. While 5% is still a relatively high rate, it is somewhat lower than the rate experienced during the period from 1975 to 1980, when growth averaged 6.5% per annum. At the expected rate, Tuktoyaktuk's population would rise from a 1980 level of 762 to about 2,000 by the year 2000. The working age population is expected to increase somewhat as a proportion of the total population during the forecast period, and there will be a slightly greater representation of men in the population, especially earlier in the forecast period. These growth estimates may be overstated, however, if political and physical constraints on the expansion of Tuktoyaktuk are not overcome.

8.1.2.1 Accommodation

The draft community plan prepared for the hamlet of Tuktoyaktuk by M.M. Dillon & Associates (1980) projects an expansion of residential accommodation composed of 50% low density single-family dwellings and duplexes, with the remaining 50% to be made up of multi-family units, including row housing and

other medium density structures. Using an occupancy rate of 4.8 persons per household, which the Northwest Territories Housing Corporation views as the desirable standard, and applying it to the population projections for Tuktoyaktuk, the total requirement for dwellings in the year 2000 would be 417 units (see Table 8.1-6).

TABLE 8.1-6

DWELLING UNIT PROJECTIONS TUKTOYAKTUK 1985-2000

	1985	1990	1995	2000
Population	970	1234	1571	2000
Current Dwelling Units	162	202	257	327
Required: Single (Semi-attached & Detached)	20	28	35	45
Multi-family	20	27	35	45
Total Dwelling Units	202	257	327	417

Source: MRA Calculations

Construction of these dwellings would require additional serviced residential land. Assuming that low density development would accommodate 37 persons per hectare, and row housing and medium density developments 62 persons per hectare, there would be a need for approximately 27 hectares of residential land in Tuktoyaktuk by the year 2000. Much of this land would be available within the present hamlet boundaries.

In 1980, 2.6 hectares of land were used for commercial purposes. The commercial sector at Tuktoyaktuk is not well developed and it is expected that future population growth would require increases in this sector, but it is difficult to estimate the magnitude of expansion required. Institutional buildings such as hamlet administration, churches, schools and other public service facilities account for 34.4 hectares of land. These facilities are acceptable for the current term, but a new commercial - institutional centre has been recommended along with the plans for a new school, government office, and churches. (M.M. Dillon Limited, 1980).

8.1.2.2 Infrastructure

Water and sewer services in Tuktoyaktuk will have to be upgraded to meet the requirements of an enlarged population. A partial solution to the water supply problem will be achieved shortly with the completion of the new community reservoir. The Industry con-

PLATE 8.1-1 *Modern transportation and communications have become part of northern life and are vital to oil and gas development. Courtesy: W. Greenall.*

tributed to the construction of this facility by allowing the territorial government to use a dredge at cost. The reservoir is being built to hold 20 million gallons of water, enough to meet foreseeable needs. Water delivery equipment will however soon be insufficient to meet projected requirements. The community's sewage lagoon will also require upgrading and maintenance, although, because of its flexibility and expandable nature, it should be adequate in terms of capacity for some time to come. The capacity of the hamlet's sewage collection vehicles will however soon have to increase.

Tuktoyaktuk airport is currently operating at or above capacity. If the needs of the community and industry continue to expand, the present facility will have to be expanded. The road system consists primarily of local roads and a winter link with Inuvik. There is good reason to believe that this road may require conversion to an all weather facility well before the year 2000.

8.1.2.3 Education Services

The GNWT provided teacher-pupil ratios which were used to make the projections shown in Table 8.1-7.

TABLE 8.1-7

ENROLLMENT & TEACHERS TUKTOYAKTUK 1985-2000

	1985	1990	1995	2000
Enrollment:				
Grades K-6	162	196	251	320
7-9	61	73	99	126
10-12	52	61	86	109
	275	330	436	555
Teachers:				
Grades K-6	7	9	11	15
7-9	4	4	6	7
10-12	3	4	6	7
	14	17	23	29

Source: MRA Calculations

Tuktoyaktuk has educational facilities of sufficient capacity in relation to its current needs. Some expansion may be required to meet growing enrollment in the future, but this should not be necessary for some time. While consideration might be given to offering high school courses at Tuktoyaktuk with the growth of population, it would seem reasonable to continue to educate local children attending higher grades at Inuvik, as is the current practice. The Industry could continue to use its own facilities to run short, specialized courses along the lines of Tuk Tech at Tuktoyaktuk, but these would not necessarily be aimed at people at the high school level.

8.1.2.4 Health Services

A three-bed nursing station will serve the community until 1986 at which time the population is projected to top the 1,000 mark, and some expansion would be

8.1.2.5 Social Services and Law Enforcement

With community growth, some expansion of social services would be required, although the community should become more able to meet its needs through voluntary groups with the passage of time.

The four-man RCMP detachment located in Tuktoyaktuk would require some expansion. If current rates per 1,000 population are maintained to the year 2000, the requirement would be ten RCMP personnel.

8.1.3 OTHER COMMUNITIES

Current planning does not foresee that any major economic or population growth induced by the Industry will occur in regional communities other than Inuvik and Tuktoyaktuk. Residents of the other communities will participate in Beaufort development by means such as rotational employment and purchases from local firms. Nevertheless, some changes will occur in these communities because of actions taken by government and the Industry, and others will take place because of changing attitudes of residents.

A change which would decrease loadings on community capital and human resources would be the out-migration of some community members. It is inevitable that some individuals and families will leave the communities and move to Inuvik and Tuktoyaktuk to take advantage of the greater economic opportunities at those centres. A change in the reverse direction, one which would tend to keep people in the communities and even encourage their movement back from the more rapidly growing communities, would be some increase in local development, perhaps based on renewable resources and increased levels of purchases by the Industry. How such countervailing trends would balance out are impossible to determine at this stage, but the Industry would venture that the communities would not experience any sudden, dramatic demands on community capital or human resources.

8.2 EFFECTS ON REGIONAL WAGE INCOME

The concern in this section is with the wage income that will arise directly out of the employment of Beaufort residents in jobs generated by the oil and gas industry. Estimates of national income and employment effects are found in the Canadian Benefits Chapter in Volume 2.

Tables 8.2-1, 8.2-2 and 8.2-3 present data on projected wage and salary payments to all northern residents. Beaufort residents, and total employees for three development plans, the high pipeline case, the high marine case and the intermediate marine case.* Assumptions concerning Beaufort residents as a proportion of total northern residents are the same as those used in Tables 7.2-1, 7.2-2 and 7.2-3; that is, Beaufort resident employees equal 80% of total northern resident employees in 1981, 70% in 1985, and 60% thereafter. Income shares are assumed to be identical to employment shares.

TABLE 8.2-1

WAGES AND SALARIES
HIGH PIPELINE CASE
NORTHERN AND BEAUFORT RESIDENT PERSONNEL
(TOTAL SHIFT PERSONNEL)

	All Northern Resident Personnel	Beaufort Resident Personnel	Total Wages & Salaries	Total Beaufort % Total
	($'000)	($'000)	($'000)	(%)
1981	7,000	6,000	71,000	8
1985	22,000	15,000	154,000	10
1990	91,000	55,000	475,000	11
1995	163,000	98,000	657,000	15
2000	252,000	151,000	824,000	18

Source: Beaufort Industrial Benefits Planning Model, 1981-2000; High Reserves, 1987 Pipeline, 42 Inch Case (2).

Note: Does not include pipeline construction.

TABLE 8.2-2

WAGES AND SALARIES
HIGH MARINE CASE
NORTHERN AND BEAUFORT RESIDENT PERSONNEL
(TOTAL SHIFT PERSONNEL)

	All Northern Resident Personnel	Beaufort Resident Personnel	Total Wages & Salaries	Total Beaufort % Total
	($'000)	($'000)	($'000)	(%)
1981	7,000	6,000	71,000	8
1985	28,000	20,000	208,000	10
1990	99,000	59,000	517,000	12
1995	175,000	105,000	711,000	15
2000	270,000	162,000	892,000	18

Source: Beaufort Industrial Benefits Planning Model, 1981-2000; High Reserves, Delayed Marine Scenario (2).

Note: Does not include pipeline construction.

* In the Beaufort Industrial Benefits Planning Model, these are entitled "High Reserves, 1987, Pipeline, 42 Inch Case (2)" "High Reserves, Delayed Marine Scenario (2)" and "High Reserves, Expected Marine Case (2)."

TABLE 8.2-3

WAGES AND SALARIES
INTERMEDIATE MARINE CASE
NORTHERN AND BEAUFORT RESIDENT PERSONNEL
(TOTAL SHIFT PERSONNEL)

	All Northern Resident Personnel	Beaufort Resident Personnel	Total Wages & Salaries	Total Beaufort % Total
	($'000)	($'000)	($'000)	(%)
1981	7,000	6,000	71,000	8
1985	30,000	20,000	208,000	10
1990	78,000	47,000	412,000	11
1995	128,000	77,000	522,000	15
2000	187,000	112,000	627,000	18

Source: Beaufort Industrial Benefits Planning Model, 1981-2000; High Reserves, Expected Marine Case (2).

Note: Does not include pipeline construction.

The tables show that the share of total wage income accruing to northern residents is expected to rise significantly over the next twenty years. By the year 2000, it may be as much as one quarter of total wage income (not including pipelines). In terms of 1981 dollars, average wages could rise from approximately $33,000 to approximately $43,000 during the 20 year period. There could, however, be some large differentials in wages among categories of labour. In the case of the marine scenario in 1990, supervisors and administrators would average $65,000; marine officers would average $51,000; geologists and geophysicists would average $45,000; crane operators would average $42,000; cooks, helpers and supply personnel would average $29,000; and labourers would average $28,000. Average salaries would be similar for the pipeline scenario. This clearly indicates that it would be desirable for present day northern residents to undertake the kind of training that would qualify them for more highly skilled employment roles with oil and gas development.

Wage payments of the level indicated would have significant multiplier effects. Outcrop (1981) estimated that income induced by the respending of earnings from direct employment with Canmar (Dome) equaled 16.5% of wage and salary payments to northern residents in 1977 and 1980. As the northern economy grows and becomes more diversified, and there are more expenditure choices available to northern consumers, induced income effects are likely to rise. It would not be surprising if, for example, they had risen to 25% of direct northern wages and salaries by 1990, in which case they could give rise to an additional $20 to $25 million in northern income.*

* Multiplier effects would also be realized in the northern economy by other means such as purchases of goods and services. See Volume 2.

8.3 GROWTH OF BUSINESS

The development of the oil and gas resources of the Beaufort Sea and related industrial growth should have a dramatic effect on the regional business sector. The magnitude and general nature of this effect are difficult to predict, although it will involve both a further development of the firms that are currently located in the region and an infusion of new business capital. Many firms will make supplying goods and services to the oil and gas industry, and related support and service industries, their principal line of business; others may be involved mainly in activities such as residential and non-residential construction in Inuvik.

Four topics relevant to regional business growth are discussed here: the first deals with the effects, on regional firms, of Industry purchases of goods and services; the second with the more general effects of population and industry growth on capital expansion and diversification; the third with entrepreneurship as a factor in regional business development; and the fourth with possibilities that the buildup of industrial assets such as base facilities and aircraft fleets may have for regional development.

8.3.1 INDUSTRY DIRECT PURCHASES FROM REGIONAL FIRMS

The Industry has for several years pursued a policy of purchasing goods and services from northern based suppliers. Table 8.3-1, which is based on a recent analysis prepared for the Government of the Northwest Territories by Outcrop, a Yellowknife consultant, summarizes pertinent aspects of northern purchases made by Dome, the company most active in the Beaufort Sea regional market during recent years.* The table indicates that both a very large increase in total expenditures and in average expenditures per supplier occurred during the 1976-1980 period. Increased average expenditures per supplier, along with the fact that suppliers decreased slightly in number between 1979 and 1980, suggests an increasing concentration of regional firms supplying goods and services to the Industry. A high concentration of purchases in a factor which is noted by Outcrop (1981):

> "In 1980 Canmar purchased $12.3 million worth of materials and services from 132 NWT businesses. Of these 132 businesses, 22 accounted for a total or $11 million or 89% of the total purchases of goods and services. Average 1980 purchases from these 22 companies was $500,000 compared with an overall average purchase of $93,000."

* The Outcrop analysis dealt only with the effects of Dome's activities, and did not consider the effects of expenditures by other companies.

TABLE 8.3-1

PURCHASES FROM NORTHERN SUPPLIERS Dome, 1976-1981

	Purchases $000	No. of Suppliers	Average Amount per Supplier $
1976	1,000	33	30,000
1977	2,290	77	30,000
1978	5,113	91	55,000
1979	8,400	135	62,000
1980	11,530	132	87,000
1981	19,376	164	118,000

Sources: Dome Senate Presentation, 1982, and Outcrop, 1981.

Such a concentration of purchases indicates that only a few northern firms have the range and volume of goods and services to become genuine, continuous suppliers to the Industry. Most firms can expect to be suppliers on only a small-scale or occasional basis.

Table 8.3-2, using Dome data, shows that a considerable number of the Beaufort communities now benefit from Industry business expenditures. Expenditures in some northern communities have become important to the local economy; for example, at Fort McPherson, where the garment factory has had contracts to supply clothing to Dome's drilling subsidiary, Canmar.

As Table 8.3-3 illustrates, Esso's expenditures, averaging about $7.2 million per year, have also been very important to the regional economy. Although expenditures in the Beaufort region have not increased during the 1978 to 1981 period shown, larger expenditures can be anticipated as development accelerates. Although it was a strong force in the regional economy during the 1970's, Gulf has not been directly active in intervening years until recently. It has however been involved as a partner in a number of ventures, and is now operator of Tarsiut. As in the case of the other proponents, its expenditures should increase in future.

In future, regional expenditures by the Industry and support and service companies are bound to increase as more oil and gas companies become active in the region, and as more concerted efforts are made to make opportunities for participation known to local firms. The trend toward a greater concentration of such expenditures could continue, however. The number of total regional suppliers should continue to increase, but the number of major suppliers (purchases of $500,000 or more) among resident firms will likely increase more slowly. Average purchases from major suppliers could thus rise.

TABLE 8.3-2

NORTHERN BUSINESS EXPENDITURES
DOME, 1976-1981

Community	Number of Resident Businesses Participating and Amount of Business											
	1976		1977		1978		1979		1980		1981	
	#	$,000	#	$,000	#	$,000	#	$,000	#	$,000	#	$,000
Tuktoyaktuk	6	100	23	370	25	1,364	26	2,204	27	3,617	29	6,238
Inuvik	23	320	48	800	53	1,312	68	3,252	71	6,100	80	9,666
Coppermine					2	6	3	8	3	9	3	11
Aklavik	1	30	2	30	2	53	2	157	2	351	3	36
Fort McPherson							1	40	1	99	2	132
Paulatuk					1	11	1	2	2	2	1	4
Sachs Harbour							1	2	1	2	2	5
Holman Island							2	1	3	3		4
Yellowknife	2	500	2	750	4	1,922	16	2,166	12	570	13	1,442
Hay River	1	50	2	340	4	375	12	565	8	776	23	1,815
Other							3	3	2	1	6	23
Totals	33	$1,000	77	$2,290	91	$5,113	135	$8,401	132	$11,530	164	$19,376

Source: Dome Petroleum Ltd.

TABLE 8.3-3

BEAUFORT BUSINESS EXPENDITURES
ESSO, 1978 - 1981

	Local Services ($000)	Local Purchases ($000)	Total ($000)
1978	4,500	2,400	8,200
1979	3,900	1,700	7,000
1980	2,400	1,700	6,100
1981	2,800	2,900	7,400

Source: Esso Resources Ltd.

8.3.2 EFFECTS OF POPULATION AND INDUSTRIAL GROWTH

Population growth of the order indicated in Chapter 7 would mean the creation of a relatively large regional market for goods and services, and could lead to a considerable growth and diversification of the regional business sector. The growth of small scale local manufacturing, and of the retailing and service industries, would resemble the growth of such industries in other northern centres such as Fort McMurray, Thompson and Yellowknife.

While the expansion of the local consumers' market would be a stimulus to business growth, another major stimulus would be the industrial market created by Beaufort development. As supply requirements increase and become more diverse, thresholds may be reached which will induce the entry of new business capital from the south. Such capital could take the form of new firms establishing themselves especially for the Beaufort market or of Beaufort branches of southern firms. Many suppliers or prospective suppliers to the Industry, including firms resident in other northern regions, would probably locate in the Beaufort region to take advantage of such development, with significant further effects on regional income and employment.

It is apparent from the work that has been done on the regional or local business effects of offshore oil exploration, development, and production activities in various parts of the world that at least three different types of businesses could develop or locate in the Beaufort region in response to the industrial market opportunities associated with oil and gas development. These types of businesses are as follows:

- Businesses that offer a sophisticated, high technology service to the oil industry. These businesses are usually branch offices of companies that operate internationally and the potential for joint ventures with local companies or local groups is usually small. However, they require local office and warehouse facilities as well as various utility and waste disposal services. These needs could be met by one or more local firms.

- Businesses that offer a somewhat less sophisticated service to the oil industry; usually a range of specialized construction, material handling and management skills, and certain specialized equipment such as supply boats and heavy machinery. The potential for joint ventures between such companies and existing or new local firms is good. Businesses of this general type would also require local office and warehouse space and the potential for a local company supplying such facilities is good.

- Businesses that offer basic construction, hauling, expediting, maintenance and repair services. Companies often come into a region from other areas to provide such services. However, there is no reason why local firms could not compete with them for oil industry contracts.

It is also evident that when government, industry and local groups are willing to take initiatives, certain other businesses can be induced to locate in the region. These are usually businesses that offer specialized repair and maintenance services that are not entirely geared to the oil industry. They are commonly located in the south. One example of such a business would be one that repairs large turbines and compressors. Special efforts might have to be made to establish such a business in the Beaufort Sea region but the payoff could be substantial.

One such a business was located in the region, other non-oil related industries, such as mining companies, electrical utilities and perhaps shipping companies, could find it economical to have large engines repaired in the north. A well-furbished central regional maintenance facility in the Beaufort Sea region would be preferable to their attempting to carry out makeshift repairs on their own, or shipping turbines or compressors south. Local residents with aptitudes and training for mechanical repair and maintenance work would find opportunities for employment and advancement in such a business. However, it must be emphasized that this type of business will not automatically locate in the region in response to Beaufort development and production activities. Government, the Industry, and regional groups would have to take positive action to create appropriate conditions.

The growth of the regional industrial and consumers' markets would likely have important scale and linkage effects. With each new increase in activity and population, regional demand could both rise and become more diverse, and the regional market could become profitable to firms that could not have operated at lower activity and population levels.

8.3.3 LOCAL ENTREPRENEURSHIP AND SPECIAL DEVELOPMENT MEASURES

The local entrepreneurial factor has a big effect on the degree to which a region is able to develop a more diversified economy on the basis of a dominant staple product geared to markets outside the region (Richards and Pratt, 1979). The presence of a strong, local entrepreneurial function is a critical element in the development of linkages to other sectors of the

PLATE 8.3-1 *A northern shopping centre. Rising incomes and the growth of consumers markets will provide enlarged opportunities for Beaufort businessmen.*

region's economy. Government, as well as the local business community, often has had to play a strong entrepreneurial role in order to encourage economic diversification.

In the Beaufort region, a considerable amount of entrepreneurship will be required for the region to fully benefit from Beaufort development. Entrepreneurship is not something that comes naturally to most people; it has to be learned and encouraged in order to grow. The Beaufort region faces special problems with respect to entrepreneurial development since native people, who are the majority of its present residents, do not come from cultures in which entrepreneurship has an important place.

Despite some handicaps, the Beaufort region already has a small but vigorous business class. Not all the business people are entrepreneurs and many would not be comfortable in building up the large-scale businesses that will be required to serve some of the markets created by the development of oil fields. Certainly, there is much that industry and government can do to smooth the road for local entrepreneurs, and the Industry has demonstrated its preparedness to assist, with positive policies on purchasing and information on business opportunities. Government could perhaps do more in areas such as training and making larger loans available to businessmen in the region. As well, additional development measures with a decidedly entrepreneurial slant will be required. Some, such as the Inuvialuit Development Corporation and the Beaumac Investment Group, are already in place or emerging. Others may be desirable, to spread both the risks and the benefits of undertakings, and to ensure that more than one viewpoint is brought to bear on potential opportunities.

The Industry basically looks to local and regional groups and to government to create such groups. It is possible that from time to time other proposals may be put forward by the Industry, but in the end, it will have to be local people, local communities, and government who make the final decision as to which vehicles are most appropriate.

8.3.4 SPIN-OFFS OF OIL AND GAS INVESTMENT

The buildup of oil and gas exploration, production and transportation capital by the Industry could include facilities such as the following:

- the expansion of present and development of new shorebases;
- topping plants for the production of fuel required by the Industry;
- the generation of electrical power for Industry use;
- airstrips to service shorebases and other facilities;
- ships which could move supplies from the south on an extended season, and perhaps year-round, basis;
- all weather roads in the vicinity of shorebases;
- a large fleet of aircraft, including many STOL aircraft;
- new communication facilities and improvements to existing facilities.

The foregoing will be built or purchased by the Industry for its own use, but it is possible that in some cases enough capacity will exist, or can be provided, to also serve special regional needs. For example, if topping plants proved economic, it might make sense to provide enough topping plant capacity to provide fuel to at least some of the Beaufort Sea communities as well as to the Industry, a measure which could free transportation capacity on the Mackenzie River. As another example, if oceangoing icebreaking freighters were built to supply shorebase facilities they could perhaps also supply community needs, assuming road links between communities and shorebases existed.

Various possibilities such as the foregoing are currently under study and the Industry would not want to appear to be promising more than it may be able to deliver. It would expect, however, that, over the years, ways will be found of dovetailing major industrial with community requirements, possibly leading to decreases in some of the costs of living and doing business in the Beaufort region and perhaps other northern regions.

8.4 TRANSPORTATION REQUIREMENTS

In northern Canada, air transport is the most important mode of transportation in terms of passengers carried. Due to the climate, nature of the physical environment, and the lack of roads, it is the only system that can operate year round. Also, due to the long distances involved, it is the only means of transport that can efficiently move personnel and provide emergency services.

There are five class 'A' airports in the Northwest Territories which serve the route between southern Canada and the Beaufort Sea. These serve as regional hubs for feeder services to smaller communities. Yellowknife and Inuvik, in particular, are centres for charter companies which perform an essential role in serving communities, the oil and gas industry, and other interests.

Pacific Western Airlines (PWA) is the largest scheduled air carrier operating between the south and the Beaufort Sea region. A daily service is operated from Calgary and Edmonton to Inuvik and intervening points. PWA operates Boeing 737 aircraft which accommodate 117 passengers, or a combination of cargo and passengers comprising, for example, 65 passengers and 2 pallets of cargo. Northwest Territorial Airways operate Hercules and smaller aircraft from Calgary on a charter basis. Due to the high cost of air transportation, cargo services are confined to the supply of emergency and perishable goods, while other modes of transport are used to supply bulk and heavy goods.

In addition to the commercial aircraft movements, Dome Petroleum Ltd. operates Boeing 737's, carrying both passengers and cargo into Tuktoyaktuk. Esso operates Lockheed Electra flights as required. In addition, a variety of aircraft are chartered by the oil and gas companies.

Water transport access to the Beaufort Sea region is possible by three routes; the western route through the Bering Strait, the eastern route through the Northwest Passage, and down the Mackenzie River from Hay River and Fort Simpson (Figure 8.4-1). The latter is the traditional lifeline to the western Arctic and has historically been the most important and least expensive mode of transport for cargo.

For four months of the year shallow draft barge trains pushed by tugs deliver cargo to communities and areas of industrial activity on the Mackenzie

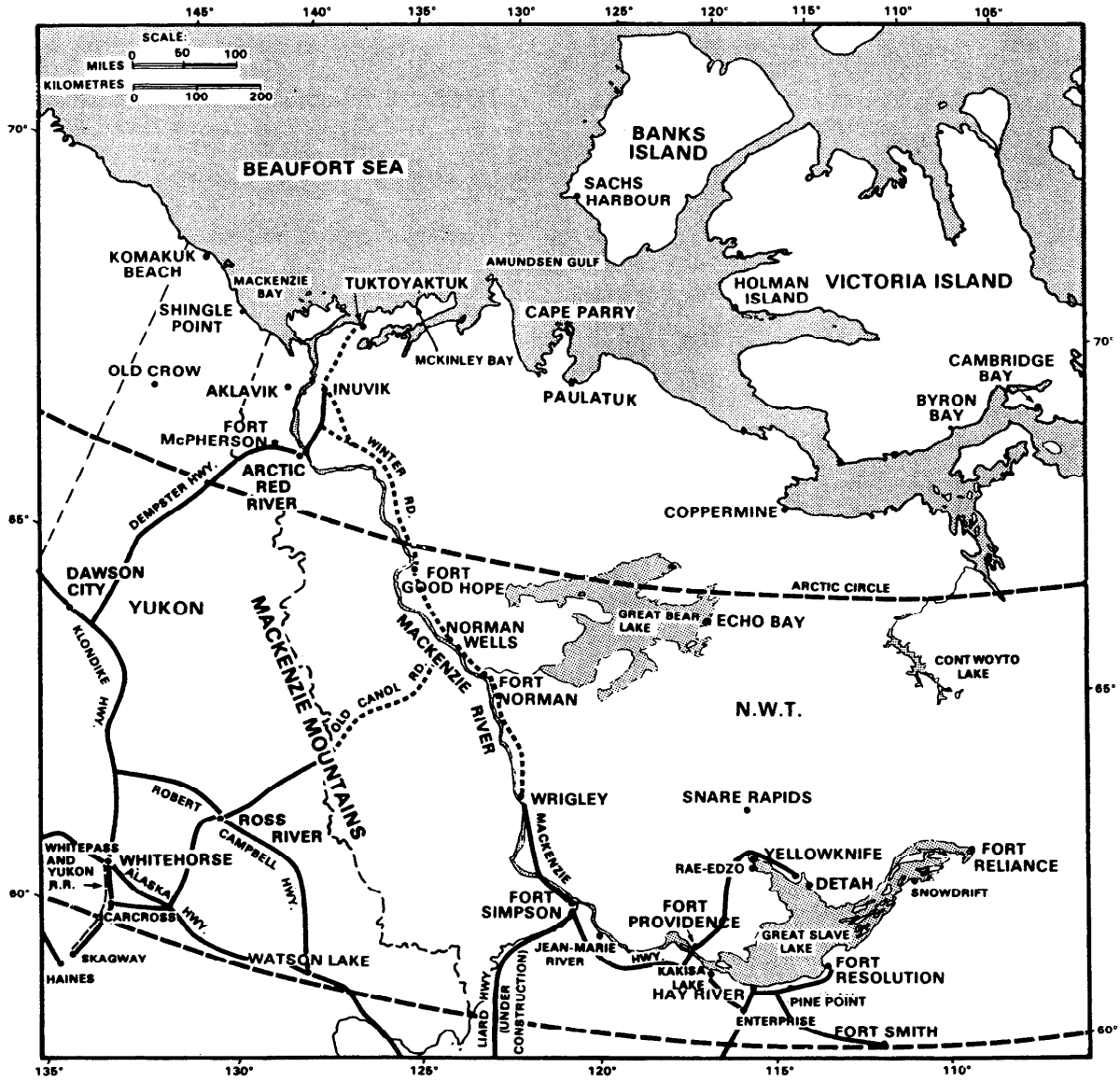


FIGURE 8.4-1 *Surface transportation routes in the western Arctic.*

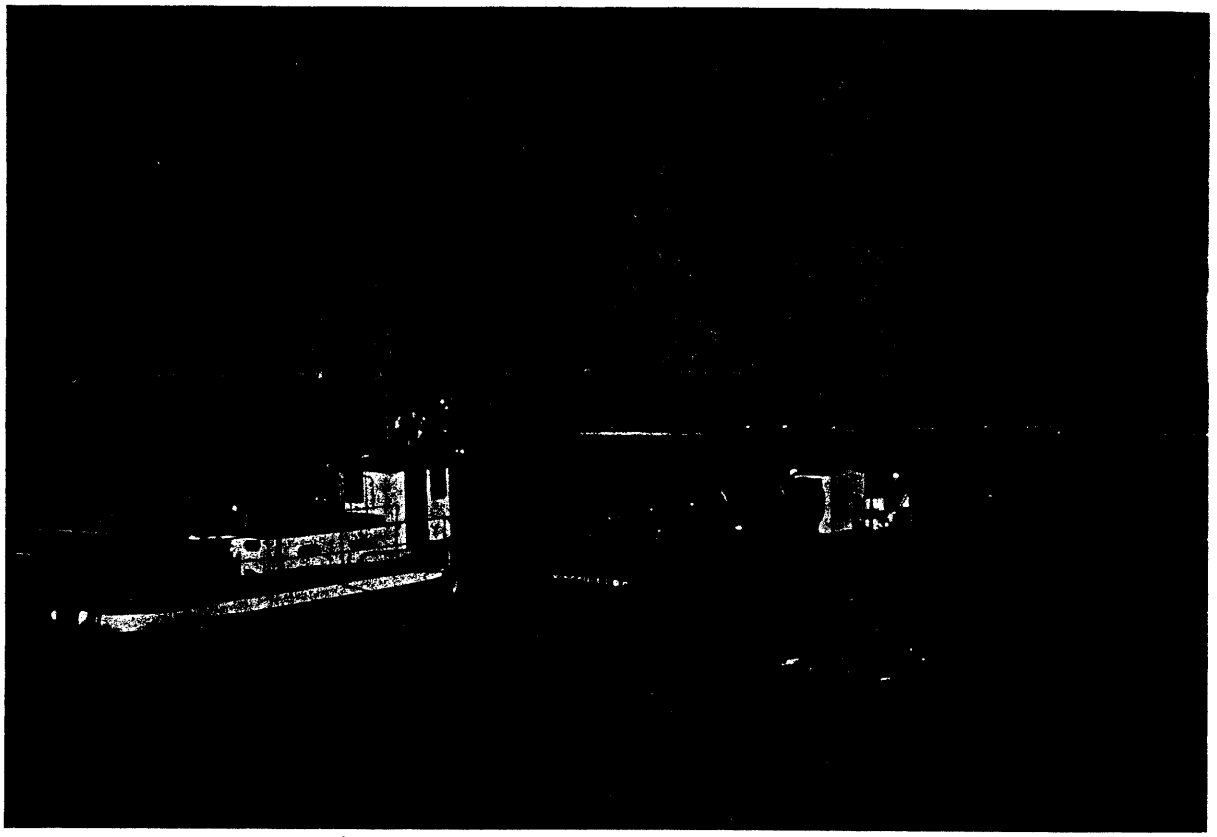


PLATE 8.4-1 *Tugs and barges — the backbone of the Mackenzie River transport system. While the river transport system currently has excess capacity, it will likely require some expansion during Beaufort development.*

River and along the Beaufort Sea coast. Such a barge train can deliver up to 5,000 tonnes of cargo and takes three weeks to complete the round trip from Hay River to Tuktoyaktuk. Hay River, on the southwestern shore of Great Slave Lake, is the principal terminal for Mackenzie River traffic. Cargoes are delivered to the terminal by truck or by Canadian National Railways from Edmonton and other points to the south. Some cargo is carried directly by truck along the Mackenzie Highway to Fort Simpson to be loaded onto barge trains. This route avoids rapids between Fort Simpson and Hay River, which limit payloads in some cases.

The Mackenzie River transport system has the capacity to carry between 500,000 and 600,000 tonnes per annum although it has typically used only a fraction of this capacity. Of the freight carried, about half is petroleum products; other principal cargoes include drilling consumables, barite, potash and general supplies for northern communities.

Two companies handle freight on this route. The largest is the Northern Transportation Company Ltd. (NTCL), a Crown corporation. This company operates a service from Hay River, down the Mackenzie to the Delta and points along the coast, from Colville River in Alaska to Spence Bay in the east, and to Banks and Victoria islands, NTCL is licensed by the federal government to supply communities and also to carry freight for industrial and commercial enterprises. In 1979, NTCL carried 215,000 tonnes to points along the Mackenzie River and the Arctic coast. NTCL owns terminal facilities at key northern locations and uses public docking and landing facilities at smaller communities.

Arctic Transportation Company Ltd. (ATL) operates both along the coast and down the Mackenzie River. This company is not licensed to supply communities and thus most of its work is in support of oil companies. In 1979, ATL carried 20,000 tonnes on the Mackenzie River using two barges. However, the largest component of its operations is offshore. Lasting from mid June until late October, these operations are based in Tuktoyaktuk. In 1981, ATL started a four year construction program for a terminal in Tuktoyaktuk. The first phase, completed in 1981, consists of a 200 m wharf; warehouse and ancillary facilities are also to be built.

The Mackenzie Highway links Alberta and southern Canada to Great Slave Lake and the Mackenzie River. It comprises an all-weather gravel road with the northern terminus near Wrigley. Long-term plans exist to extend the road to Fort Good Hope. In

winter, an ice road is constructed from Fort Simpson to Inuvik. The usefulness of this winter route is, however, limited. Speed and load size are restricted by terrain and road conditions. The Mackenzie Highway is used to truck freight from Alberta to barge terminals, principally at Hay River. A major operator on this route is Grimshaw Trucking, a subsidiary of Northern Transportation Ltd.

The Liard Highway is under construction from Fort Nelson, in northern British Columbia, to Fort Simpson, and is scheduled for completion in 1983. It will provide a shorter route for freight from British Columbia to the Beaufort Sea, with transfer to barges at the Fort Simpson terminal.

At present, freight from Vancouver is either shipped to the Beaufort region through the Bering Strait or carried by ship to Skagway, then by the Whitepass and Yukon Railway to Whitehorse and finally by truck along the Dempster Highway to Inuvik. The Dempster Highway is also used by trucks originating in Alberta, which reach it by way of the Alaska Highway. The length of these routes, coupled with the transfers between three different modes of transport in some cases, make use of the Dempster Highway alternative expensive. Thus, oil companies operating in the Beaufort Sea region used it principally to carry supplies during winter when other routes are impassable.

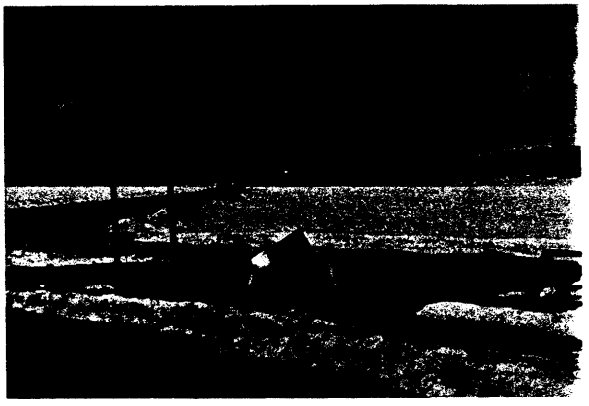


PLATE 8.4-2 *Ice crossings are important linkages in the transportation network on a seasonal basis. Above: The Mackenzie River crossing near Arctic Red River in late April. Below: Access and egress may be difficult in late spring when the crossing is still passable.*

Construction of the Dempster Highway, about 420 miles long, started in 1959 and was completed in 1979. It is an all-weather gravel highway with ferry crossings for summer travel (June to September) and ice bridges in winter (mid December to mid April). The highway is closed during thaw and freeze-up. In winter, an ice road links the Dempster Highway at Inuvik with Tuktoyaktuk. Consideration has been given to constructing a permanent road over this route.

Community growth will have a bearing on future transportation development. An increasing population in the Beaufort region will require a build-up of freight and passenger services, and will undoubtedly initiate considerable pressure around the question of links with the south. While demands could, to some extent be met by a high quality of air service, it is likely that there will also be calls for the upgrading of the Dempster Highway to complete year-round status, the completion of the Mackenzie Highway to Inuvik, and the construction of ayear-round road linking Inuvik and Tuktoyaktuk. People living in a much more populous, high-income Mackenzie Delta will want to drive their vehicles south on a more regular, continuous and comfortable basis. Entrepreneurs in Yukon and in the Great Slave Lake region will want regular access to the growing Beaufort market. Whether or not they make complete sense economically, there is at least a possibility that dependable year-round road links with the Mackenzie Delta may be a fact before the year 2000.

8.5 PROBLEMS AT THE COMMUNITY LEVEL

The historic experience with rapid development is that, while most people benefit, effects arise which are not always amenable to control or mitigation. Along with increases in economic activity and income, during the next twenty years the Beaufort could experience social and economic dislocations. In general, these would mainly affect the more rapidly growing communities, especially Inuvik, and they would be kept to a minimum by responsible measures such as the preparation of advance plans by Industry. Nevertheless, recognition must be given to the fact that uncertainty is always an important factor in a growing economy, and that people, governments, and private companies are, at times, not able to plan and coordinate their activities in an optimum manner.

For community plans to be created and implemented in a timely manner, and for necessary resources and services to be put in place to respond to rapidly changing community needs, decision-making and communications need to be efficient. Often, decisions and allocation of resources for expansion of schools, health care, recreation and other forms of community capital wait until the need has already been proven, and shortages and overcrowding are already experienced. In a period of rapid growth and change, unless systems are in place to make decisions and allocate resources in advance of need, overcrowding, shortages and bottlenecks will occur. Administrative and service delivery burdens are generated by the "shadow population" of people moving in and out of the community, and the level of transience experienced during periods of major growth, as was the case in Fort McMurray. These additional burdens require allocation of personnel and resources beyond the levels generally dictated by the actual population level of a community. Sensitivity and responsiveness to the development area's unique circumstances are required by funding and support agencies, if bottlenecks are to be avoided and problems are to be resolved or at least diminished. Shortages of supply and other frustrations at the community level contribute to difficulties in recruiting and retaining professional, service, and other personnel - which in turn can lead to further bottlenecks and lack of continuity in services.

This section explores three problem areas that the more rapidly growing of the Beaufort communities are likely to encounter. Firstly, there are problems arising out of the fact that whenever rapid growth occurs, a by-product is typically local shortages and inflation. This tendency would be exacerbated in the Beaufort region because of the unusually heavy demands that will be placed on local resources, which are not abundant, and because the logistical systems that support the region are not especially well developed and could easily become clogged. Secondly, there are problems arising out of the difficulties that communities experience during periods in which there is a great deal of transience. Thirdly, there are problems of alcohol abuse and anti-social behaviour, which are a factor in all rapidly growing communities, but which can be particularly worrisome in northern communities having both native and non-native populations. The relations between these populations during times of stability are sometimes delicate, and they can become strained during more unsettled periods. While these problems could be experienced in some form at several Beaufort communities, they would likely be felt most strongly at Inuvik and Tuktoyaktuk.

8.5.1 BOTTLENECKS, SHORTAGES AND LOCAL INFLATION

Population growth and rising levels of private and public activity of the magnitude envisaged will require a large and growing annual flow of resources into the Beaufort region. Assuming that such resources are available, they may at times not arrive in the more rapidly growing communities as quickly as they are needed, because of possible seasonal and other limitations to transportation systems. Supply problems could be more serious than those confronting communities in more favourably located regions. Fort McMurray, for example, was served by year-round road and rail transport when it was growing rapidly.

Potential supply problems would be increased by the fact that resources indigenous to the Beaufort Sea are limited. While some gravel is available for construction purposes, there is little merchantable timber or stone suitable for building. Thus local resources will be able to serve as only a minor supplement to the large volume of resources that will have to be imported to the region.

Supply problems could at times also be aggravated by a shortage of human resources, as the range of locally available industrial skills and experience is not great. The potential labour force indigenous to the region is too small and unskilled to contribute more than a fraction of the labour needed for Beaufort development. Such development will, therefore, be strongly dependent on labour brought in from the south, but problems could arise in the case of such labour. Assuming that it is available in the numbers required, it will have to be housed and supplied with services. While large companies like Dome, Esso and Gulf will be able to meet the needs of their employees, the provision of facilities and services could at times be difficult for small firms and the local governments in Inuvik and Tuktoyaktuk. It could be even more difficult for private individuals. Accommodation shortages and escalating local prices would appear in local costs such as wages, which small firms could find more difficult to meet. Many would likely find it hard to compete with wages offered by the Industry and other large firms.

The local inflation of prices and costs in growth communities such as Inuvik could have several other consequences. Public servants and self-employed businessmen might find it difficult to meet rising costs and could find their earnings falling behind those of newcomers associated directly with the oil and gas industry. If significant wage differentials arose, some public servants might shift from government to better paying jobs in the private sector, perhaps leading to a drain in public resources at a time when they would be most needed. Another trend might be an increase in the number of married

women taking jobs, partly because of the greater availability of opportunities, but also partly because families might have to meet rising costs. Moonlighting could increase, as it did in Fairbanks and Anchorage during the Alyeska pipeline boom.

Members of the local labour force who were reasonably adept, competent and experienced, would not likely be affected more than minimally by local inflation. Such people could probably at least keep up either by making larger demands on their current employers or by moving to other jobs. Some regional residents would probably be less fortunate, however; the old, the disabled, single parents who must look after children, people with few labour force skills. Two observations are warranted about such people. Firstly, while this in not invariably so, in the north they are usually synonymous with native people, who are in the large majority among the recipients of social assistance. Secondly, while their incomes may fluctuate, these incomes tend to rise more slowly than prices, and would rise much more slowly during periods of rapid price escalation. The indigent and unemployable would therefore be the main losers; perhaps the only serious losers, during periods in which local rents, wages and other prices were rising, unless strong measures were taken to ensure that their limited incomes rose correspondingly.

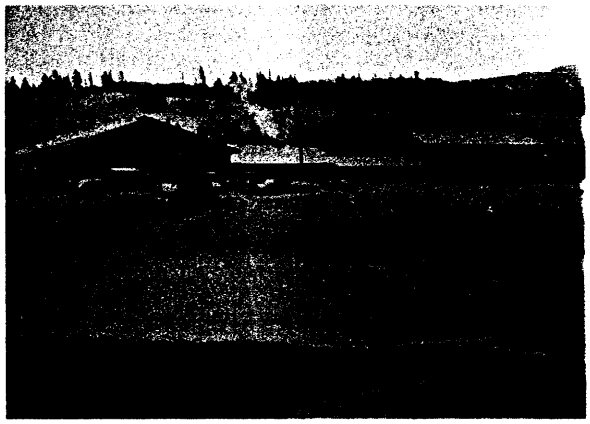
8.5.2 COMMUNITY SOCIAL ADJUSTMENT

Associated with economic development are social benefits, such as opportunities and options for productive employment, upgrading of skills and experience, and financial security. But with these benefits also come social costs, including strains on the quality and availability of services, and disruption and stress in personal, family and community relationships. The capacity of rapidly growing communities to mobilize the necessary resources to adapt to social change, the level of available resources, and residents' attitudes toward change could be as important to the ability of communities to adapt and adjust as the nature of the change itself.

The development of human resources within growth communities, and potential bottlenecks and shortages in the supply of services, have obvious implications for social adjustment during the rapid social change anticipated from Beaufort Sea development. In general, the variety and availability of facilities and services influence residents overall satisfaction with a community and their relative sense of isolation. Planning for, and provision of, services to meet the needs of varying levels and mixes of population, administration of programs, and the maintenance of continuity and quality, are strained during periods of rapid growth. These tasks are aggravated by the high levels of turnover (both of labour and of associated families) and transience often experienced during such periods.

While long-term residents will notice increases in the alternatives available to them in employment, services, shopping, and facilities as the community grows, new residents previous experience in communities where more amenities and services exits, may result in disappointments regarding the range of services available. This, in turn, can increase their feelings of isolation, particularly given difficulties of access to other major centres.

Residents' involvement in, and commitment to their communities are noted by Kerri (1971), Veit (1978, 1979) and others, as important for community stability and adjustment. Through participation in planning and provision of community services, residents not only supplement existing services, where amenities and other resources may be limited, but also establish social networks, which help to build a sense of community and alleviate feelings of isolation. These social networks also provide informal means of offsetting inadequacies in mental health and family support services.



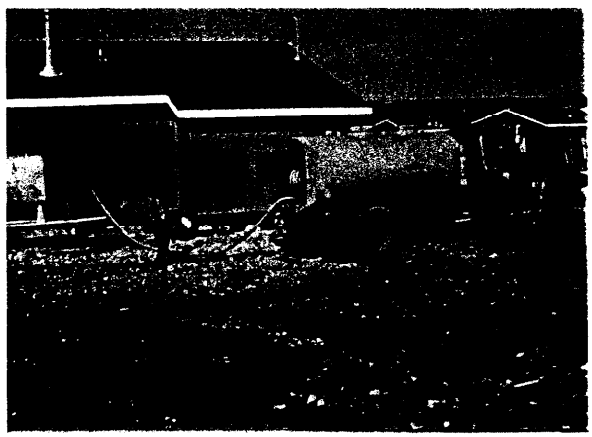


PLATE 8.5-1 *Beaufort development will require an expansion and improvement of services and infrastructure. Above, vocational school, Whitehorse. Below, water supply truck.*

Residents of the growth communities will need to make numerous trade-offs. For example, increasing employment or volunteer opportunities for women may increase families' length of stay in communities and decrease demands for services related to depression or "cabin fever," but may also increase demands for child care, family support services, and education programs. The focus of community activities, programs and services may need to shift from families to singles and back again, over time. Increasing private ownership of homes may have implications for housing types, and the limitations of affordable single family accommodation may increase demands for community recreation and cultural services. Growth and development of services in some communities, while other communities retain their traditional characters, could have implications for migration between communities, and their relative positions of influence in the region.

While industry and government will cooperate with Beaufort Sea communities to assist their adjustments to social change engendered by development, community members themselves will face complex and difficult decisions in planning for change and growth. Numerous studies done elsewhere have yet to clearly establish the significance of relationships between community facilities and services on the one hand and satisfaction and turnover on the other. In large part, residents' own judgements and commitments to planning for their communities will be required to make Beaufort Sea development successful in social terms.

8.5.3 ALCOHOL ABUSE AND ANTI-SOCIAL BEHAVIOUR

A matter that communities will have to address is the effect of alcohol on individual and family well-being. Alcohol use and abuse is often noted as a characteristic of frontier communities, where a lifestyle of "work hard, play hard" is adopted by residents who have left behind the constraining influences of extended family and friendships in "home" communities. It is said to occur in situations in which many people, both native and non-native, are apparently adrift and have not yet found a satisfactory relationship with community. In northern communities, extensive use of alcohol is noted both among native and non-native residents, but appears to be a different phenomenon between the two groups.

Among non-native people, excessive drinking may be related to loneliness, feelings of isolation, problems of adjustment to the difficult environment of northern communities, or personal problems. Where there is an alcohol abuse problem, non-native drinking often tends to take place away from the public eye. It can be a factor associated with the depressive social disorientation known as "cabin fever."

Among native people, while quantities of liquor individuals consume may not be greater, drinking and drunkeness is often more public and obvious, and is an important factor in family strife, crimes of violence and suicide. Both alcohol abuse and anti-social behaviour may, in turn, be related to the substandard living conditions of many native people, particularly in larger centres. Although not all native people live in identifiably native parts of communities, typically, native populations often tend to concentrate in areas where housing is poor and conditions are crowded. During periods in which a community is growing, housing may be in short supply, increasing the incidence of crowding. In such environments, there may also be a relationship between cash income and drinking, and available cash is often spent on liquor, perhaps as a means of temporarily escaping squalid conditions.

The degree to which the economic and population growth anticipated for the Beaufort Sea region might intensify problems of alcohol abuse or anti-social behaviour will depend in some measure on how carefully and effectively the social aspects of such growth are planned and conducted. Above all else, native people must be made to feel they have a genuine and legitimate place in the growth communities, and that they are not there at the sufferance of non-native residents. Both native and non-native people must develop a shared concern about community standards and behaviour, a matter which would seem to depend most basically on the perception, by each group, that the other is not in a position of special advantage and therefore able to promote its own standards and values. This would in turn require that both groups have access to comparable housing, political and economic power, and opportunities for personal, business and professional development. If communities are divided and unable to work cooperatively toward common goals in the face of the challenges of rapid growth and change, the alternative remains that of an increased incidence of personal and social stress, alcohol abuse and anti-social behaviour.

8.6 POTENTIAL CONFLICTS WITH NATIVE HARVESTING

Many people, particularly northerners, fear that expansion of industrial activity in the Beaufort Sea region will result in interference with traditional activities, and that increased human habitation and traffic will have adverse impacts on wildlife through general processes such as habitat destruction, resource competition, increased interaction and creation

of stress, or through more specific means such as direct harassment causing reproductive failure. Although there is some knowledge and much speculation about the nature of these impacts, there is much to learn and understand about their real severity and significance.

8.6.1 DIRECT INTERFERENCE BY INDUSTRIAL PROJECTS

This section examines the various ways in which Beaufort Sea oil and gas development might interfere with, or in some cases enhance, the traditional harvesting of fur, fish and game by native people. The discussion proceeds in three stages. The first is concerned with the nature and location of possible industrial interference with both human activity on the land (hunting, trapping and fishing) and the renewable resource base. The second deals with the community by community effects of potential industrial activity and population growth. The third stage deals at a somewhat more abstract level with the values that are important to the preservation of animal populations, and with the need to ensure that both the species and the native right to harvest them will survive. The background for the discussion is the descriptive material found in Chapter 5.

There is a value in being flexible when it comes to using the renewable, living resources of the land and flexibility is exhibited by people and wildlife. For example, the successful fisherman does not camp at one spot and remain there at length if the fish are not biting, nor does the hunter restrict himself to one valley if there is no sign of game. People have favourite hunting areas and fishing holes and they return to these whenever possible. However, these places are not used to the exclusion of others, and they may be temporarily abandoned if it becomes inconvenient to use them, other locations are better, or stocks seem to be depleted. In parallel, a bear may have a favourite denning site, or the caribou may prefer certain river crossings and valleys in their annual migrations. If circumstances arise that prevent them from using these places, they will look for alternatives. What is important is that the alternatives are available and that they may be reached.

In considering the impact of industrial development, it would be appropriate to view what choices are available and what choices would actually be used by the people or wildlife involved if the development were to displace them. In some cases, displacement may only be temporary. People and wildlife are capable of becoming accustomed to what is new and may return to an old pattern once the "fearful" becomes known. Alternatively, patterns may be altered to facilitate adjustment to change.

Furthermore, the consequences of displacement should be examined. In some cases, they could be beneficial rather than detrimental. Alteration of habitat that goes along with industrial activity is not always injurious. Clearing of land and the stimulation of new growth may enhance biological productivity and, hence, have positive effects on resident wildlife populations.

The point is, that industrial development should not be equated with adverse environmental impact *per se*. For every kind of development and every individual project, there will be a combination of effects which may be judged to be positive or negative to varying degrees. The severity and significance of these impacts is relative to the capacity of the species affected to adjust on site or to adjust by moving to other territory.

Some wildlife habitats are in scarce supply in the Beaufort region, with the result that alternative areas may not be abundant, available, or accessible for certain species functions such as denning, nesting, calving, staging or for winter range. It would be worthwhile, therefore, to identify these areas as less suitable for industrial activity owing to their strategic importance to wildlife.

8.6.1.1 Methodology

Using the resource material available, but chiefly (1) information provided by wildlife officers and personnel in Yellowknife, the Mackenzie Delta communities, and Tuktoyaktuk during the summer and fall of 1981; (2) Jacobson's (1980) study of harvesting on Victoria Island, (3) the Northern Land Use Information Map Series, (4) Usher's Original Composite Maps used in Freeman's Inuit Land Use and Occupancy Project, (5) the Environmental - Social Committee and CAGPL maps, (6) maps and text of the Canadian Arctic Renewable Resource Mapping Project prepared by The Boreal Institute for Northern Studies, (7) Arctic Ecology Map Series, (8) Atlas of Wildlife Habitat Inventory Maps; and (9) information prepared by Dome, Gulf, and Esso, a composite map was prepared for the Beaufort region to help identify areas of potential land use conflict (Resource Harvesting Supplemental Study).

Important wildlife areas and migration routes, reported in the literature and published maps, were included in the consideration of possible impacts of industrial development on resource harvesting. Definitions for important wildlife areas were taken from the text of the Arctic Ecology Map Series which defined "critical" and "important wildlife habitat" as follows (CWS, 1972):

> "Both important and critical areas represent habitat necessary to the maintenance or survival of wildlife populations. The maps show areas of hab-

itat utilized by large numbers of animals (concentration areas) at specific periods of their life cycle, such as breeding, wintering or year-round. An exception is made in the case of such endangered species as the peregrine falcon, where critical areas may support only small numbers of individuals, which nonetheless constitute a significant portion of their population. In the case of migratory waterfowl, delineated areas refer to the summer life cycle, since very few birds winter in the Canadian Arctic.

Critical areas have attributes which render them particularly susceptible to permanent damage by man's activities. Deleterious activities may include habitat destruction, or simply harassment of wildlife. For example, aircraft flying low over colonies of nesting geese may cause adult birds to desert their nest and their young. Excessive predation and possible loss of the entire breeding cycle of that colony may result. When one considers that the Canadian Arctic supports most of the world population of such species as muskoxen, or that it holds a significant proportion of the North American breeding population of white geese, the impact of habitat destruction or breeding failure becomes evident."

Three maps were then prepared (Figures 8.6-1 to 8.6-3) for this volume to depict the locations of harvesting and proposed industrial activities in the Beaufort region. Important features of these maps are the following:

- Permanent camps and harvest areas are located as they have been identified by Wildlife personnel and local residents in combination with information provided in the literature and maps documented above.
- Areas of importance for domestic fishing are shown as identified on the Northern Land Use Information Maps, and
- Proposed locations for oil and gas related developments are shown including shorebases, connecting roads, the pipeline corridor, and onshore gathering systems.

The next section deals with potential land use conflicts, as seen by the Industry, with some consultation in the communities. Prior to the release of this Environmental Impact Statement, not all communities had the opportunity to see and comment on these maps and assist with updating and verification of information. The maps will continue to be available for community consultation and the use of community field-workers.

8.6.1.2 Land Use Conflict Areas

Considering both the tanker and pipeline transportation scenarious together, areas where land use conflicts may be encountered from Beaufort Sea hydrocarbon development can be grouped as follows: (a) shorebases and offshore; (b) road connections to shorebases; (c) pipeline corridor, and (d) the hinterlands of urban centres designated to be growth points; i.e. Inuvik and Tuktoyaktuk. Each of these groupings will now be examined in turn:

(a) Shorebases and Offshore

In support of drilling and island-building activities in the Beaufort Sea, projected to focus initially in the vicinity of the Tarsiut, Koakoak and Issungnak fields, Industry could confine most of its onshore operations to: Inuvik, Tuktoyaktuk, McKinley Bay, King Point or another location in the Yukon, and one other location, depending on the general location of offshore drilling; for example, Pauline Cove; (Herschel Island), Y.T. or Wise Bay - Summer Harbour, N.W.T.

Given such a locational scheme, interaction with traditional harvesting activities could occur in the coastal zone off the Yukon, lower Mackenzie Delta islands, and west central portion of the Tuktoyaktuk Peninsula. Within this zone are areas currently used by residents of Aklavik, Inuvik, and Tuktoyaktuk for summer whaling, spring to fall goose and duck hunting, fishing, spring polar bear hunting, a little sealing, and winter trapping, predominantly for white fox. An essential consideration in the assessment of impact from Industry's activities is the overall effect on species abundance and patterns of movement in coastal regions. These are dealt with in Volume 4 of this Environment Impact Statement. What is important to traditional harvesting activities is that people should continue to be able to find whales, polar bears, birds, foxes, fish, and seal - preferably in areas where they are accustomed to procuring them - and that they should be able to travel to their hunting and trapping places.

Traditional use is changing in that people are growing increasingly dependent on the use of boats, canoes, skidoos, and aircraft to reach these coastal areas. Fewer people rely on the land for their livings, and fewer people than in days past travel extensive distances from the settlements. Nevertheless, harvesting activities are as important, if not more important, for the psychological, social, and economic wellbeing of the people. Changing land use, with respect to intensity and location of use, must be recognized by all concerned in the planning process. Areas that are currently under intensive use by the Inuit, for example, those nearer their settlements, are perhaps more important than they were in the past, because people do not have as much time or inclination as before to travel further to alternative locations. Industry will

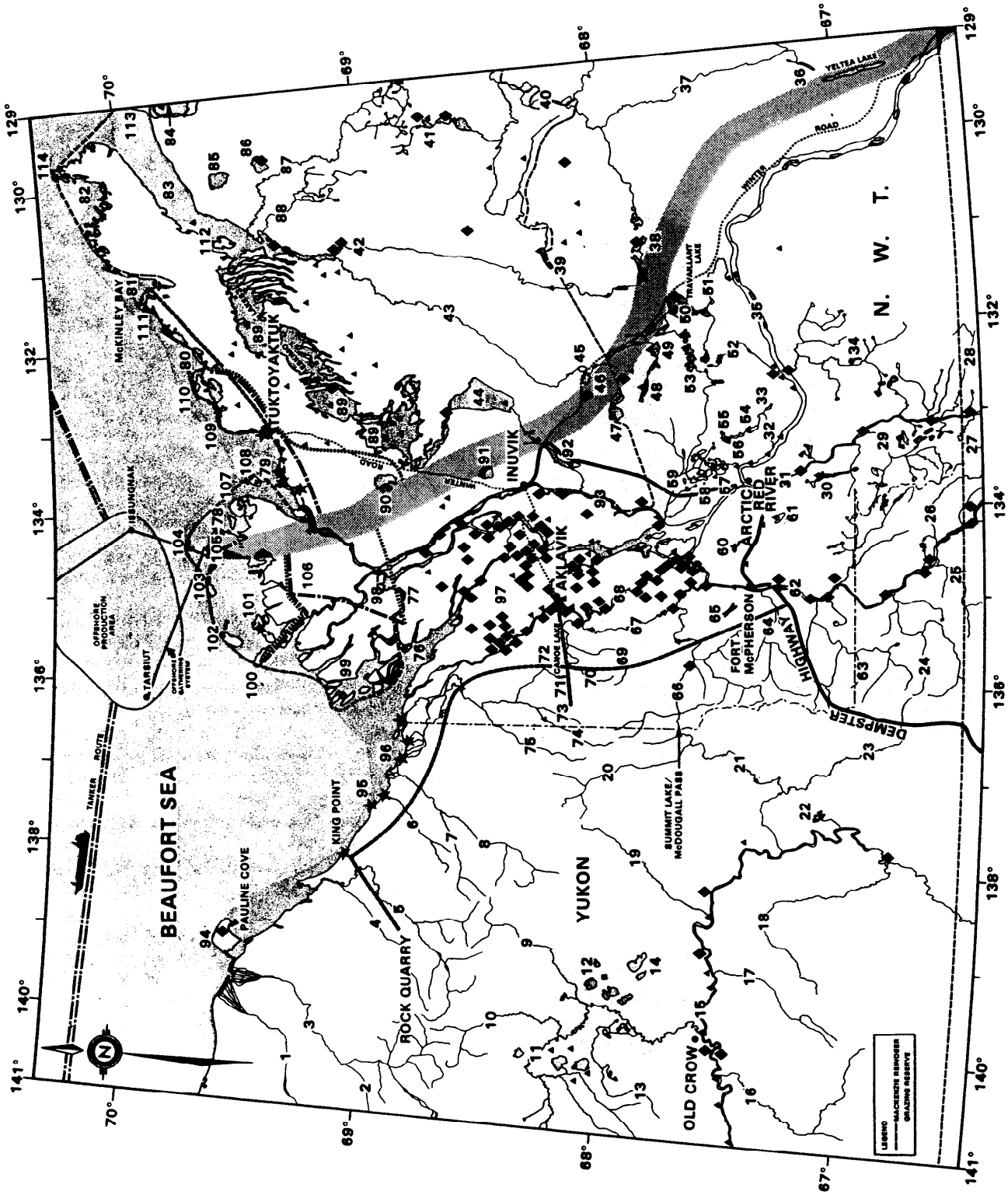


FIGURE 8.6-1 *Industrial activities in traditional harvesting areas: Mackenzie Delta area.*

respect the need to keep these areas intact for traditional uses. On the other hand, areas which were more heavily used in the past, and which are only occasionally visited nowadays, should be recognized as such and managed so that Industry, the hunters and trappers, and the wildlife may coexist.

LEGEND

- COMMUNITIES
- PERMANENT CAMPS
- WHALING STATIONS
- DOMESTIC FISHING
- PROPOSED OIL PIPELINE ROUTE
- POSSIBLE ROAD
- PROPOSED ONSHORE GATHERING SYSTEM
- POSSIBLE PIPELINE ALTERNATIVE
- POSSIBLE TANKER ALTERNATIVE

RIVERS AND LAKES

1. MALCOLM RIVER
2. JOE CREEK
3. FIRTH RIVER
4. TRAIL RIVER
5. BABBAGE RIVER
6. RUNNING RIVER
7. ANKER CREEK
8. BLOW RIVER
9. BLACK FOX CREEK
10. TIMBER CREEK
11. OLD CROW RIVER
12. PATTULLO LAKE
13. SCHAEFFER CREEK
14. CHUNGKLEE LAKE
15. PORCUPINE RIVER
16. BLUEFISH RIVER
17. LORD CREEK
18. JOHNSON CREEK
19. DRIFTWOOD RIVER
20. BELL RIVER
21. BELL RIVER
22. WHITEFISH LAKE
23. ROCK RIVER
24. ROAD RIVER
25. TRAIL RIVER
26. BROWN BEAR CREEK
27. SAINVILLE RIVER
28. UPPER BEAVER RIVER
29. JACKFISH CREEK
30. FISHING LAKES
31. ARCTIC RED RIVER
32. PIERRE CREEK
33. PIERRE LAKE
34. TREE RIVER
35. MACKENZIE RIVER
36. ONHDA LAKE
37. IROQUOIS RIVER
38. TENLEN LAKE
39. HYNDMAN LAKE
40. CARNWATH RIVER
41. CROSSLEY LAKES
42. KUGALUK RIVER
43. MINER RIVER
44. SITIDGI LAKE
45. LOST REINDEER LAKES
46. NORTH CARIBOU LAKE
47. CARIBOU LAKE
48. SUNNY LAKE
49. SANDY LAKE
50. TRAVAILLANT LAKE
51. TRAVAILLANT RIVER
52. BIG STONE LAKE
53. BATHING LAKE
54. ATTOE LAKE
55. WHIRL LAKE
56. TSITAL TREIN CREEK
57. CLEARWATER LAKE
58. TUNDRA LAKE
59. RENGLENG RIVER
60. NIENDO LAKE
61. NEREJO LAKE
62. PEEL RIVER
63. VITTREKWA RIVER
64. STONY CREEK
65. HUSKY LAKE
66. RAT RIVER
67. HUSKY CHANNEL
68. PEEL CHANNEL
69. WILLOW RIVER
70. MARTIN CREEK
71. CANOE LAKE
72. DIVIDE LAKE
73. CACHE CREEK
74. LITTLE FISH CREEK
75. BIG FISH CREEK
76. SHALLOW BAY
77. REINDEER CHANNEL
78. HANSEN HARBOUR
79. KUGMALLIT BAY
80. HUTCHISON BAY
81. McKINLEY BAY
82. RUSSELL INLET
83. LIVERPOOL BAY
84. WOOD BAY
85. RUFUS LAKE
86. KAGLIK LAKE
87. SMOKE RIVER
88. MOOSE RIVER
89. ESKIMO (HUSKY) LAKES
90. PARSONS LAKE
91. NOELL LAKE
92. CAMPBELL LAKE
93. EAST CHANNEL

LAND

94. HERSCHEL ISLAND
95. SHINGLE POINT
96. NIAKUNAK CAMPS
97. MACKENZIE DELTA
98. LANGLEY ISLAND
99. ELLICE ISLAND
100. GARRY ISLAND
101. KENDALL ISLAND
102. PELLY ISLAND
103. HOOPER ISLAND
104. PULLEN ISLAND
105. NORTH POINT
106. RICHARDS ISLAND
107. SUMMER ISLAND
108. HENDRICKSON ISLAND
109. TOKER POINT
110. WARREN POINT
111. ATKINSON POINT
112. CAMPBELL ISLAND
113. NICHOLSON PENINSULA
114. CAPE DALHOUSIE

The Yukon coast in the vicinity of Herschel Island (Figure 8.6-1) used to be an important white fox trapping area. Polar bears and seal were hunted off Herschel Island as the periodic occurrence of open water caused seals to congregate and polar bear to be abundant. There was insignificant trapping activity as the area is too far away for weekend trappers from Aklavik or Inuvik to penetrate, although an occasional hunting party might pass by skidoo or boat in search of caribou or moose. Considering the reduction in overall traditional use in this area, it should be possible to establish a shorebase at Pauline Cove with an acceptable level of impact on traditional harvesting activities.

King Point is located approximately 60 km west of Niakunak (Shallow Bay) which is one of the more important white whale concentration areas. Small numbers of people from Aklavik, Inuvik, and Holman Island were found whaling at Niakunak in July of 1981, albeit further to the east, from Shingle Point to Bird Camp. Whaling has not declined between 1964-65 and 1979-80 despite socio-economic changes that could result in people doing other things in July and August. The establishment of a shorebase at King Point would increase vessel traffic in waters known to be frequented by whales during their fall migration out of the Beaufort. If a shorebase were established there, a whale monitoring program, similar to that operated out of Tuktoyaktuk for the past 10 years would be instituted to ensure that minimal interference with migrating whales would occur.

People do not trap or hunt regularly in the vicinity of King Point owing to its distance from the settlements. In June, Inuvik people may take boats through Reindeer Channel and go toward Shingle Point for caribou, but they do not go as far as King Point. If caribou cannot be found closer to town, Aklavik hunters will travel along the coast by skidoo or boat through this area. In 1981, for example, two Aklavik men journeyed as far westward as the Firth River, where a concentration of some 2,000 caribou had been reported. The establishment of a shorebase at King Point should not severely interfere with traditional activities because the area is already one of marginal use.

As mentioned previously, whenever possible, the current pattern is one in which people hunt closer to the settlements. Considerable numbers of people travel to the coast only when there is news that hunting is good. The impact of a shorebase at King Point on traditional harvest activities could be minimized by ensuring adherence to game laws. The presence of a shorebase should not impede the occasional movement of Porcupine caribou along the coast. It is well known that migrating caribou have not been diverted but have passed through communities such as Old Crow and Coppermine from time to time.

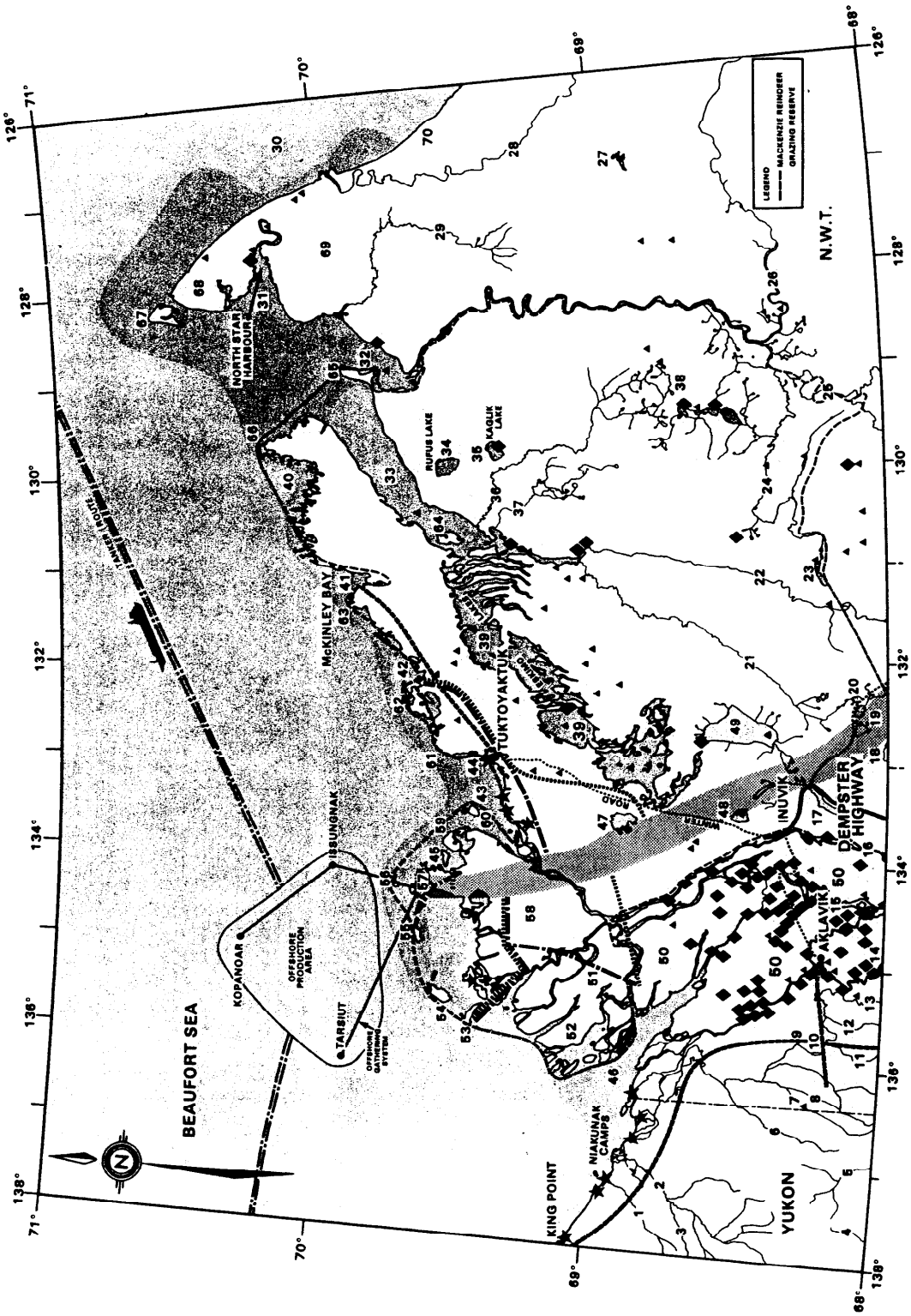


FIGURE 8.6-2 *Industrial activities in traditional harvesting areas: Beaufort coast.*

McKinley Bay is located on the north coast of the Tuktoyaktuk Peninsula (Figure 8.6-2) where residents of Tuktoyaktuk have traditionally trapped their principal revenue producing furbearer, white fox, during the winter trapping season, and where spring polar bear hunting and sealing has been known to be good. Ducks and geese inhabit the coast from spring to fall for moulting, nesting, and/or staging. Hunting and trapping efforts have recently declined in the area due, perhaps, to the fact that it is some 80 km from Tuktoyaktuk. Sealing is minimal at Tuktoyaktuk and occurs mainly at Toker Point. People from the community do not usually go as far as McKinley Bay to hunt seals. For ducks and geese, people may travel as far as Warren Point, which is about half way to McKinley Bay. Polar bear sightings are, however, strong enough inducements for a trip to McKinley Bay. In general, expansion of the Industry camp at McKinley Bay should not create interference with the limited traditional harvesting activities that take place in the locality. The number of people trapping and hunting in the area is not expected to rise substantially, and Industry personnel living in camp facilities would not be permitted to compete with hunters and trappers.

LEGEND

- COMMUNITIES
- PERMANENT CAMPS
- WHALING STATIONS
- DOMESTIC FISHING
- PROPOSED OIL PIPELINE ROUTE
- POSSIBLE ROAD
- PROPOSED ONSHORE GATHERING SYSTEM
- POSSIBLE PIPELINE ALTERNATIVE
- POSSIBLE TANKER ALTERNATIVE

RIVERS AND LAKES

1. RUNNING RIVER
2. BLOW RIVER
3. ANKER CREEK
4. DRIFTWOOD RIVER
5. BELL RIVER
6. BIG FISH CREEK
7. LITTLE FISH CREEK
8. CACHE CREEK
9. DIVIDE LAKE
10. CANOE LAKE
11. MARTIN CREEK
12. WILLOW RIVER
13. HUSKY CHANNEL
14. PEEL CHANNEL
15. MIDDLE CHANNEL
16. EAST CHANNEL
17. CAMPBELL LAKE
18. CARIBOU LAKE
19. NORTH CARIBOU LAKE
20. LOST REINDEER LAKE
21. MINER RIVER
22. KUGALUK RIVER
23. HYNDMAN LAKE
24. WOLVERINE RIVER
25. CARNWATH RIVER
26. ANDERSON RIVER
27. LAC RENDEZ-VOUS
28. HORTON RIVER
29. MASON RIVER
30. FRANKLIN BAY
31. HARROWBY BAY
32. WOOD BAY
33. LIVERPOOL BAY
34. RUFUS LAKE
35. KAGLIK LAKE
36. SMOKE RIVER
37. MOOSE RIVER
38. CROSSLEY (SLAVEY) LAKES
39. ESKIMO (HUSKY) LAKES
40. RUSSELL INLET
41. McKINLEY BAY
42. HUTCHISON BAY
43. KUGMALLIT BAY
44. TUK HARBOUR
45. HANSEN HARBOUR
46. MACKENZIE BAY
47. PARSONS LAKE
48. NOELL LAKE
49. SITIDGI LAKE

LAND

50. MACKENZIE DELTA
51. LANGLEY ISLAND
52. ELLICE ISLAND
53. GARRY ISLAND
54. PELLY ISLAND
55. HOOPER ISLAND
56. PULLEN ISLAND
57. NORTH POINT
58. RICHARDS ISLAND
59. SUMMER ISLAND
60. HENDRICKSON ISLAND
61. TOKER POINT
62. WARREN POINT
63. ATKINSON POINT
64. CAMPBELL ISLAND
65. NICHOLSON PENINSULA
66. CAPE DALHOUSIE
67. BAILLIE ISLANDS
68. CAPE BATHURST
69. BATHURST PENINSULA
70. SMOKING HILLS

The Wise Bay - Summers Harbour area (Figure 8.6-3) is off the tip of the Parry Peninsula - far enough away from areas used by Tuktoyaktuk and Paulatuk trappers and hunters, that direct interference with harvesting activities is not anticipated. Increased traffic through excellent polar bear and seal habitat would likely result in more polar bear sightings. This could benefit polar bear hunters if the information were relayed. Providing the Wildlife Services' polar bear quotas were not exceeded, the polar bear population should not be endangered.

(b) Road Connections to Shorebases

It is possible that, eventually, Tuktoyaktuk and Inuvik will be connected by an all weather surface road. McKinley Bay will continue to require a winter road connection with Tuktoyaktuk, and shorebases in the Yukon would require winter road connections with Inuvik, probably via the Dempster Highway.

Roads will likely pose more problems than shorebases with respect to harvesting activities and impact on wildlife because roads offer access, roads constitute a linear rather than a one-point development, and because activities associated with roads will be much more difficult to control than those associated with shorebases. It is the opinion of a number of people in the Wildlife Service that the presence of a road is a lesser problem to wildlife than the activities associated with a road (P. Gray, J. Donahie, pers. comm., Yellowknife). For example, an issue under debate and present study is how a road may affect caribou migrations. It is thought that the amount of disturbance brought about by a road can be cut down by proper road design. In the case of caribou, providing a gently graded approach to a road rather than an embankment, and the elimination of vegetation beside the road that could act as screening for predators, could result in animals crossing the road rather than being diverted by it. The problem of controlling disturbance by traffic on a road is more difficult to handle. Presently, a question being asked is whether or not convoying traffic during caribou migrations may result in less impedence of their

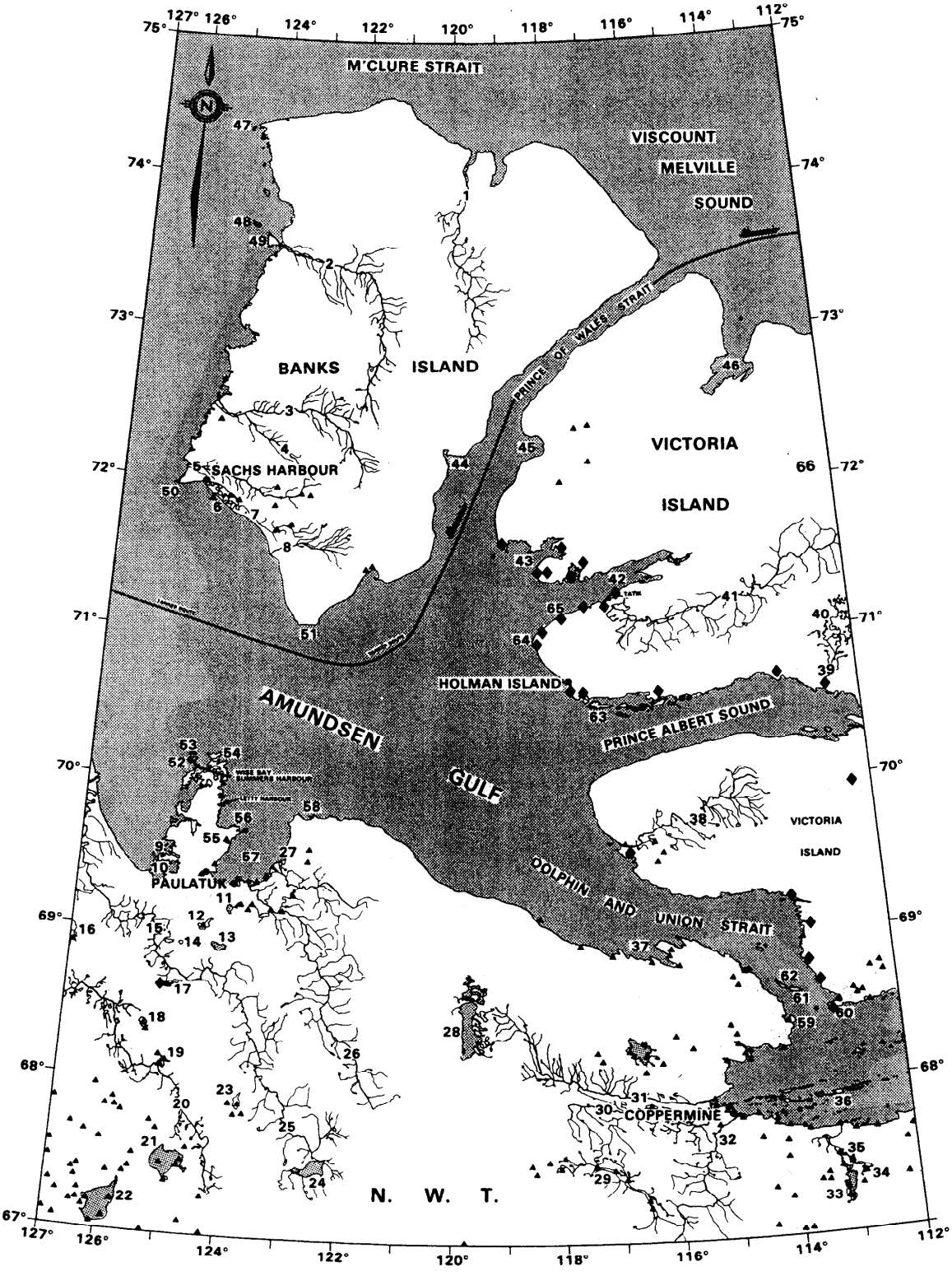


FIGURE 8.6-3 *Industrial activities in traditional harvesting areas: Amundsen Gulf area.*

movements. Problems of poaching and uncontrolled slaughter of wildlife populations and reindeer within the Reindeer Reserve in close proximity to roads will also need to be addressed. Consultations with native organizations and hunters and trappers will be needed prior to planning the locations of connecting roads.

Wildlife populations most likely to be affected by the construction and use of winter roads are white fox and grizzly bear. Particular attention will need to be paid to the minimizing of damage to their denning sites and to the attraction of them to camps and garbage dumps. Waterfowl nesting habitats may be destroyed by tracked vehicles, or vehicles capable of crushing the hummocks of vegetation used by geese. Pollutants, particularly oil, constitute hazards and will need to be controlled.

During the summer construction season, waterfowl will be present throughout coastal areas. According to the Canadian Wildlife Service (AEMS, 1972). "Disturbances to nesting colonies during the breeding season (May 15 to September 1) can be seriously damaging and travel by foot or vehicle in nesting areas should be avoided entirely. Low level flying by aircraft is also harmful, so a minimum ceiling of 2,000 feet should be maintained over critical waterfowl breeding areas. Although harassment by boat or aircraft should be avoided on moulting or staging areas, normal transportation activities do not constitute a significant hazard to waterfowl."

LEGEND

- COMMUNITIES
- CAMP SITES
- WHALING STATIONS
- DOMESTIC FISHING
- PROPOSED OIL PIPELINE ROUTE
- POSSIBLE ROAD
- PROPOSED ONSHORE GATHERING SYSTEM
- POSSIBLE PIPELINE ALTERNATIVE
- POSSIBLE TANKER ALTERNATIVE

RIVERS AND LAKES

1. THOMSEN RIVER
2. BERNARD RIVER
3. BIG RIVER
4. EGG RIVER
5. KELLETT RIVER
6. MIDDLE LAKE
7. SACHS RIVER
8. MASIK RIVER
9. TOM COD BAY
10. LANGTON BAY
11. BILLY LAKE
12. BINAMÉ LAKE
13. FALLAIZE LAKE
14. STEFANSSON LAKE
15. GILMORE LAKE
16. LAC RENDEZ-VOUS
17. DELESSE LAKE
18. TSOKO LAKE
19. EWARIEGE LAKE
20. ANDERSON RIVER
21. LAC MAUNOIR
22. COLVILLE LAKE
23. ESTABROOK LAKE
24. HORTON LAKE
25. HORTON RIVER
26. HORNADAY RIVER
27. BROCK LAGOON
28. BLUENOSE LAKE
29. DISMAL LAKES
30. RICHARDSON RIVER
31. RAE RIVER
32. COPPERMINE RIVER
33. KIKERK LAKE
34. EOKUK LAKE
35. KUGARYUAK RIVER
36. CORONATION GULF
37. STAPYLTON BAY
38. KUGALUK RIVER
39. KUUK RIVER
40. TAHIRYUAK LAKE
41. KUUJJUA RIVER
42. MINTO INLET
43. WALKER BAY
44. JESSE BAY
45. DEANS DUNDAS BAY
46. RICHARD COLLINSON INLET

LAND

47. CAPE PRINCE ALFRED
48. NORWAY ISLAND
49. BERNARD ISLAND
50. CAPE KELLETT
51. NELSON HEAD
52. BOOTH ISLAND
53. FIJI ISLAND
54. CAPE PARRY
55. PARRY PENINSULA
56. CLAPPERTON ISLAND
57. DARNLEY BAY
58. PEARCE POINT
59. CAPE KRUSENSTERN
60. LADY FRANKLIN POINT
61. CAMPING ISLAND
62. LAMBERT ISLAND
63. ALBERT ISLANDS
64. CAPE PTARMIGAN
65. CAPE WOLLASTON
66. SHALER MOUNTAINS

(c) The Pipeline Corridor

The proposed pipeline corridor (Figure 8.6-1) stretches southwards from North Point to a point east of Inuvik, and thence through the Travaillant Lake area to Yeltea Lake.

The section of the proposed corridor from North Point to the southeast of Inuvik falls within the boundaries of the Tuktoyaktuk and Delta Registered Group Trapping Areas and the Mackenzie Reindeer Grazing Reserve. Interference with traditional harvesting activities will be minimal along this route and could occur only during construction. There are no permanent or seasonal camps located in its vicinity and, although sections are within range of part-time trappers from Tuktoyaktuk and Inuvik, the area is not heavily trapped (B. Wooley, pers. comm., Inuvik). Geese and ducks may be hunted along the corridor during the summer months.

Through the Travaillant Lake area, there may be some interaction with a small number of serious trappers working out of Inuvik. These trappers travel by skidoo and chartered aircraft and rely on the land for fish and meat during the winter trapping season.

The corridor may or may not affect trappers from Arctic Red River, depending on their numbers and the extent of their activities in the future. In 1981, only one man was reported to be working seriously in the Travaillant Lake area from his camp by the Mackenzie River (J. Snowshoe, pers. comm., Fort McPherson).

The pipeline corridor traverses the westernmost part of an important winter range for some of the Bluenose caribou herd and some important waterfowl staging areas. Impacts from pipeline construction and maintenance should not be serious if due care is

exercised by the work crews because alternate habitat is quite extensive for both caribou and waterfowl.

(d) The Hinterlands of Inuvik and Tuktoyaktuk

The areas which are most likely to be affected by petroleum development are the immediate hinterlands of Inuvik and Tuktoyaktuk. Fish and wildlife resources will be under stronger pressure from traditional harvesters who do not have time to travel farther from the settlement and who do not wish to charter aircraft to get to more remote areas. Pressures on resources could also occur from new members of the communities - people from the south or from other northern locations who would also enjoy harvesting activities. Population growth will bring more demands for outdoor recreation and tourism. Land use conflicts may arise as recreationalists and tourists demand areas for sports hunting and fishing, boating, snowmobiling, cross-country skiing, hiking, photography, and other such activities.

8.6.2 THE BEAUFORT COMMUNITIES - CONTINUED RENEWABLE RESOURCE USE

The continuing importance of hunting, trapping, and fishing to residents of the Beaufort Sea communities will depend, largely, on the interest people have in retaining their relationship with the land. Wage employment will be offered to local residents and each individual will need to decide the extent to which he or she will want to become involved in such employment. It is expected that a number of people will want to become full-time employees on a year-round basis, and that others will want to have full-time positions on a seasonal basis. Others will take part-time jobs that, nevertheless, keep them committed with respect to time, and still others will be most comfortable with part-time work when they wish to have it. To date, it is Industry's experience that rotation schedules such as two weeks on, two weeks off, are quite acceptable to native people because the time off is adequate to allow some hunting, fishing, or trapping.

Owing to changes in life-style, people do not travel as far to hunt, fish and trap as their ancestors did, nor do they take the entire family on every occasion. Children may be in school, or a member of the family may have a job. It is very important to the people that they may continue to have the enjoyment of traditional activities, but they now recognize that such enjoyment must be experienced in the more intensively harvested areas near the settlements.

Population pressure is a critical factor in discussing how Beaufort Sea hydrocarbon development may affect traditional harvesting activities on a community specific basis. Owing to the different roles the communities are perceived as assuming, they can be grouped as follows: 1) Inuvik, 2) Tuktoyaktuk, 3) Aklavik, Fort McPherson, and Arctic Red River, and 4) Paulatuk, Coppermine, Holman Island, Sachs Harbour, and Old Crow.

8.6.2.1 Inuvik

Inuvik is likely to be the major growth point in the western Arctic. The influx of non-native people will be disturbing to the resident native population. Continued access to the land will, if anything, increase in its importance to the psychological and social wellbeing of native people.

The area most intensively used by native residents of Inuvik is the Mackenzie Delta. In the spring, when it is time for ratting and fishing and waiting for the ducks and geese to arrive, people go out to their camps in the Delta. Some people may have taken their children out of school because the whole family moves out of town. Others must spend time in town and will go to their camps on weekends, or when they have days off from work. Snowmobiles will be used until the first channels open. After that, boats will provide transportation.

One of the greatest potential impacts of population growth in Inuvik will be disturbance of ratting camps by newcomers who also want to be skidooing, boating, shooting ducks and geese, or partying near town in the Delta. For some southerners, it will be "going native"; for others, it will be the exhilaration of spring; for others, it will be curiosity. Whatever the motives, there will be an increase of traffic in the Delta and the native people will perceive that to be "interference." Parks planners call a similar phenomenon, particularly in backcounty areas, "exceeding psychological capacity." Because there will be many new people in Inuvik besides Industry personnel, the control and mitigation of this type of impact would be the responsibility of government authorities.

Later on in the summer, when a few families pack their belongings and go whaling on the coast, they could experience increased recreational traffic. In time, such traffic could rightfully be called "congestion." There will be recreational boating on the Delta and out to the coast. Some non-native people will fish. It may not be too farfetched to say that when the days get hot, some people may even brave the mosquitos to try wind surfing on the wider channels of the river. Recreational boating could do more to influence whale movement patterns than would Industry activities. Effects of this general kind would again be out of the Industry's jurisdiction to control.

In the fall, sports hunters will head into the Richardson Mountains or into the Wildlife Management

PLATE 8.6-1 *Fish camp near Coppermine. Every summer people from Arctic communities camp at traditional locations and engage in subsistence fishing. While economically important, fish camps also have a deep social and cultural meaning for native people.*

Zone south and east of the Mackenzie Reindeer Grazing Reserve for caribou. Although only holders of Resident Licenses may hunt the Richardson Mountains area, as time progresses, there will be an increasing number of encounters between native and non-native hunting parties. Resentment may develop if more non-natives begin to hunt the Canoe Lake -Divide Lake area because they are better able to afford the chartering of an aircraft.

Winter trappers with traplines further than a few hours from Inuvik or the highways are not expected to be seriously disturbed when the population of Inuvik increases. Weekend trappers working near town will, however, experience change. When the weather is amenable, recreationists will be found on snowmobiles, snowshoes, and cross-country skis in proximity to town, the Dempster Highway, the winter road to Tuktoyaktuk, and, in the longer-term, other access or connecting roads. It will probably be beneficial to people with traplines and camps if an education program is launched that teaches recreationists proper respect for traps and bush camps.

In the long-term, almost any kind of recreational use of lands and waters near Inuvik is imaginable. Groups may apply for permits to build ski lodges in the Richardson Mountains and fly to them. Helicopter skiing and "heli-hiking under the midnight sun" may become popular for tourists, if not local residents. Increased recreational use would create a need for search and rescue and medical delivery services. Physicians would need to be knowledgeable in the treatment of hypothermia, frostbite, and athletic injuries. A permanent search and rescue coordinator might be required, and people would need to be trained to work in ground and air operations. If a National Park is established in the Beaufort region, Parks Canada personnel could become important in these respects.

All of the foregoing points to the prospect that population growth could have a far more serious impact on native harvesting then industrial activity *per se*. The activities of large companies can be controlled, and the oil and gas industry has a good track record in policing itself. However, with large population growth, only partly attributable in any direct way to the Industry, traditional use in Inuvik's hinterland may be placed in jeopardy unless regulations and controls are devised and enforced to protect the native way of life. It should be noted that recreational planners are developing knowledge and skill in controlling the movements of people through the hinderance of access. The controls that are imposed are of a type that ensure that a majority of recreationists

stay near main access routes or on marked trails or watercourses. With proper advance planning, the overrunning of traditional harvest areas can be prevented.

8.6.2.2 Tuktoyaktuk

If greater proportions of the population of Tuktoyaktuk become employed by the oil and gas industry over the years, more changes in harvesting patterns are anticipated, although the nature of these changes is difficult to predict. People may become more dependent on the immediate hinterland of the community for harvesting activities. On the other hand, more hunters and trappers may have the ability to pay for the use of aircraft to extend their effective range so harvesting areas may expand.

The Husky (Eskimo) Lakes area will continue to be very important to the community for spring fishing, hunting, ratting, and socializing, in much the same way as is the Mackenzie Delta for residents of the Delta communities. As the Husky Lakes are some distance from the settlement, new residents of Tuktoyaktuk are less likely to travel there, camp, and offer competition for the resources or disturb the native people when they are out on the land.

Population growth in Tuktoyaktuk will be of much lesser magnitude than in Inuvik. The Industry believes that growth should not occur at a rate which could lead to a loss of control by its long-term residents; hence some types of impact associated with population pressures that could be experienced in Inuvik should not be felt in Tuktoyaktuk. However, there could be some competition by new residents for fish and wildlife and some potential for interference with traditional harvesting activities by recreationists.

Movement on the tundra in the vicinity of Tuktoyaktuk is almost impossible during the summer, so recreation demand will likely be channeled to the coast in the form of boating, fishing, sightseeing, or photography. An education program or some form of control will be needed to minimize possible interference with whaling activities in July and August.

Sport hunting is not permitted within the Mackenzie Reindeer Grazing Reserve which encircles Tuktoyaktuk. General Hunting License holders have some restrictions but, overall, can hunt nearer to town within the Reserve. Thus, native weekend hunters may continue to travel across the "Fingers" of Husky Lakes to the Rufus Lake-Kaglik Lake-Smoke River-Moose River area for caribou without competition from non-native people.

8.6.2.3 Aklavik, Fort McPherson, and Arctic Red River

Aklavik, Fort McPherson, and Arctic Red River may experience some growth as road linkages are improved and they receive more traffic. However, population growth will not be the result of direct hiring and placement by companies involved in Beaufort region hydrocarbon activity. Harvesting activities will continue to be important to their economies but opportunities will arise for wage employment and business, perhaps in the highway services and commercial sector. Harvesting activities may become more road-oriented as people are able to purchase vehicles to supplement their uses of skidoos and boats.

8.6.2.4 Paulatuk, Coppermine, Holman Island, Sachs Harbour, and Old Crow

Changes in resource harvesting in these communities brought about by Beaufort activity will be the result of changes in the attitudes and orientations of the people themselves, rather than changes to the land. People accepting wage employment will likely have work arrangements that permit them to return home for hunting, fishing, and trapping. Harvesting activities could decrease if people became less keen on being out on the land, if they use their "rest and recreation" time for other leisure pursuits, or if at times they stay away in Inuvik rather than returning home. However, experience in Coppermine indicates that harvesting activity could actually increase.

If wages are used for the purchase of equipment and vehicles for traditional activities, hunters, trappers, and fishermen may be more comfortable out on the land, more effective, and more successful. As long as the use of more efficient and powerful weapons and technology does not result in overkill or wastage of carcasses, wage employment may be seen as being good for people who wish to pursue traditional activities.

People in Sachs Harbour and Holman Island are concerned that tanker traffic will have adverse effects on harvesting activities in Amundsen Gulf and Prince of Wales Strait. Industry, with the aid of government and local people, has tried to pinpoint concentration areas for seal and polar bear and is conducting research to determine the possible effects of marine traffic (see Volumes 3A and 4) on them. Although it remains to be demonstrated, the Industry believes that the perception of interference by tankers may be greater than actual interference. Once hunters and trappers compare the crossing of sea ice behind tankers to normal obstructions on the sea, and once they become familiar with making such crossings, worries about danger and inconvenience may be greatly alleviated.

8.6.3 THE ROLE OF VALUES

As increasing numbers of non-native people take up residence in a frontier region, the native view of

wilderness and animals becomes displaced, and new values become introduced and increasingly dominant with respect to both wilderness areas and game resources. In terms of how they affect native people, these may be differentiated as conservational and competitive values.

Conservational values are based on notions of the vulnerability of animals to increased hunting and other pressures, and are implemented by means of a variety of rules, regulations, and administrative practices. The objective is to restrict access to animal resources. Even where native access is supported in law, practices which native people often regard as harassment can impede harvesting activity. With the growth of population in the Beaufort region, there will be strong pressures for new conservation measures, which will undoubtedly be needed. Recognition of the cultural and political sensitivity of such measures, and hence the care taken in their application, will be an important determinant of future relations between native and non-native people.

If both the native and non-native peoples living in the Beaufort region wish to continue harvesting wildlife resources to the year 2000 and beyond, the Wildlife Service's efforts to learn about managing wildlife resources for sustained use must be supported. According to the Science Advisory Board of the Northwest Territories (1980). "Developing a system to provide accurate harvest statistics should be the first priority with continued inventories a close second". "...only with a comprehensive and ongoing program of maintaining up to date information on wildlife stocks and harvests can the potential of any species be realized. The increased harvests that such efforts will make possible will repay the investment in time and funds." The Industry discusses the need for better harvesting statistics in Volume 7 of this EIS.

The harvest level a species can sustain, changes from year to year, in accordance with population abundance and other factors. More knowledge about these relationships will enable the Wildlife Service to employ management strategies in the interest of keeping stocks up. For example, incentives may be provided to encourage harvests of particular species, or to distribute harvest pressures over the range of a species rather than to have concentrations that result in overharvest.

The Wildlife Service in the Northwest Territories is currently initiating a number of habitat management programs that should prove to be of benefit to the wildlife resources, people harvesting those resources, and industrial proponents. Detailed critical wildlife habitat mapping will assist the Industry in the making of location decisions. Habitat enhancement studies and mitigation guidelines development will help proponents understand the types of impact they may be initiating and what they need to do to mitigate possible adverse effects. In some cases where habitat is removed, it may be possible to provide alternate habitat for the wildlife populations by habitat enhancement in a nearby location.

Competitive values pose a more direct and significant threat to the future of native harvesters. Such values are realized when non-native hunters actually compete for game with native hunters, or when non-native recreationists encroach on, and disturb, traditional hunting areas. There are, of course, some spectacular examples of instances in which the extension of the frontier has either been the major factor in the destruction of a native resource (the buffalo) or in the reduction of a resource to a level requiring the application of radical conservation measures (the bowhead whale). In the present day north, many non-native hunters feel that it is their right to hunt, expecially in light of the still abundant game resources. Perhaps there is no problem now, but with the addition of many people to a region like the Beaufort, matters could change. Hunting must be carefully regulated to ensure the well being of regional game populations.

Competition for fish and wildlife resources will increasingly arise from within the Beaufort communities and elsewhere as the Beaufort Sea region becomes better known and more accessible to the south. Although native people may have the advantage of knowing the land, they may be put at a disadvantage as relatively affluent non-natives exercise their greater ability to pay for charter aircraft, guides, faster or bigger snowmobiles, or faster and bigger boats. In the long-term, tourist camps, sport fishing camps, and hunting camps could gradually begin to dot the landscape as entrepreneurs vie for business and as areas nearer to the settlements become congested.

Scattered camps and developments serving resource harvesting activities may look innocuous owing to geographic spread. Nevertheless, they may have an acute bearing on the health of wildlife resources because of their synergistic and cumulative effects with each other and with other man-made developments. Personnel from the Wildlife Service, Fisheries, and Travel Arctic will need to prepare themselves for some coordinated, long-range planning in order to control harvesting, recreational, and tourist pressures in both developed and remote areas in the future.

One way of alleviating potential problems of subsistence versus sports competition for fish and wildlife resources, may be to establish more appropriate wildlife management programs. Southerners are quite used to regulations, and sportsmen are accustomed

to purchasing licenses, stamps, and tags and being attentive to seasons, zones, bag limits, and the age and sex of game. If adequate regulations protecting important native harvesting areas, and the means to enforce such regulations, are in place, objections to them will not be as fierce as they would be if they were imposed after newcomers had experienced relative freedom.

As a final note, the people who manage and administer the wildlife resources of the northern territories are few in number and have vast areas to look after. This would suggest that, no matter how dedicated these people are, they cannot do an adequate job. If they cannot do an adequate job now, when activity is still at a relatively low level, they are unlikely to be able to do so in future without a significant reinforcement of their numbers. Consideration needs to be given to a stepped-up program for recruiting and training local people to become wildlife officers, or to be able to assist officers in their duties. Budgets that government will allocate to preserve wildlife and to protect the subsistance interests of the native people will have to be raised to levels that are sufficient to the task.

8.7 GOVERNMENT RESPONSIBILITIES

Under the existing political structure, the federal government, among the various levels of government, will be the principal beneficiary of Beaufort oil and gas production. However, implementing the social programs that will be needed during the course of development will, in considerable measure, fall to the governments of the Northwest Territories and Yukon Territory. The governments have responsibility for a wide range of social, economic and game management programs, whose costs are likely to increase greatly under conditions of rapid development. This would suggest the provision of substantial additional funds to the territorial governments. The Industry does not offer any advice on how such funds should be provided, but believes that it is important to mention the need for them.

Another matter that the federal government will have to consider is the effect that Beaufort Sea development would have on the collective interests of northern native people. Whether or not these inter-

PLATE 8.7-1 *Northwest Territories Legislative Assembly in session. A majority of the present members are native people. Beaufort development will raise questions concerning geographic and intergovernmental political arrangements.*

ests are served to the satisfaction of all parties via land claims settlements, special recognition must be given to the prospect that the resources and economy of native people will require strengthening, if these people are to play effective collective and individual roles in the future of the Beaufort region. It is proposed that the government make sufficient funds available to native economic organizations for the purpose of developing native business establishments, expertise and skills.

The responsibility toward northern native people must, however, go considerably further than to simply ensure that they are given an opportunity to participate in economic development. Native people currently comprise a majority of the population of the Beaufort Sea region and the Northwest Territories as a whole (though not of Yukon). Given anticipated population inflows, it is not difficult to foresee them becoming a minority in their homeland at some point in time. To ensure that they are in a position to protect their interests, it would facilitiate the task of planning if their political status became clarified at the earliest possible time. Even if a claims settlement is not achieved early, provision must be made for the protection and preservation of matters native people regard as vital to their culture, their continuity as a people, and their sense of the north as a homeland.

Like the territorial governments, municipalities will also face a growing burden under conditions of rapid change. If they are to be able to perform the range of functions demanded by their residents, their budgets will have to undergo a signifcant increase. While some northern municipalities have limited revenue raising powers, all are heavily dependent on fiscal processes of the territorial governments. This raises the question of whether current practices should continue or whether the powers of municipalities to raise revenues directly should be increased. This is, of course, a matter that would have to be considered on a community by community basis. A review of the powers and responsibilities of Inuvik and perhaps also Tuktoyaktuk would especially seem warranted.

CHAPTER 9

BEAUFORT REGION - POLICIES FOR DEVELOPMENT

In considering the future of the Beaufort region and the northern territories in a broader Canadian context, two factors stand out. On the one hand, the development of the Beaufort's oil and gas resources should make a substantial contribution to national income and employment and to the balance of payments. Such development could help to make energy self-sufficiency a reality and could be of great importance to Canada's standard of living and quality of life. On the other hand, the northern regions from which these benefits would come are currently among the more politically, economically and socially disadvantaged in Canada. To be more explicit:

- Major steps have been taken toward the development of self-government in the northern territories, but greater self-determination remains a major issue throughout the north. Native people want acceptance as distinctive national groups within the larger northern and Canadian context. The territorial governments, now fully elected and representative, want more autonomy from Ottawa and a stronger fiscal base, which could include the sharing of revenues from resource development. Communities such as Inuvik and Tuktoyaktuk in turn want greater fiscal independence from the Government of the Northwest Territories which, in many respects, serves as their municipal government.

- While the income of many northerners is substantial, there are nevertheless large economic inequalities in the territories. Native northerners tend to earn incomes well below the Canadian average, and many are below the poverty line. They require substantial annual subsidies in the form of low cost housing, free medical services, and subsistance allowances.

- Unemployment levels in many northern communities are high, and opportunities to earn wage income occur only intermittently. People who leave such communities in search of employment are typically underqualified in terms of the modern labour market. As a consequence, if they find employment at all, it is usually in unskilled jobs. Due partly to market conditions, but also to a lack of skills and experience, the full potential of northern business is not realized.

- While health standards and life expectancy have risen greatly during the past decade, many problems remain. Tuberculosis is no longer a major problem, but venereal diseases and diseases related to poor nutrition are widespread. Infant mortality remains higher than the Canadian average. Alcohol abuse, arising partly out of the depressed circumstances of northern society, is endemic, and is a prominent factor in crime and violence.

It has already been proposed that without major development, such conditions could only become more chronic. Yet preventing a further deterioration of the northern milieu, and moving the northern economy toward greater self-sufficiency, would seem to require more than just engaging northerners in oil and gas related jobs and business. A more total developmental effort involving local peoples, government and industry would seem warranted.

There are four substantive parts to this chapter. Section 9.1, describes the current policies that the Industry already pursues in the north with respect to local employment, the purchase of goods and services, cultural support and other matters. Where appropriate, such policies will continue into the future, and will be reviewed and modified as needed. Section 9.2 deals with long-term community and human resource development needs, addressing the question of how large-scale growth can become a planned process of benefit to all Beaufort residents. Section 9.3 deals with measures needed to maintain the traditional economy, and Section 9.4 deals with land-use planning and coordination.

PLATE 9.1-1 *The Beaufort Sea Community Advisory Committee meets every four months in a Beaufort community to discuss Industry plans and the ways in which regional residents can benefit from industrial development.*

9.1 CURRENT INDUSTRY POLICIES AND THEIR IMPLEMENTATION

The Industry has now had many years of experience in the Beaufort and other northern regions. Out of this experience, it has devised and implemented many policies which govern its day to day and year-

to-year relations with northern communities and peoples. These policies are the subject of this section, leaving to the following section the matter of the broader role that the Industry will have to play in the region as its activities expand during the next two decades.

To ensure that its policies are sensitive to northern needs, the oil and gas companies work closely with governments, communities and appropriate interest groups. The Industry has visited all of the communities of the Beaufort region and other northern regions to provide information and to identify local needs. These visits will continue.

Current policies relate to matters such as community liaison and consultation, the employment of northerners, training, and socio-cultural support. Their essential features are described in the paragraphs which follow.

9.1.1 LIAISON AND CONSULTATION

Industry liaison and consultation policies relate to the development of a communication and consultation process. This process enables northern people as well as government agencies, to participate in planning and operating practices, particularly with respect to matters which bear on environmental safety and socio-economic impact. In carrying out this role, the Industry maintains an extensive contact with government, native organizations, and other interest groups. It consults directly with individuals and community governments, and also maintains important links with the communities through representative regional groups. The Industry will ensure that continuous information is available on its operations and future plans, that such information is provided in an understandable manner, and that communities are not overburdened with excessive information.

Over the years, the content of liaison and consultation programs will vary. They will, however, deal with all facets of Industry, community and government interactions. Examples of matters that will enter into the consultative process are as follows:

- consultation regarding the location of temporary and permanent facilities, including roads, camps, docks, pump stations and operation and maintenance facilities.

- planning concerning the additional workloads that may be placed on health care systems, educational facilities and other aspects of community capital.

- the establishment of appropriate means of working with regional, territorial and federal agencies to assist referral counselling services in coping with additional loads that may be associated with Beaufort development.

- the establishment of appropriate means of working with governments, communities and other interest groups to minimize the possible impact of Industry facilities on traditional hunting, fishing and trapping areas or areas of cultural significance.

- means of minimizing or preventing competition by industry personnel with local resource harvesters.

- examining appropriate methods of compensation to individuals and groups for losses that may be suffered as a result of Industry activities.

9.1.2 NORTHERN EMPLOYMENT

The Industry's objective in this area is to involve northern residents in current Beaufort Sea exploration and future oil and gas development, by offering opportunities for employment among communities in the Beaufort Sea region, and in other parts of the territories. While northerners will be encouraged to take short-term employment in major construction projects, emphasis will be placed on ensuring employment opportunities in long-terms jobs associated with production, processing and operations and maintenance. The Industry will communicate employment opportunities throughout the northern territories as much as possible so that northerners are aware of job openings.

With respect to job rotation, the Industry employs a rotational leave system for all employees. To assist in job rotations from northern communities, contact persons or personnel expeditors are engaged in communities which have large groups of residents employed. Employment officers are also available to cover regional groupings of communities. Northern employees from the Beaufort Sea area are rotated directly from their home communities to the worksite. Rotational work schedules employed to date appear to have been effective in providing considerable flexibility in staffing, and in allowing northerners to participate in employment, without abandoning their traditional lifestyle.

The Industry has developed, and will continue to develop and implement, orientation programs for all employees. The general intent of such programs is to prepare employees for their work experience and to increase their sensitivity to the social and environmental circumstances surrounding their jobs. Normally, orientation programs would cover topics such as the nature of the project; the socio-economic setting in which it takes place; living conditions, work-

ing conditions and recreational facilities; camp regulations, including conduct codes; safety, security and rules governing equipment use; and the nature of the bio-physical environment and the ways in which the environment is monitored. The Industry advises all employees of the laws and penalties governing the possession of illegal drugs and cooperates fully with the authorities in their work to enforce these laws.

Regular counselling services are made available to all employees. While at the worksite, personnel must behave in accordance with Industry security and discipline policy. All employees must abide by specific regulations in order to ensure that Industry personnel and assets are protected at all times.

9.1.3 TRAINING AND DEVELOPMENT

The objective of policies in this area is to develop a broad base of competently trained northerners to meet the Industry's operations requirements at all levels of responsibility. To this end, the Industry provides information to northern residents on training and employment. It also assists them in identifying their vocational interests and in appraising their skill levels. It gives first consideration to qualified northern residents when it selects trainees in order to help overcome longstanding employment barriers, as well as to encourage northerners to complete high school. The Industry encourages job progression by northerners. This is done by conducting on-the-job training as well as institutional training during the off-season.

The Industry works closely with communities and territorial governments, and keeps them advised of training and employment requirements. It supports government efforts toward providing facilities and training for northerners. The Industry is convinced that its record with respect to training and employee development is a sound one. Many northerners have benefited from its programs.

9.1.4 ECONOMIC DEVELOPMENT

The objective here is to ensure that the national interest of resource development recognizes the long-term interests of northern residents. The Industry is planning its land use requirements, and is sponsoring and undertaking appropriate research on the northern environment.

To promote northern business involvement in its operations, the Industry works closely with local businessmen, development corporations, and government. It makes use of local business, having spent millions of dollars on local purchases in the Beaufort region and the north in general during past years. The Industry encourages the establishment of new businesses in the Beaufort region where existing local services are not available to meet its needs.

Representatives of the Industry meet with Chambers of Commerce, or similar groups, on a regular basis, as well as with local councils and residents, to ensure that all groups are informed of development plans, and to allow businessmen lead-time to plan the provision of goods and services. The Industry maintains current lists of northern suppliers and is active in the identification of future opportunities that may be of special interest to such suppliers.

9.1.5 SOCIAL AND CULTURAL SUPPORT

The Industry has a sound record of recognizing its social responsibilities to the residents and communities of the north, and has always been concerned about the strain that its activities could place on the lifestyle of northern people. It has worked closely with northern people, local governments and the native organizations, to identify key areas for resource harvesting, and sites that are of historic and cultural importance. Wherever possible, the Industry has worked with local groups to determine and develop the most suitable scheduling and location of project activities in order to minimize impact on people as well as on terrestrial and marine wildlife.

While Industry has attempted to maximize benefits accruing to community residents through employment and business programs, it also recognizes that problems can follow from development. Whenever possible, it has worked closely with territorial officials and local people to develop solutions to the problems that have arisen. The Industry is particularly concerned that the transition to wage employment, increased income, and the influx of southern people and values, have had a disturbing effect on some communities. To the extent possible, it has ensured that its employees and contractors are mindful and respectful of regional values and lifestyles.

9.2 LONG-TERM COMMUNITY AND HUMAN RESOURCE DEVELOPMENT

The Industry wants northerners to have an opportunity to participate in the development of oil and gas resources. It is important that its objectives concerning the production and transportation of hydrocarbons, and the objectives of other groups active in the region, such as municipalities and native organizations, are not strongly at variance. In cooperation

with various levels of government, the Industry sees itself providing a major impetus for economic and social development, by employing local people, contributing to the local pool of skills and experience, and buying local goods and services. The Industry proposes the foregoing out of recognition that healthy, productive and harmonious relations with the people and communities of the Beaufort Sea region will serve everyone's long-term interests, including its own.

There should, however, be no complacency about how easy some of the circumstances which now prevail in the Beaufort region will be to overcome. Conflicting views exist in the region around the questions of economic and political control; many people are under-educated in terms of modern needs; health problems persist; alcoholism and other social disorders are prevalent; housing, health, education, and social services require continued subsidization. The Industry has not been overly affected by such matters to date because its operations have thus far been of a more limited scale and generally seasonal. However, if left unresolved, they could in future raise obstacles to the effective conduct of industrial activity and development.

The following proposals could not, in most cases, be implemented without extensive consultation and cooperation among government, local people, the Industry and other groups. As appropriate, the Industry will participate in discussing them with government, local people and regional groups, and will assist in implementing them.

9.2.1 COMMUNITIES AND CAMPS

9.2.1.1 Regional Considerations

The main shorebases that the Industry may develop, or continue to develop, over the next 20 years could include:

- Inuvik,
- Tuktoyaktuk,
- McKinley Bay,
- King Point (or a similar location in Yukon), and
- other locations, depending on the general location of offshore drilling (eg. Pauline Cove, Y.T., or Wise Bay - Summer Harbour, N.W.T.).*

* In addition to the main shorebases, the Industry will continue to need advance camps and staging areas such as Bar C and Swimming Point, usually on a short-term basis.

To the maximum degree possible, Industry facilities at the foregoing locations will be established only after consultation with government and local communities.

At Inuvik and Tuktoyaktuk, if desired by residents, it would be possible to integrate Industry activity and residential requirements with those of the community to a large degree. By the year 2000, Tuk Base and other camp facilities at Tuktoyaktuk could, in considerable measure, be operated by people who live in, and work out of, the community. Inuvik could be the principal residential and management centre for Beaufort Sea operations. If desired, Inuvik could also become a principal centre for support and service companies, as well as of considerably expanded government operations.

The other sites mentioned, if and when developed, would likely be operated as year-round camps. Employees from Beaufort communities would be flown to and from the sites on regular rotation in the same manner as southern employees. Hiring would take place only at the communities, not at the worksite. Employees would be returned to their home communities at the end of a work period.

All of the locations mentioned above may require airstrips capable of year-round, all weather operations. Depending on requirements, such airstrips may have runways and terminal facilities of sufficient size to accommodate large passenger aircraft. At some point, it is possible that Tuktoyaktuk and Inuvik would be connected by an all-weather surface road. McKinley Bay would continue to have at least winter road connections with Tuktoyaktuk. King Point in the Yukon, if developed, would likely be serviced at least initially by winter road and possibly eventually by a year-round road linking it with the Dempster Highway.

9.2.1.2 Facilities At Inuvik

Inuvik could be the major centre for permanent population growth associated with Beaufort development. Its growth may not be uniformly distributed over time, but may occur more rapidly in some years than in others. It would be important that annual population increments not exceed the community's ability to absorb people. This would depend on the availability of housing or serviced land for housing, and the capacity of infrastructure such as water and sewer systems, and of services such as education, health and shopping facilities. Such infrastructure and services would have to be provided before a period of more rapid growth to avoid overcrowding and over-use.

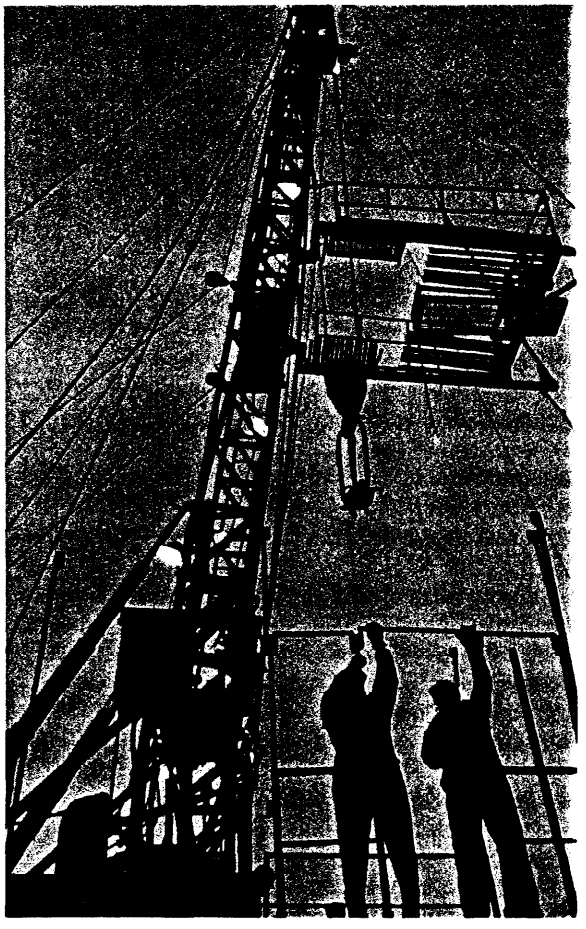


PLATE 9.2-1 *In the modern north, people are accepting that they can both work for wages and live by their traditions. Above, an industry worksite. Below, a traditional camp.*

Inuvik could become the main regional centre for operations management and administration of Beaufort Sea production. It could also become the principal location of technical, scientific and engineering support services that do not have to be located at the site of operations, or at shorebases directly supporting such operations.

(a) Residential Requirements

Inuvik's principal function within overall Beaufort operations will likely be limited to: operations management, supervision, administration; technical, scientific and engineering support; and operation and maintenance of onshore gathering and processing facilities. There would also be some accommodation for crews in transit to and from Industry camps and offshore facilities.

To fill managerial and support roles, many Industry employees would reside in Inuvik either permanently or temporarily. The Industry will ensure that accommodation is available for its employees. Industry experience at locations like Inuvik indicates that these employees will be a mixture of people with families, working couples without children, and single men and women. In many cases, wives may work as well as husbands, although both spouses would not necessarily be employed by the Industry. To accommodate such staff, a mixture of single family housing units and apartments would be required. Such housing would be integrated with the other housing of the community, as appropriate.

(b) Infrastructure Requirements

The term "infrastructure" denotes the assets that support life and activity in a community, and which link that community with others. It includes facilities such as roads, water and sewer systems, power, and the protection of property (fire and police). Infrastructure required for Industry purposes must conform with requirements outlined for Inuvik as a whole in the community plan.

Infrastructure must be provided in advance of the activity or residential requirements that it is intended to support. The principle that should be followed is that industry, and joint Industry-community requirements, should not be unduly impeded because of inadequate or insufficient infrastructure.

Among the categories of Inuvik's infrastructure, early attention would have to be given to water and sewage systems, whose capacity would soon become inadequate. Exisiting roads would have to be upgraded and new roads built as the community expands. There would be a requirement for greatly increased fire and police protection.

(c) Recreational and Cultural Requirements

No special recreational and cultural facilities would be built especially to service the requirements of Industry employees in Inuvik. All such requirements would be merged with those of the community as a whole, as expressed by an evolving town plan. These requirements would grow rapidly with population growth. The provision of facilities in sufficient quantity and to an adequate standard could have a large bearing on the quality of life in Inuvik during years of more rapid growth.

(d) Health and Education

Industry health and hospital requirements can be merged with community requirements. The Industry will carefully estimate its demands on Inuvik health facilities on a five-year basis and work with the town so that its needs can be met. It is not expected that permanent camp locations would impose more than a minimal demand on Inuvik services. Camps will have their own emergency treatment facilities, and patients who are more seriously ill or injured would be flown south. Inuvik facilities would be used only if a substantial emergency arose or if the patient was a resident of the community.

With regard to education, the concern here is with physical requirements. Attention is given to more qualitative aspects later. The educational requirements of Industry employees' children should be provided by means of facilities available in the community. Such requirements* will be carefully estimated and introduced into the education planning process as appropriate.

Because of the vital role such facilities would play in the future of the Beaufort region, and because Industry employees would want their children to have educations comparable to those they would receive in the south, the Industry would support government action to ensure that educational facilities and staff at Inuvik are satisfactory.

Inuvik would appear to be a good location for the establishment of post-secondary vocational training facilities in the western Arctic. Some facilities already exist that could perhaps be used for such a purpose.

(e) Social Facilities and Services

Even with considerable planning and coordination, development of the scale envisaged for the Beaufort region during the next 20 years will engender social dislocation and disruption, much of which would focus on Inuvik. A variety of social services will have to be instituted and expanded to provide increased levels of personal and family support and to cope with problems such as marital and family breakdown, juvenile delinquency, alienation and depression, alcohol abuse, violence, and transience.

The Industry would adhere to the principle that the provision of social services is the general responsibility of government and the community. It would, however, like to comment on the special need for three types of facilities:

- an impact monitoring office,
- an information, referral and crisis centre, and
- transient facilities.

An impact monitoring office should be established in the near future to work closely with the community planning office and the various levels of government represented in the community. It would function, in part, to assist these bodies (and the public) in evaluating their services, identifying their accomplishments in dealing with change, projecting likely future needs, and exposing unanticipated outcomes of plans and activities. A number of examples for such an office exist, and Industry is prepared to work with the community to determine which approach would be most appropriate for Inuvik.

An information, referral, and crisis centre would serve to orientate residents to community services, to help with critical and immediate social and personal problems (family violence, potential suicide, abandonment of children, etc.), and to guide residents to existing services for longer-term assistance. Additionally, the centre, in cooperation with the impact monitoring office, could act as a centralized source of information about the community, thus relieving local leaders and agency personnel of some of the burden of responding to repeated information requests. The early construction and operation of a centre is important, if its usefulness is to be recognized by the community, and if the centre is to adjust to community needs.

The Industry would pursue a program of hiring personnel who are not northern residents, at southern centres. Nevertheless basic facilities for transients would be required because individuals, despite all possible discouragements, would venture north to seek employment or other opportunities.

As a member of the community, the Industry will be supportive of community efforts to plan and deal with rapid growth and change. It will make current information available to enable local and other government agencies to initiate preventative and pro-active, rather than reactive, measures. The Industry would also encourage its resident employees, as individuals and family members, to become active participants in community affairs and activities.

Additionally, the Industry will endeavour to make available to community libraries, materials concerned with community planning, social impact assessment, and documentation on other communities which have experienced the effects of major resource development.

9.2.1.3 Facilities at Tuktoyaktuk

Tuktoyaktuk is a small community with a population that is largely native, and it is important that its village lifestyle be maintained because local people have expressed a preference for such a lifestyle. While the community may grow because of Beaufort development, it should grow at a rate deemed appropriate by its long-term residents. In this volume it has been assumed that, by the year 2000, the total population of the community could be about 2,500. This growth would not occur, however, if the community chose to limit population numbers at a lower level by controlling access to the hamlet, or the supply of housing within Tuktoyaktuk itself.

The growth of Tuktoyaktuk can be limited if it does not undergo much further expansion as a shorebase for Beaufort Sea oil and gas activity. This would require that further shorebase expansion occur elsewhere; for example, at McKinley Bay or King Point. It would also require the building of a strong sense of identification between the community and local shorebase support facilities. Local people would have to see local base facilities as something in which they have a real stake. Individual companies may consider providing for a share of local ownership of shorebases and other facilities to meet this need.

While the Industry will always need temporary accommodation at Tuktoyaktuk, a proportion of the people now working there on rotation could reside in the community on a more permanent basis. Planning should be undertaken to not phase-out camps such as Tuk Base, but to phase them down — to have more become part of it. Provided that the community agreed, an objective could be that, by the year 2000, more than half of the people that work at local base than half of the people that work at local shore base facilities at all levels would reside at Tuktoyaktuk with their families. These people would be a mixture of people who are indigenous to Tuktoyaktuk and people from the south who would be willing to locate in the community for a few years.

With limited community growth and the gradual integration of the local industrial work force into the community, planning needs would be minimal and could proceed by discussion between the Industry, the hamlet's planning committee, and appropriate government officials. A community plan has been drafted by M.M. Dillon Ltd., and if it is accepted, the zoning outlined in it could provide the basis for future community development.

Finally, the ability of community residents to assume positions of leadership and authority would require continued development. Such development would necessitate cooperation among current leadership and other community residents, senior levels of government and their agencies, and Industry. The Industry recognizes that issues related to further development in education (in the broad sense), community planning, and service provision are best encouraged through programs which already exist in the community, or which would be available to it. Industry's role would include reinforcing the importance of local leadership, and proposing initiatives through continued consultation and cooperation with local authorities. In cooperation with government, it would also support educational programs which include management and life-skills components for its northern employees and community members at large.

(a) Residential Requirements

Housing requirements in the community would be dampened to the extent that future workers for base operations would be drawn from long-term native residents of the community who already have housing. However, the existing quality of housing in Tuktoyaktuk is generally poor. Conditions of considerable crowding prevail, meaning that even long-term resident employees could require assistance with housing needs.

New housing introduced into the community for Industry employees should be developed gradually, and integrated with existing residential areas to the extent possible, although some new land for residential purposes would be needed. Arrangements that suggest the division of the community into native and non-native sections should be avoided, though it must be recognized that more traditionally oriented native people may want to live in a part of the community that they regard as distinctively theirs.

(b) Infrastructure Requirements

There would not seem to be major immediate infrastructure requirements to handle growth in the short-term. An upgrading and expansion of facilities such as roads and the local sewage removal system would have to be undertaken to meet longer-term growth needs. A new water reservoir, adequate for the long-term, has recently been provided by the territorial government with the assistance of the Industry.

PLATE 9.2-2 *Modern accommodation facilities at Dome's Tuk Base can serve as a prototype for future Industry shore-base facilities. Above, exterior view. Below, cafeteria.*

(c) Recreation and Cultural Requirements

Recreational facilities are adequate for short-term needs. However, expansion and diversification might be required as the community grows. Within the hamlet, common facilities should serve both Industry and community needs.

With regard to cultural facilities, the people of Tuktoyaktuk have an interesting history which includes whaling, trapping, the DEW line, marine transportation and, recently, participation in oil and gas exploration. There are artifacts around town that reflect this history as well as the fact that the people are currently still strongly oriented to the land. Thought should be given to the development of a distinctive museum which would reflect both the past and living culture of the community. Such a facility could be developed in conjunction with an existing facility in Tuktoyaktuk such as the school or community hall.

(d) Health and Education

Treatment facilities for illnesses and injuries that are not serious, and first aid, are available at Tuk Base, and will continue to be available. If an increasing proportion of Industry staff becomes resident and the population expands, the community nursing station could, within the next ten years, become upgraded to a clinic capable of providing more extensive medical services.

The local school system is currently used to full capacity and would require limited expansion with any increase in population. Such expansion could be handled by incremental additions to existing facilities, and would not seem to require major additional buildings. Industry related training programs could continue to be provided at Tuk Base and other industrial facilities.

Expansion of the Tuk Alcohol Committee, and the education and training available to it, would enable the committee to broaden its services to community residents and to establish cooperative programs with area employers. Increased use of existing community facilities for social and recreational purposes could also assist in providing alternatives to over-use of alcohol and alcohol-substitutes. To the extent that alcohol use may be aggravated by seasonality and uncertainty of wage employment, growth of the wage economy and increased year-round employment may also alleviate some aspects of alcohol-related problems. Expansion of educational offerings regarding home and money management, and nutrition could also benefit the community.

Adult education programs would likely face increasing demands, as residents prepare to enter the wage economy, or wish to upgrade to take advantage of increased economic options. In addition, a broader spectrum of adult education programs would likely be demanded by members of families new to the region, who would bring from the south expectations of adult education as a supplement to recreation and other leisure-time activities.

(e) Social Facilities and Services

Even limited growth of the kind envisaged would place stress on the community, and facilities like an impact monitoring office and an information, referral, and crisis intervention centre may be needed. Given the limited growth anticipated for Tuktoyaktuk, such facilities would not be as elaborate as those envisaged for Inuvik. As far as possible, community residents should staff such programs.

Although Industry intends, through its hiring practi-

ces, to discourage speculative job-seekers from arriving at Tuktoyaktuk, some transients could be expected to come to the community. Limited facilities for transients would therefore be needed, although such facilities should obviously not be of a standard that would encourage transients to remain in them for any length of time.

Demands for day care services will likely increase with the growth of the community and increased participation in wage employment by women who have young children. While the demand for social assistance payments could be expected to decline as other sources of income become increasingly available, demand for counselling and other forms of family support would continue over at least the medium-term, as families of both long-term and new residents adjust to changing lifestyles.

9.2.1.4 McKinley Bay, King Point and Other Permanent Camps

(a) Functions

Onshore camps will be located and designed so as to minimize adverse environmental effects and interference with traditional activities. The camps will be enclaves, and access to them from regional communities will generally be difficult. Unless desired by the communities, personnel at the camps would be discouraged from visiting communities for purposes not directly related to their jobs.

These permanent camps will perform the following functions:

- accommodation and services for Industry personnel working within the activity range of the camp;

- transfer of personnel from north/south to onshore/offshore shuttle aircraft;

- storage and transshipment of materials required in offshore exploration and production activities;

- limited involvement in meteorology, environmental monitoring and other technical support;

- overwintering of vessels.

Most of the foregoing functions will have to be performed year-round, although logistical activity dependent on seasonal barge traffic will peak during summer.

The following proposals deal only with matters affecting personnel located at, or in-transit through, the permanent camps.

(b) Accommodation

When they are fully operational, there will be ample provision for all on-site personnel year-round at each permanent camp. Personnel would generally work on a suitable rotational schedule, and the standard of accommodation and meals will be appropriate to the working conditions and isolated circumstances.

One of the most important functions of the shorebases will be the transport of personnel to and from offshore activity sites, a procedure which will at times be subject to problems such as adverse weather or the mechanical breakdown of aircraft. Extra accommodation will be provided for such special needs.

(c) Recreation

This will be provided to a standard suitable for the isolated circumstances under which people will be required to work and live. As is currently the practice of several oil and gas companies, some of the camps would be dry. Camp residents will not be permitted to have firearms.

(d) Medical Facilities

These would be provided to a suitable high standard. More serious illnesses or injuries would be handled at Inuvik or in the south.

9.2.2 BUSINESS DEVELOPMENT

The Beaufort Sea region is currently a costly place to do business. The reduction of current high costs can only come about through the creation of a more diversified, less isolated and more competitive market and business sector. This will take time and would require substantial encouragement.

The Industry believes that the general forms that such encouragement should take are as follows:

- The provision of opportunities for industrial and commercial development by regional residents. Such encouragement would not invalidate the importance of the regional non-industrial economy, but it would recognize that industrial growth, generated by oil and gas development, would be a strong factor in the life of the region over forthcoming decades.

- The establishment, at the territorial or regional level, of a number of business support programs or measures which are now widespread in the rest of Canada, but not generally available to northerners.

- The generation of income to provide cash flows

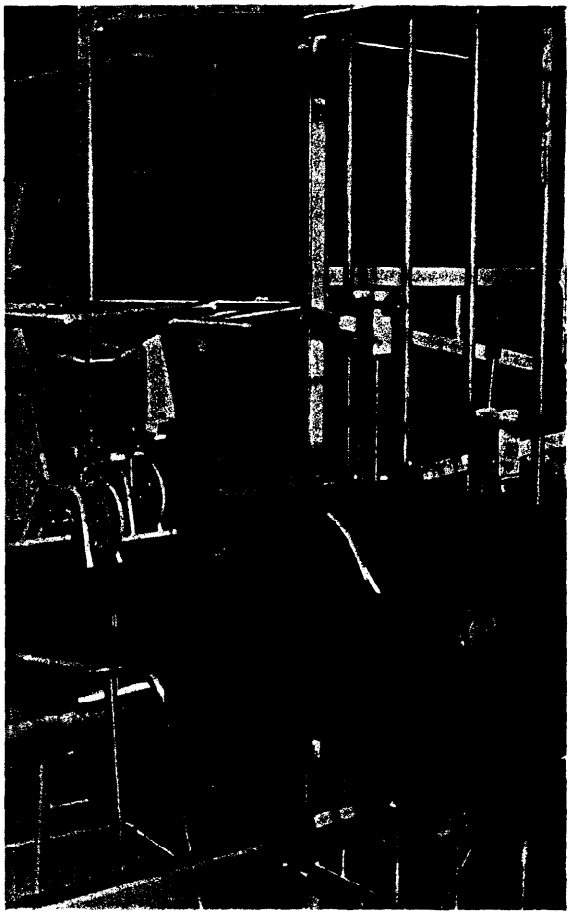


PLATE 9.2-3 *Recreational facilities are a must for rotational workers living at a base camp. Above, the weight room at Tuk Base. Below, part of the pool/ping pong area. Courtesy: J. Cheng.*

for reinvestment in a variety of ventures, including joint ventures.

- The development of a greater and higher quality resident business expertise.

- The development of appropriate business strategies for both native and non-native people.

Some proposals for attaining the foregoing objectives are outlined as follows.

- The policy of giving competitive regional suppliers first consideration with respect to the purchase of goods and services will continue.

- The Industry will encourage joint ventures between regional and southern firms. The intent of such ventures would be to raise the level of expertise within the region and to make more venture capital available.

- Within reason, the Industry will encourage southern firms which do business in the Beaufort region to open establishment within the region.

- The Industry will encourage training programs and seminars if regional businesses show a sufficient interest. Such programs would be operated in cooperation with the governments of the Northwest Territories and Yukon Territory. Similary, the Industry will encourage the development of regional residents with managerial and entrepreneurial talent.

9.2.3 EDUCATION AND HUMAN RESOURCE PLANNING

The economy and technology of the Beaufort region is changing, and job-related educational requirements are rising. They would seem to be rising more rapidly than the educational and training standards most northerners, and especially native northerners, attain. Unless this is rectified, the increasing gap between educational attainment and job requirements can only result in northern people holding unskilled, or at best, semi-skilled jobs in a more industrialized Beaufort region.

The Industry believes that industrial wage employment will become an increasing necessity for Beaufort people, especially for the people of the Mackenzie Delta. It believes that people must be equipped in terms of education and training to take jobs at increasing skill and responsibility levels. It concedes that present educational problems are of a difficult character, but insists that, with effort and will, they could be resolved by the year 2000, with substantial progress by 1990.

Education should be more directly relevant to employment needs and opportunities available in the Beaufort region. The Industry will cooperate in the implementation of such educational plans which encourage local residents to undertake training for industrial or business careers.

PLATE 9.2-4 *An important objective of policy must be to ensure that northern children are able to obtain an education that enables them to qualify for a career with the oil and gas industry, if that is what they choose.*

The Industry will support and encourage government to take strong initiatives with respect to the emerging educational needs of the Beaufort Sea region and the northern territories as a whole. The Industry could assist government by measures such as offering its own facilities for training programs.

9.3 INTERACTION WITH TRADITIONAL HARVESTING

9.3.1 SUBSISTENCE ECONOMY

The Beaufort region has been the locale of renewable resource harvesting for thousands of years. Currently, the local native economy is of a mixed character; native people work for wages and use a portion of the income from such work to purchase capital goods needed for a land-based lifestyle. Even though a shift toward increased industrial employment is likely because populations are growing, expectations are rising, and more people are becoming interested in working for wages, a way of life involving renewable resource harvesting will continue to be a strong factor in the villages of the region in the future.

The Industry sees the continuation and strengthening of a village based hunting-trapping-fishing economy as important. With the traditional economy as a genuine alternative, residents should have a range of choice in how they could make a living. Some individuals may wish to remain on the land full-time, others may wish to balance wage employment with harvesting activities, while others may feel suited to full-time wage employment. Industry also believes that its own activities can be carried out in a manner that does not compromise the long-term viability of the native economy. Industry can promote environmental awareness among its employees and can influence, through internal policies, the activities of its personnel with respect to hunting and fishing.

The hydrocarbon sector will spearhead industrial growth in the Beaufort Sea region but it will not be the only growth sector. With population increase, demands for recreational lands will grow. Land use conflicts may arise as these demands are met, and pressures of the kind identified in Section 8.6 could have implications for the native traditional economy. To deal with these possible consequences of growth, government policies would be needed. To be specific, if government wishes to encourage the tourism industry, policies will be needed that consider tourism in the context of the energy industry, the fur industry, native harvesting, wildlife management, and preservation of a healthful environment. Sound development of the Beaufort region requires comprehensive planning on the part of government.

In general, the Industry believes that, as Beaufort oil and gas development proceeds, a number of problems and concerns could arise with respect to native harvesting, and these are briefly discussed below:

- There is an increasing tendency to harvest, and probably overharvest, lands that are reasonably close to communities and that can be reached in about a day's travel. Because of their importance to the communities, the Industry will be especially careful to prevent any of its activities from having a negative effect on the productivity of such lands.

- Improved access encourages activities that could influence traditional harvesting activities. Industry will consult with native organizations and hunters and trappers when planning the locations of connecting roads and pipelines. These will be located and managed so that they provide controllable access to important harvesting areas and avoid critical areas.

- Special consideration should be given to an all-

weather road which may eventually connect Inuvik and Tuktoyaktuk, as it would pass through the Mackenzie Reindeer Grazing Reserve. Measures would have to be initiated to control poaching.

In light of the above, the Industry will work with the communities, native organizations, and the Wildlife Service in the identification of areas within proposed development zones or corridors that are important to renewable resource harvesting and in devising methods of protecting such areas.

- Since ship tracks in ice resulting from increased see traffic have been perceived to potentially impede or inconvenience winter ice travel by trappers and hunters in the vicinities of, for example, Tuktoyaktuk, North Point, and Prince of Wales Strait, Industry has initiated a program in cooperation with local hunters and trappers to assess this concern and will continue efforts to evaluate and minimize potential problems of this nature.

- Local hunters are concerned that increased marine traffic may impede the movements of whales towards their traditional whaling camps. Industry will continue to carry out surveillance and monitoring programs and support research directed at minimizing these effects, should they arise.

The Industry is concerned about the possible effects of its marine activities on marine animals and the people that hunt those animals, and will take all possible precautions to minimize adverse disturbances.

- More knowledge is needed concerning how animals are disturbed or displaced by development related activities or what happens to them if they move to alternative habitat. Industry will continue to support disturbance studies, particularly as they relate to hydrocarbon activities so that the nature of possible effects is better understood.

- To minimize harmful effects on wildlife populations, the Industry will support mitigation studies. It will supply information to the people conducting such studies on the nature of its activities so that realistic simulation studies may be designed.

- If wildlife populations important to people must be displaced, this may not be harmful if alternative habitat is found or created. Industry will cooperate with appropriate government agencies, and hunter - trapper associations in undertaking studies designed to learn how to make habitats more suitable or biologically productive for wildlife populations.

The Industry will examine appropriate controls and assist authorities and research bodies in studies of wildlife populations important to the native economy. Volume 7 of this EIS should be consulted with respect to proposed Industry research programs.

- Native people do not welcome increased competition for wildlife resources that may come from Industry personnel and other newcomers to the Beaufort Sea region. The Industry will require that its personnel comply with prevailing game regulations.

- The governments of the Northwest Territories and Yukon Territory should consider the creation of policies that would control the harvesting activities of an expanded non-native population. More people will need to be hired to control hunting, and to ensure that the native interest in the animal resources of the Beaufort Sea region is not undermined. Native people could be trained and employed as game officers.

- Other industries such as tourism and sports hunting and fishing may develop along with the energy industry, and in the long-term have a much greater impact on the renewable resource base than oil and gas resource exploitation. It would seem advisable to develop policies concerned with the location, type, and growth of tourist camps, and sports hunting and fishing camps. Because of their potential for undermining traditional activities, they should not be located where they may interfere with native harvesting.

- In the vicinity of Inuvik and Tuktoyaktuk, recreationists may disturb ratting, whaling, other traditional activities, camps, and the distribution and movements of wildlife. Appropriate policies would need to be devised by government to address and, to the extent necessary, control recreational use.

- A by-product of further development would be facilitated access to remote harvesting areas by local people. This factor, coupled with increased purchasing power for skidoos, all-terrain vehicles, rifles and canoes, would allow local people to harvest wildlife more efficiently. The territorial governments and local hunters-trappers associations should consider policies that would control the harvesting activities in areas where overharvesting could occur.

Many of the foregoing potential problems and concerns are only indirectly related to prospective industry activities. They are fully within the jurisdictions of the federal and territorial governments, but the Industry will try to assist government, wherever possible to deal with their direct and indirect effects.

9.3.2 COMMERCIAL RENEWABLE RESOURCE HARVESTING

The prospect of increased growth in the Beaufort Sea region brings with it the possibility of larger regional markets for the products of commercial resource harvesting (such as fish and reindeer meat) and, as a result of improvements in the transportation system that will come with Beaufort Sea development, better and, perhaps, cheaper access for such products to larger markets in the south.

Industry is prepared to work with interested groups and communities to facilitate the expansion or development of Industry markets within the Beaufort region. The development of small local industries could encourage residents to remain in their communities and not migrate to the more rapidly growing centres of the Beaufort Sea region.

However, while it is recognized that the commercial harvesting sector of the regional economy is currently underdeveloped, there is a question of how large an increase in harvesting many fish and animal populations could stand without affecting their long-term survival. Wild species which have commercial potential would be limited in number. They would include caribou, musk ox, and whitefish. They could also include some fowl. Some of these species are already subject to considerable harvesting and, as the population of the Beaufort region grows, harvesting could begin to encroach on reproductive capability. Adding commercial harvesting to subsistence harvesting could affect the resource.

Potential may exist for considerable increases in harvests from the privately owned and commercially operated reindeer herd in the Mackenzie Delta and Tuktoyaktuk area. The present owners of the herd have suggested that it might be feasible to transfer two to three thousand animals from the herd to a new site and create an additional reindeer industry where none now exists. (Nasogaluak and Billingsley, 1981). Earlier studies of, and aspirations for, the reindeer herd saw it as a large and productive enterprise. Whatever the merits of such ideas, the reindeer project is an example of a modern industry that stands in contrast to both highly mechanized activities such as oil and gas development, and increasingly marginal subsistence hunting, trapping and fishing. The proposed Mackenzie Delta and offshore fishery that the Inuvialuit Development Corporation is attempting to develop could be an activity with similar possibilities.

9.4 LAND USE PLANNING AND COORDINATION

The Industry is willing to assist government in its task of planning and managing the use of the Beaufort region's lands, especially in cases where land-use conflicts might arise directly or even indirectly from the Industry's development proposals. It has already made suggestions to government concerning potential lands it may require as corridors for pipelines and as locations for additional shorebase facilities.

It is hoped that current work underway within the Department of Indian and Northern Affairs toward the establishment of a land use planning process will provide an effective framework within which Industry plans and proposals can be given fair consideration along with other regional needs, and that such a framework will be available at an early date. It is assumed that the proposed planning process will provide for full consultation by all of the parties interested in development. It is also hoped that the process will have a capability for resolving problems expeditiously to the mutual benefits of all interested parties.

CHAPTER 10
NORTHERN SUPPLY REGIONS

While this volume is structured to focus on the oil and gas production region and tanker and pipeline outhaul routes, consideration must also be given to other northern regions which could play a significant ancilliary or supply role in Beaufort development. Two regions could be especially important in this respect: The Yukon Territory and the Great Slave Lake area, especially Yellowknife and Hay River. The Great Slave Lake area is considered in Chapter 11, which deals with the Mackenzie Valley pipeline route and therefore will not receive full discussion here. The Yukon Territory is, however, dealt with at some length.

Four eastern Arctic communities, Resolute, Arctic Bay, Pond Inlet and Grise Fiord, lie along the Northwest Passage portion of the Eastern Tanker Route and are therefore examined in some detail in Chapter 5. Other Arctic communities which could also be affected by Beaufort development, especially by means such as the employment of local residents, will also be discussed in this chapter.

10.1 YUKON

10.1.1 GEOGRAPHIC AND HISTORIC OVERVIEW

Yukon occupies the extreme northwest corner of Canada, and is bounded by British Columbia on the south, the Northwest Territories on the east, Alaska on the west, and by means of a 200 mile stretch of coastline, the Beaufort Sea on the north (Figure 10.1-1). The territory has an area of 533,540 square kilometres. Much of the terrain is mountainous, with the St. Elias Range, located in the extreme southwest, containing the highest mountains in Canada.

The waters of Yukon flow into several drainage basins. The most important of these, and the most central fact of the geography of the territory, is the

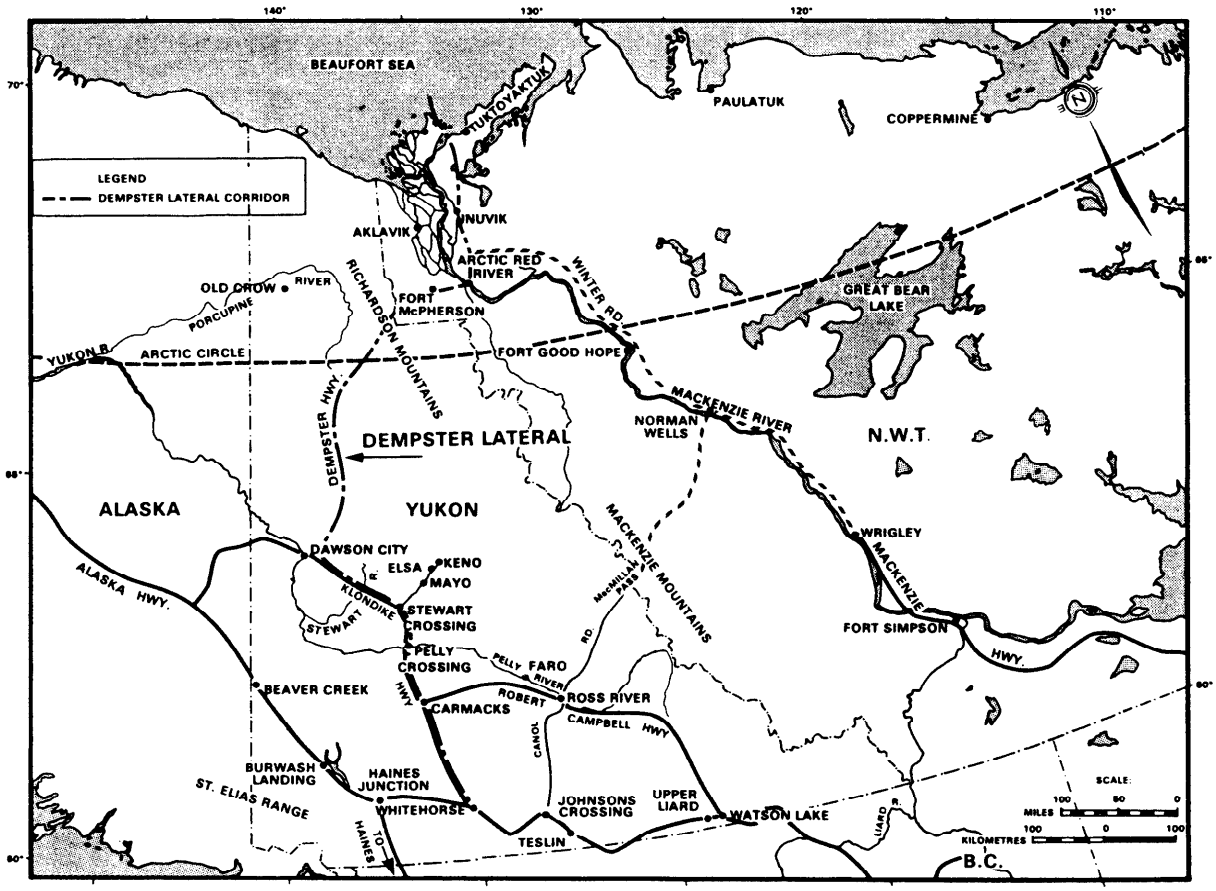


FIGURE 10.1-1 *Regional setting: Yukon.*

Yukon Basin. The Yukon River arises in an extensive lake system in northwestern British Columbia, flows through Whitehorse, Carmacks, and Dawson, and then westward through Alaska. Many of the other major rivers of Yukon, such as the Pelly, Stewart and Porcupine, flow into the Yukon River. Other major drainage basins include rivers which flow northward from the Mackenzie and Richardson mountains and either directly to the Beaufort Sea, or to the Beaufort Sea via the Mackenzie River, and rivers which flow southward into the Liard and then to the Mackenzie.

The large majority of people of Yukon live in the southern part of the territory. Whitehorse alone accounts for nearly 70% of the population. Other significant centres are Watson Lake, Faro, and Dawson. All of the communities of Yukon except Old Crow are now connected by an all-weather road system.

Yukon has gone through several distinct periods of history, and has a very long prehistory. Evidence of man in the vicinity of Old Crow indicates habitation as long as 30,000 years ago and perhaps longer. The present Indian population, most of which is of the Athabascan linguistic stock, has probably lived in the region for at least 8,000 and perhaps 10,000 years. The fur trade first entered the region in the early 19th century when, via Tlingit middlemen, Yukon Indians traded with Russians who occupied positions along the coast in what was then Russian Alaska. Hudson Bay trading posts in Yukon date from 1842 (Fort Frances) and 1848 (Fort Selkirk). Fort Selkirk, which was located near the junction of the Pelly and Yukon rivers, was captured and razed in 1852 by Chilkat Indians because it was undermining their trading monopoly as brokers for the Russians.

The fur trade in Yukon integrated native people into an externally controlled economy that supplied them with new technology and trade goods in exchange for furs. However, it did not fundamentally change their relationship to their lands. They could continue on as renewable resource harvesters, having added another activity to their economy, that of trapping. As in other parts of the north, trapping remained viable and even prosperous until the collapse of fur prices in the 1940's.

The history of Yukon typically takes as its high point the Klondike Gold Rush, which lasted for only about four years. What occurred during that brief period changed the region permanently. At its height, Dawson was the largest Canadian city west of Winnipeg, having had a population of almost 30,000, which is more than the present population of Yukon. By 1910, the gold rush population had left and Yukon had achieved a more or less stable population of some five to six thousand people.

The Alaska highway, built in the 1940's, ushered in the modern era of Yukon development. Its construction was accompanied by the construction of other major war-time facilities - the airstrips of the northwest staging route, the Canol road, and the Canol pipeline. Whitehorse was the leading activity centre. Almost overnight, its population rose from about 700 to 40,000. During the height of Alaska highway construction, many trappers gave up their trap lines and moved near the construction camps. The old pattern of settlement had been based on the principal Yukon waterways, but the new pattern tended to follow the easier means of transport offered by all-weather roads. The Alaska Highway created new roadside settlements such as Beaver Creek, Haines Junction, and Watson Lake. It resulted in the growth of Indian settlements at Upper Liard, Teslin, and Burwash Landing (Lysyk, 1977).

The highway boom of the 1940's was followed by mining development and the construction of other roads in the 1950's. Mining development came into its own in the 1960's, but only with substantial government aid. By 1967-1968, the now defunct Clinton Creek asbestos mine had opened with $4 million in government assistance. The government paid one-third of the cost of bringing the large Cyprus Anvil lead-zinc-silver mine near Faro into production in 1969 (Department of Regional Economic Expansion, 1978).

The economy of Yukon has now became quite diversified, its government complex and sophisticated, and its population cosmopolitan. However, the fortunes of the territory are still for the most part based on industries that are vulnerable to world market trends, such as mining and tourism. It would therefore seem logical that the next phase of Yukon development should include attempts to increasingly diversify the economic base into other areas. It is hoped that Beaufort oil and gas development might offer possibilities in this respect.

10.1.2 POPULATION AND LABOUR FORCE

As noted previously, the population of Yukon is concentrated in the south, with Whitehorse being the principal and only major population centre. Table 10.1-1 and Figure 10.1-2 summarize population data for the 1976-1981 period.

The Yukon population falls into several categories which are not especially distinct because there has, over the decades, been a considerable mixing of populations and ethnic groups. Native people comprise about one quarter of the population. Another component of the population consists of long time non-native residents who were born in Yukon and whose parents may also have been born there. Still others

TABLE 10.1-1

YUKON POPULATION 1976-1981

	1976[1]	1977[2]	1978[3]	1979[4]	1980[4]	1981[4]
Yukon	21,836	23,113	23,306	24,007	24,138	25,121
Whitehorse	13,311	15,157	15,455	16,191	16,362	17,023
Faro	1,544	1,619	1,557	1,633	1,668	1,869
Watson Lake	1,167	1,244	1,354	1,360	1,374	1,398
Dawson City	838	1,033	1,034	1,118	1,109	1,252
Elsa	456	583	601	574	609	519
Mayo	447	477	486	479	489	474
Ross River	371	219	222	232	257	265
Carmacks	346	292	321	330	339	351
Haines Junction	268	343	397	426	451	468
Carcross	250	253	263	303	263	274
Clinton Creek	246	564	493	—[5]	—	—
Teslin	241	350	353	372	355	363
Old Crow	224	183	197	212	215	219
Beaver Creek	221	116	105	117	121	102
Pelly Crossing	135	96	102	104	112	127
Destruction Bay	72	56	63	65	70	75
*Other	1,699	528	303	491	344	342

Source:
[1] Census Canada
[2] Population @ August 1977 - Health Care Records
[3] Population @ July 1978 - Health Care Records
[4] Population @ June 1979, 1980 & 1981 - Health Care Records
[5] Mine closed in 1978

*Includes Burwash Landing, Keno, Stewart Crossing
(Table taken from Yukon Economic Review, September, 1981)

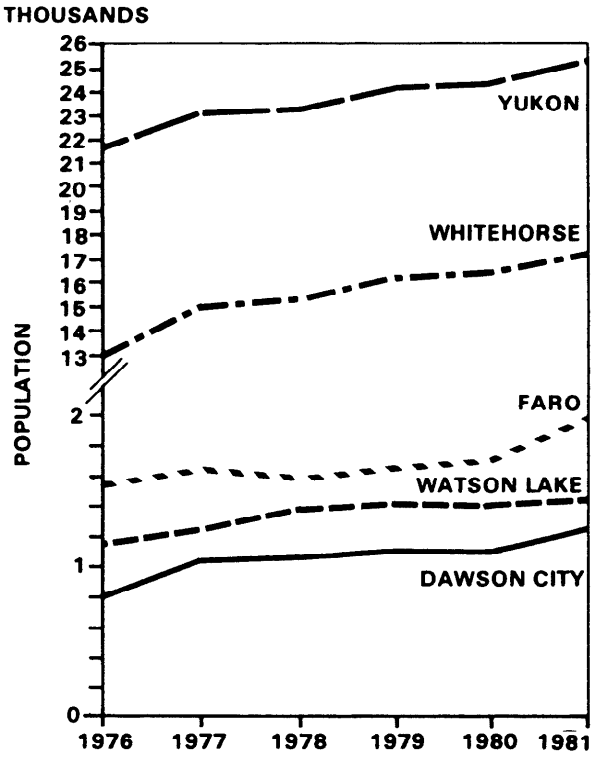


FIGURE 10.1-2 *Yukon population 1976-1981.*

can claim to be long-term Yukon residents by virtue of now having lived there for many years. However, as might be expected in a frontier region, newcomers comprise an important part of the population. The newer elements of the population are quite diverse. They range from people who have come to the Yukon to make a quick stake to people who are there because of the still relatively unspoiled environment.

Because of their diverse backgrounds, Yukoners are likely to take sides strongly on issues which arise out of development. While some segments of the population would welcome Beaufort development or indeed any form of industrial development, others would strongly oppose it. Native people are often caught somewhere in the middle. The position they have tended to take is that they do not always look upon industrial development with disfavour and indeed want to benefit from it, but they are primarily interested in maintaining their way of life and entrenching it in a land claims settlement.

During the past two years the labour force of the Yukon has ranged from a low of 8,571 in December 1980, to the high of 11,766 in August 1981, according to territorial government data. It thus comprises about 40 to 45% of the total population. While much of the labour force is skilled and mobile, native people tend to be underemployed and often lack skills required for modern employment. Training programs would be needed before a significant number of native people could participate in Beaufort development.

10.1.3 THE ECONOMY

10.1.3.1 Overview

During recent decades, the level of economic activity in Yukon has been closely related to two central trends - growth and fluctuations in the mining industry and the growth of government. Tourism has been a third basic force in the economy, though it has been less economically important than government and mining.

Secondary and tertiary economic activities have responded to trends in mining, government and tourism. As government and mining grew, so grew a variety of regional industries, especially residential and non-residential construction, the supply of a variety of contracting services related to mining, and transportation. As income grew, and the Yukon economy became more complex, the service sector expanded. Table 10.1-2 shows employment by economic sector.

Because of its severe and prolonged winter, the Yukon economy experiences a considerable seasonal cycle. In 1980, for example, the unemployment rate went from a January level of 16.6% to the annual low of 4.5%, which occurred in July, to the annual high in

TABLE 10.1-2

EMPLOYMENT BY ECONOMIC SECTOR: YUKON

Sector	No. of Full-Time Employees, January, 1981
Mining	1191
Forestry	42
Construction	476
Service	2385
Transportation	636
Communications and Utilities	462
Government	3556
Other[1]	170[P]
Total	8918

[1]Hunting, fishing, trapping, agriculture, and summer students.
[P] preliminary figures.

Source: Yukon Economic Review, September, 1981

December of 20.8% (Government of Yukon. Undated b). There is a corresponding seasonal cycle in the number of unemployment benefit claimants, who are considerably more numerous in winter than summer (YER, 1981). It should not be inferred, however, that there is much economic hardship in Yukon, at least among non-native Yukoners. Indeed the case may be otherwise, even given the relatively high price structure residents face. Average earnings in Yukon have, during recent years, tended to remain some 35% to 40% higher than the Canadian average (YER, 1981). While this would to a degree reflect higher compensation needed because of higher living costs, it would also reflect the high productivity of labour in the capital-using, mechanized and relatively modern mining and transportation sectors of Yukon industry. Available comparisons indicate that Yukon per capita gross domestic product tended to hover some 50% above the Canadian average during the 1967-77 period (YER, 1967-77).

The economy of Yukon is not only distinctly seasonal in character, it is also more subject to longer term cycles than most regions of Canada. The economic forces which affect its year-to-year growth and stability are largely determined outside its boundaries, and the territory cannot exercise any strong control or influence over such forces. Of the two leading sectors, government and mining, the latter tends toward an often unpredicatable volatility, with both investment in production and exploration responding to changes in world mineral prices. The cancellation or deferment of production or exploration plans can have a major effect on the regional economy, as the current business climate demonstrates. Government represents a stabilizing force in the economy, but being bound to long-term fiscal planning that also takes years to develop, it is typically unable to respond quickly to downturns in the private sector.

Most recently, Yukon has found itself in a multi-year cycle arising from the proposed construction of the Alaska Highway Pipeline. When it was first announced, this proposed project generated a flurry of activity lasting two to three years. Among other trends, population grew, especially in Whitehorse, and the real estate market boomed. A decline in activity ensued when it became apparent that the pipeline could be delayed by several years.

Despite ups and downs, the modern sector of the Yukon economy (which does not include renewable resource harvesting by native people) does not have a chronic unemployment or underemployment problem. The territory is fortunate in that its labour force, with the exception of many native people, is highly mobile. Typically, during periods of growth, outsiders have moved into the territory to take jobs, and just as typically, during downturns, many of these people have moved out of the territory. A substantial part of the territorial labour force still does not regard the territory as a permanent home, but as a place to work for a while and make a stake. Yukon thus imports much of its labour and exports much of its unemployment.

Such behaviour is not, of course, characteristic of the native people to whom Yukon is a homeland nor of the non-native families who have now lived in the territory for two or three generations. Neither of these groups can look at Yukon as a place of transience. The native people are in an especially disadvantaged position. They tend to be undereducated and unmotivated with respect to most modern activity, especially the highly mechanized industrial activity that has been characteristic of Yukon. Because they have not been able to find a place in the modern economy, and because the traditional economy is no longer sufficiently productive, government assistance is an important factor with respect to many native people. They are currently actively pursuing a settlement of their claims, and economic development instruments which may arise out of such a settlement could have a major positive effect on their lives.

Although they have changed greatly during their long interaction with non-native people, many native people are still active in the traditional hunting, trap-

ping and fishing economy. Viewed from a regional income perspective, the value of the products of the traditional economy may not be large, but, as is the case in all northern regions, its cultural and social value should not be underestimated.

10.1.3.2 Sectoral Review

This section briefly describes each of the major sectors of the Yukon economy and makes an assessment of how these sectors might be affected by Beaufort development.

(a) Government

Government is a major presence in the Yukon economy. In September 1981, government employment at the federal, territorial and municipal levels totalled 3,836 persons, or 33% of the employed labour force. About 15% of the entire population is currently employed by one of the three levels of government (YER, 1981).

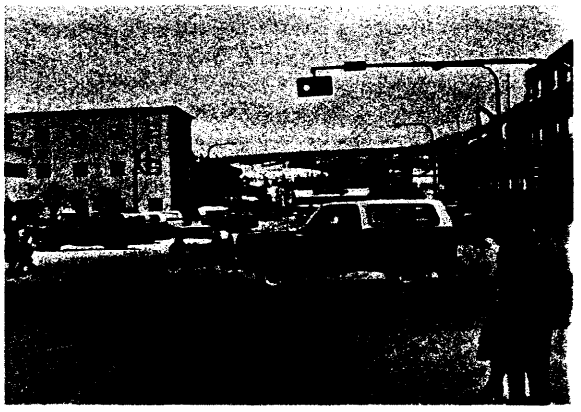


PLATE 10.1-1 *Whitehorse, capital of Yukon. Businesses in Whitehorse have already benefited from Beaufort exploration, and because of the Dempster Highway link with the Mackenzie Delta, should benefit greatly as oil and gas development proceeds.*

The Federal Government is represented in Yukon by several departments, reflecting the fact that the ownership of Yukon lands is still largely federal, that the Federal Government is responsible for mining and oil and gas activity, and that, in cooperation with the territorial governments, it conducts national programs such as manpower training and regional expansion. The Territorial Government has a broad range of responsibilities, ranging from renewable resources (including game management), through education, health, and the maintenance of the territorial highway system (though not the further expansion or upgrading of that system, which is a federal responsibility). With the exception of the City of Whitehorse, the powers and responsibilities of local governments tend to be quite limited.

The Territorial Government is the major employer, employing more than half the government labour force. Education and Recreation (741 employees), Health and Human Resources (243 employees), Highway and Public Works (451 employees) and Justice (132 employees) are the largest territorial departments. The largest federal department is Indian and Northern Affairs.

There is an indication in longer run data that the importance of government as an employer and perhaps, therefore, as an economic sector is decreasing. Available data show that salaries and wages paid in the "public administration and defence" sector declined from 53% of total Yukon wages and salaries to less than 40% during the 1967-77 period (Table 10.1-3). This decline would reflect the growing economic importance of other activities such as mining, transportation, tourism and the service industries.

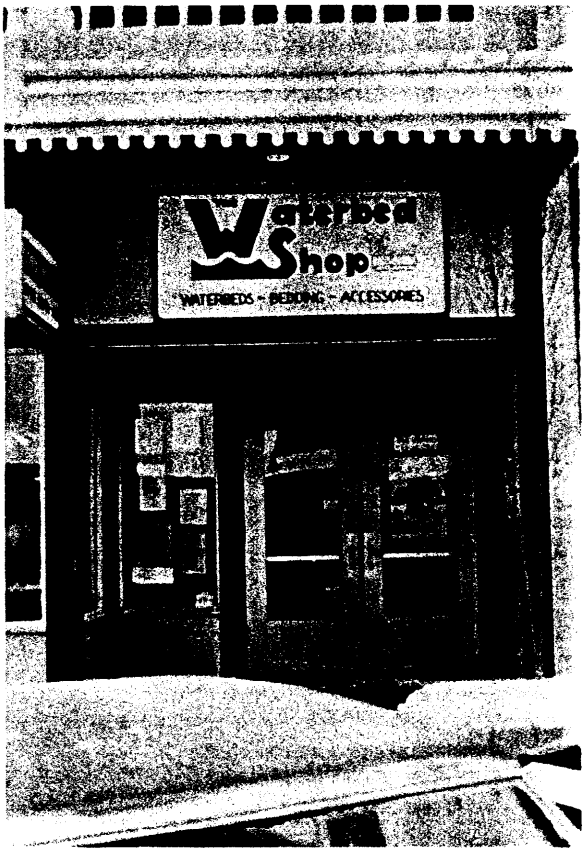
TABLE 10.1-3

WAGES AND SALARIES
PUBLIC ADMINISTRATION AND DEFENCE
1967-1977

	PA & D ($000)	Y.T. Total ($000)	% PA & D
1967	14,761	28,270	53
1968	17,075	35,316	48
1969	18,895	41,458	45
1970	19,560	50,242	39
1971	22,381	53,436	42
1972	27,952	63,159	44
1973	30,436	68,480	45
1974	38,152	84,726	45
1975	41,200	112,860	37
1976	47,530	122,141	39
1977	55,056	145,483	38

Source: Yukon Economic Accounts, 1967-1977.

It is unlikely that Yukoners will be able to bear the full costs of government within the territory for many years to come. Economic accounts data reveal that in terms of Yukon revenues and expenditures, the Federal Government, which subsidizes the Territorial Government, was in a net deficit position of $50.7 million in 1977. This was in part accounted for by a $66.2 million current transfer to the Territorial Government (YEA, 1967-1977). Considering all three levels of government, the consolidated 1977 deficit was $39.2 million, which suggests that even under different federal-territorial fiscal arrangements than prevail, the government sector would not likely approach a break-even position.



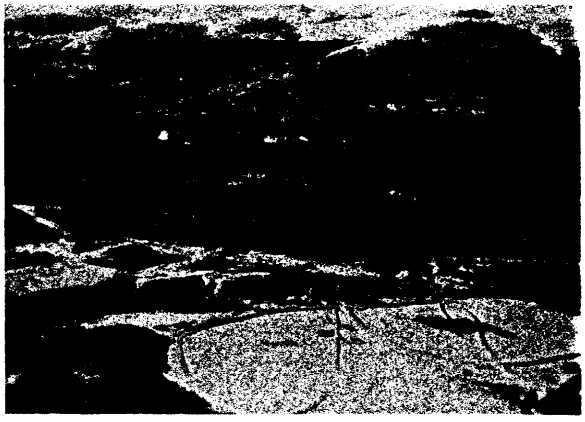


PLATE 10.1-2 *Two facets of Yukon's economy. Above, a small business. Below, the Whitehorse Copper Mine.*

Yukoners have argued for, and achieved, a greater measure of political responsibility during recent years. Yet fiscal barriers to further gains in the direction of responsible government are very real in Yukon and will not easily be removed. Government agencies and departments are not often divisible beyond certain limits. To administer services to an acceptable standard requires a certain basic block of people and money, regardless of whether the service is administered to 10,000 or 100,000 people. Yet the higher the number of people available to pay for the service (through taxes or some other means) the lower the cost per capita becomes, and the greater the possibility of the population as a whole breaking even with respect to the service. The closer a region comes to being able to break even, the more strongly it can argue that it should run its own affairs.

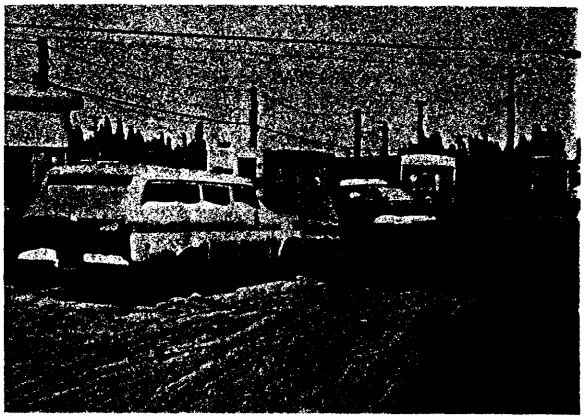


PLATE 10.1-3 *Trailer park, Whitehorse. Mobile homes are a typical aspect of frontier development, and should be planned for by the provision of well located, serviced trailer parks.*

Given considerations such as the foregoing, the need for economic development and population growth in Yukon, and the creation of a larger government revenue base, cannot be understated. For years now, the territorial government has seen mining and tourism as being the engines of development and growth. While mining has grown, this growth has been somewhat unpredictable from one period to the next, and tourism, while more certain, has not as yet been able to provide a major growth impetus to the territorial economy.

Beaufort oil and gas development would undoubtedly have a stimulative effect on economic activity and population growth, but this would be dampened by the remoteness of the Beaufort region from the Yukon heartland. Also to be considered is the wide range of transportation and supply options available to Beaufort developers, which means that Yukon supply routes could receive relatively minor use. Yukon could perhaps tax industry facilities on the North Slope, but there are competing claims to North Slope lands which might first have to be resolved. How much impetus Beaufort development could provide, and whether such impetus would be sufficient or merely marginal, are not therefore questions that are easily answered at this time. The Yukon government would be well advised to pin some hopes on Beaufort development, but to do so with caution.

(b) Mining and Exploration

Mining remains the most important industrial activity in Yukon. In September 1981, the industry employed 1,753 people directly (YER, 1981) and provided employment to perhaps as many as another 1,500 people indirectly. The volume and value of mining output grew rapidly between 1977 and 1981, the growth in value being shown in Table 10.1-4.

TABLE 10.1-4

TOTAL VALUE OF MINERAL PRODUCTION, YUKON 1977-1980

Year	Value ($000)	Percent Increases
1977	209,898	
1978	218,804	40
1979	299,244	37
1980	302,953	1

Source: Yukon Economic Review, 1981

Economic accounts figures for the years 1967-1977 indicate that mining output annually comprises some 30 to 40% of the gross domestic product (at factor cost) of Yukon. More recent data are not available, but it is doubtful that the position of mining would have changed greatly.

In terms of value, silver has recently been the leading mineral. Preliminary estimates for 1980 indicate that Yukon mines produced over 4 million troy ounces of the precious metal, this output being valued at $101 million. Lead and zinc, at $81 million and $73 million respectively, were next in terms of value, with copper, at $27 million and gold, excluding placer gold, at $19 million, well down the list. (YER, 1981). Preliminary data obtained from the Yukon Chamber of Mines for 1981 suggest a substantial drop in the production of all of the metals except zinc.

In addition to the foregoing, Yukon is a significant producer of placer gold. However, because only a portion of the placer gold produced enters the market at the time of production, and the relation of that portion to total production is not known, the volume and value of production cannot be determined with any accuracy. One informant indicated that current output might be valued at $50 million per year, but hastened to add that this was little more than a guess.

Not including placer operations, there are currently three producing mines in Yukon. The largest is the Anvil Mine, operated at Faro by the Cyprus Anvil Mining Corporation. This mine produces 420,000 tonnes of lead, zinc and silver concentrate per year and directly employs 720 people. It is believed to be capable of production to the year 2010. The Keno Hill mine, operated at Elsa by United Keno Hill Mines Ltd., is Yukon's oldest producing mine. It currently produces silver-lead concentrates at a rate of 8,000 tonnes per year, employing 350 people. Estimated mine life is currently 1990. The Whitehorse Copper Mine is operated by Hudson Bay Mining and Smelting near Whitehorse. It currently produces 18,000 tonnes of copper-gold concentrate annually, employing 210 people. This mine has encountered serious problems, and it is now believed that it will shut down in the near future (Government of Yukon, 1981).

There are also a number of properties in Yukon that show considerable potential as producers. However, both potential and existing mines have recently had their prospects dampened by unfavourable trends in world metal prices. The Venus Mine, a gold, silver, lead, zinc mine owned by United Keno Hill Mines and located near Carcross recently opened and closed in the course of a year. Production from mines such as Mactung (tungsten, copper) and Rust Creek (zinc, lead, silver), both located in Macmillan Pass, appears to have been put in abeyance.

A mineral that could be directly affected by Beaufort Sea development is barite. A considerable number of barite deposits exist in Yukon and several companies have been examining these in terms of their prospective usefulness to the Beaufort. To date, questions about quality, quantity, and accessibility are not reconciled; hence no conclusions are possible on whether the deposits could serve as a major source of barite for drilling mud.

In the more distant future, Beaufort region development could have some effect on mineral development in northern Yukon, perhaps by providing year-round shipping access. However to discuss such possibilities would be venturing too far into the speculative at this time.

(c) Tourism

Although it remains far behind mining, tourism is at present the second highest income producer in the private sector of Yukon. Table 10.1-5 summarizes Yukon boundary crossings for the years 1977 through to 1980. It shows a significant overall increase. However, gains in both arrivals by highway and air were

somewhat offset by decline in the "other" category, which would consist largely of rail passengers.

TABLE 10.1-5

YUKON BORDER CROSSINGS (Number of People)

	Highway	Air	Other	Total
1977	182,681	67,953	49,520	300,174
1978	244,423	78,591	39,891	362,905
1979	249,551	79,169	33,454	362,174
1980	231,884	90,601	17,955	340,440

Source: Yukon Economic Review, Sept. 1981, Table 45.

The Yukon Government is heavily involved in promoting tourism, which has been the subject of one of the two Subsidiary Agreements signed between the Federal and Territorial governments under the DREE General Development Agreement for Yukon. This subsidiary agreement has led to an expenditure of approximately $6 million on the tourist industry. The original Subsidiary Agreement expired on March 31, 1982, but it has now been extended for a one year period without further funding.

The tourist industry shows considerable potential for expansion but is highly seasonal. Capacity is limited in the summer months and is excessive for the rest of the year. Attempts are being made to lengthen the tourist season in the spring and fall and to highlight the attractiveness of the territory as a convention centre in the off-season.

While Beaufort development could prove somewhat disruptive to tourism in the short to medium term (more trucks on major highways), it could prove beneficial in the longer-run. As the population of Inuvik grew, more and more people would likely drive up the Dempster Highway to Yukon for short or extended holidays. Even if they were just driving through to a southern destination, distances are such that they would have to spend time in the territory, as do present-day travellers to and from Alaska.

(d) Construction

Construction is not really a single industry but a diverse industrial grouping which includes the building and upgrading of roads, the building of facilities for government and institutional uses, private business construction, and residential construction. Obviously, some segments of the group are much more sensitive to economic upswings and downswings than others.

The construction industry now ranks third in Yukon in terms of value of production. Most recent commercial, residential and apartment construction has

PLATE 10.1-4 *Riverdale, a northern suburb. Located close to downtown Whitehorse, this is a modern, attractive community.*

taken place in Whitehorse, with institutional construction projects occurring in various centres. Institutional construction will continue to be as strong a factor as government budgets permit, but it is unlikely that residential and business construction will increase greatly until the effects of over-expansion in anticipation of the Alaska Highway Gas Pipeline shake themselves out of the economy.

With respect to highway construction, the late 1970's saw the initiation of the Shakwak project, which includes the upgrading and paving of over 483 kilometres of highway from Haines, Alaska, to Haines Junction, Yukon, and from there to the Alaska border. This project was expected to take 10 years to complete at an estimated cost of $200 million. It would appear that it is not proceeding as quickly as had been planned, and further funding may be delayed once present contracts are completed.

The Yukon economy is currently depressed because investment in major mining and pipeline projects has not materialized as early as had been expected. It is difficult to say much that is positive about the short-term prospects of the Yukon construction industry because of this. Nevertheless, longer term prospects would seem favourable. Beaufort development could, in particular, have an important effect on the industry because of the large scale construction demand it would generate. The community growth projections presented in Chapters 7 and 8 suggest a potential for involvement by firms in both Yukon and the Northwest Territories. Whitehorse, which has direct access to the Mackenzie Delta, is in a particularly favourable location with respect to such prospects.

(e) Transportation

The transportation industry in Yukon has three components - rail, highway and air services. Each of these has played a significant role in the past and present development of the territorial economy.

The territory has a well developed system of airports and roads. Several airports and the Alaska highway were built during World War II and were subsequently improved to provide services to communities and to the mining industry. In the 1950's and 1960's, other roads were added to this system. Most recently, the Dempster Highway has provided the territory with a link to the Arctic. Old Crow in the far north is the only community not linked by year-round road.

Because of its system of roads and airports, the territory is well served by a wide variety of air services as well as by the trucking industry. Nevertheless, long distances and relatively low volumes continue to make the movement of people and goods within territorial boundaries and between the territories and the south expensive.

Whitehorse has been served by rail since the time of the Gold Rush, being connected with Skagway via a narrow gauge 180 km railroad, the White Pass and Yukon Railroad. Since World War II, this railroad has not only played a major role in tourism, it has also been the principal means by which minerals from the Yukon have been transported to world markets. During recent years, the railroad has experienced problems due to the need for large capital expenditures for line improvements and uncertain traffic prospects. What the future holds is by no means clear, but the view current in Yukon is that the railroad should be able to continue to operate.

Trucking has expanded considerably in Yukon. It has, however, had the effect of eroding the role of the White Pass and Yukon Railroad in the outhaul of mineral products. With more highway improvements, trucking could play an even larger role in the shipment of goods to and from Yukon.

When one considers the role of Yukon with respect to Beaufort development, attention must naturally focus on the Dempster Highway. This highway has already been used by oil companies active in the Beaufort. For example, in 1981 about 600 truck loads of goods moved over the highway to the Mackenzie Delta, with Dome Petroleum accounting for about 80% of this. The present role of the Dempster is, however, somewhat limited in that haulage over it is expensive. It could not serve as one of the principal Beaufort supply routes unless it were upgraded and, given the relative costs of road and water transport, even then it might not be competitive with coastal routes or the Mackenzie River for major freight volumes.

The role of the Dempster will, therefore, likely continue to be a more specialized one well into the future. The extent of the use that it receives would depend in part on the buildup of the southern Yukon business sector and the extent to which that business sector fosters links with the Mackenzie Delta.

(f) Forestry

Soft wood, consisting mainly of white spruce, is found in commercial quantities in southern Yukon. Compared with other producing or potential areas, timber growth is slow, with replacement taking as much as one hundred years. There is a local market for all of the lumber now produced, with additional potential markets in Alaska and the southern United States.

In the late 1970s, annual production of lumber was about 1.2 million cubic metres. On the basis of var-

ious studies, this is believed to be a small percentage of potential production, but timber cutting permits have limited allowable cut because of uncertainty about the size of the resource. The only area which has timber available in amounts required for larger sawmill operations is southeast Yukon near Watson Lake. To exploit such resources, production volumes would need to increase and operations would have to be placed on a more competitive footing in outside markets. Currently, high production costs and transportation disadvantages can impose strong penalties.

The development of the oil and gas resources of the Beaufort Sea could provide Yukon with a market for forest products. It should not be expected that large volumes would be taken from the territory since, for the most part, materials would be brought to the Beaufort region from the south by sea or barge. However there is no doubt that a small and more specialized market need could be filled with the growth of population in the Mackenzie Delta.

(g) Business Sector

Much has already been said about various aspects of the Yukon business sector under other headings of this chapter, so this should be viewed as a summary statement. The Yukon business sector is lodged mainly in Whitehorse, and is quite varied and diversified. It includes a range of professional services such as engineering services, accountants, geological consultants, lawyers and doctors. There are a variety of construction contractors, several air carriers, automotive and equipment dealerships, banks, material suppliers, caterers, cleaning services, food and dry goods wholesalers and retailers, fuel suppliers, drilling contractors, electrical contractors, hardware and tool suppliers, hotels and motels, outfitters, movers, photographers, a variety of trades people (plumbers, welders, carpenters), and several trucking firms. There is no doubt that such firms will participate in and benefit from Beaufort development, and it is possible that several would establish branch firms in the Mackenzie Delta.

(h) Electric Power

Table 10.1-6 shows electricity generated in Yukon from 1977 to 1980. It indicates rising electrical power requirements.

Two companies produce and distribute electrical energy in Yukon. The Northern Canada Power Commission (NCPC), a Crown Corporation, produces about 90% of all of the energy generated, and is the main source of power for the grid which links the most important power consuming centres, such as Whitehorse and Faro. The Yukon Electric Company, a privately owned company, produces a small proportion of the power consumed in the Whitehorse area, and also produces energy for communities that are off the main grid, such as Destruction Bay, Old Crow and Watson Lake. In addition, Yukon Electric retails energy produced by the NCPC to the Whitehorse market. The costs of energy generated for Yukon must be paid for by territorial consumers. It is not subsidized in any way except insofar as the NCPC is able to borrow capital at more favourable rates than a private corporation.

TABLE 10.1-6
ELECTRICITY GENERATED
(MW.h)

	Total	% Change
1977	338,703	
1978	331,190	3.7
1979	353,434	0.6
1980	384,373	8.8

Source: Yukon Economic Review, Sept., 1981, Table 38

Yukon faces difficulties with respect to the generation of electrical power. The market for such power is small and Yukon must produce all of its own power requirements as it is not connected with grids in the provinces or Alaska. Currently, power is produced by a combination of hydro and diesel generation, both of which are relatively costly methods in the territory. Diesel fuel is expensive and hydro generation is confronted with the problem of seasonal water shortages. As a consequence, price per kilowatt hour is now in the vicinity of some seven to eight cents, as compared with about two cents in British Columbia.

While present power costs may still be tolerable to the business sector and fortunate private consumers whose utility costs are subsidized, further increases could pose severe problems. One possibility that has been mentioned in Yukon is to use Mackenzie Delta natural gas as a generating fuel, but the economic feasibility of this has not yet been established.

10.1.3.3 Summary

From the foregoing, it would appear that Beaufort development would not have a large, sudden and comprehensive impact on the economy of Yukon, but that it could nevertheless create positive changes in the territorial economy in a variety of ways. The cumulative effect of these changes, each relatively small, could in time help the territory achieve a

greater degree of economic stability and more sustained growth. Yukoners would be well advised to appraise Beaufort development strategically, and encourage the kind of growth and development in their business structure that could mesh effectively with the longer term opportunities that Beaufort development would raise.

Through employing Yukon residents and making purchases from Yukon firms, Beaufort development could raise Yukon's population, income and employment base, and hence the territorial government's revenue base, helping it to achieve greater self-sufficiency. It would thus help make Yukon less dependent on both federal transfers and some of the less certain aspects of investment in the mining industry. Reduced dependence and structural change could, however, only be achieved over considerable time and no short-term miracles should be expected.

10.1.4 INDUSTRY PROPOSALS

The Industry will make every effort to work cooperatively with the Government of Yukon to ensure that Yukoners benefit from the development of the oil and gas resources of the Beaufort Sea.

- It will employ qualified Yukon residents who are willing to work for the Industry in Beaufort development.

- It will discuss with the Government of Yukon how it may assist in training Yukon residents for Beaufort employment.

- It could either originate flights at Whitehorse to rotate crews to and from northern worksites or route aircraft to and from a centre in the south to pick-up or drop-off rotational crews.

- It will use Yukon contractors and trades and service personnel insofar as this is economically possible.

- It will purchase part of its supplies from firms in the Yukon wholesale-retail trade sector which are competitive with other suppliers.

- It will route some of its freight requirements via the Dempster Highway, although it must be kept in mind that such a route would continue to be a high cost surface route even if it were upgraded.

PLATE 10.1-5 *An objective of northern development is to provide the kind of economic base that ensures that young people do not have to travel far from home to earn a living. Young Yukoners near Carcross.*

- To the extent possible, it will encourage the utilization of Yukon materials such as barite, lumber, gravel and rock.

It must be recognized by Yukon residents and their government that the implementation of the foregoing will take time and will be phased in gradually as Beaufort development proceeds. While the development of a specific timetable is premature, the Industry would be prepared to work out an agreement on principles that would apply to the foregoing.

10.2 GREAT SLAVE COMMUNITIES

For the purposes of this volume, the Great Slave communities include Yellowknife, Detah, Snowdrift, Fort Resolution, Hay River, Pine Point, Enterprise, Kakisa Lake, Fort Providence, and Rae-Edzo (Figure 10.2-1). Some of these communities are also discussed in Chapter 11, which deals with possible pipeline routes. Each will play some role in Beaufort development, although the nature of the role would differ considerably from community to community.

TABLE 10.2-1

POPULATION - GREAT SLAVE COMMUNITIES DECEMBER, 1979

Yellowknife	9,918
Detah	161
Snowdrift	264
Fort Resolution	523
Hay River	3,345
Pine Point	1,719
Enterprise	40
Kakisa Lake	41
Fort Providence	571
Rae-Edzo	1,367

Source: Outcrop Ltd.; NWT Data Book, Yellowknife, 1981.

As can be seen from Table 10.2-1, these communities differ greatly in size. The City of Yellowknife, which has been the capital of the Northwest Territories since 1967, is a large, diversified administrative, transportation, mining and cultural centre. Hay River, whose principal economic role revolves around transportation, is also relatively large and diversified. It is the northern terminus of the Great Slave Lake Railway and the southern transportation base of the Northern Transportation Company (NTCL). Pine Point, some 60 kilometres east of Hay River, is a town built in the early 1960's to service the important lead-zinc mine operated by Cominco Ltd. This mine

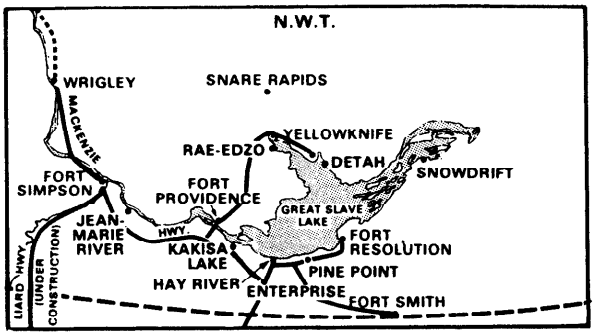


FIGURE 10.2-1 *Regional Setting: Great Slave Lake communities.*

employs about 570 people and in 1980 produced 62,000 tonnes of lead and 167,000 tonnes of zinc. Enterprise is a very small non-native community built around highway facilities (gas station, motel, etc.) at the junction of the Northwest Territories's two principal highways.

Rae-Edzo, Fort Resolution, and Fort Providence are Dene-Metis communities of moderate size. All have played important roles in the history of the Great Slave Lake region and of the Northwest Territories as a whole. Each played a special role during the long period known as the fur and mission era, which preceeded World War II. The people of these communities are still heavily involved in hunting, trapping and fishing, and for the most part prefer these activities to full time wage employment.

Detah, Snowdrift and Kakisa Lake are small Dene communities which are still strongly traditional. While many of their residents have taken wage employment outside their communities, hunting, trapping and fishing play a dominant role in their lives.

10.2.1 ROLE IN BEAUFORT SEA DEVELOPMENT

All of the communities of the Great Slave Lake region may expect to supply labour to the Beaufort, although only a small proportion of the labour force of the more traditional communities would likely be affected.

Hay River would play a major transportation transshipment role as volumes of freight moving to the Mackenzie Delta and beyond via the GSLR-NTCL rail and barge system increased. The community would also play a major role in supplying pipeline construction along the Mackenzie Valley (see Chapter 11).

The involvement of the Hay River business commun-

PLATE 10.2-1 *Yellowknife, as well as being the capital of the Northwest Territories, has an extensive business sector which should benefit greatly from Beaufort Sea and related developments.*

ity could also be significant. This business community includes small scale manufacturing, printing, publishing and advertising, construction, air charter services, wholesaling and retailing, trucking, and a variety of professional services.

The Yellowknife business sector would undoubtedly play an important role in Beaufort development, even though the community has no direct surface transportation links with the Beaufort, as have communities such as Hay River and Whitehorse. Yellowknife has a major airport and a well developed air charter industry as well as road connections with the south, factors which could make it important in the truck-air transshipment of goods to the Beaufort.

Yellowknife has 100 construction companies. Many are small operations, but a number are businesses of significant size and have operated elsewhere in the northern territories. Some have sought work on the Norman Wells project and in the Mackenzie Delta, and several have had experience in joint venturing with other companies. The community also has about 10 retail trade outlets and 12 wholesalers and distributors. All of these have served a wide area of the north including Beaufort communities. There is a large and well developed service sector. Business support services include legal, accounting, data processing, advertising, and various types of management and engineering consulting. The city also has a growing number of finance, insurance and real estate enterprises.

10.2.2 INDUSTRY PROPOSALS

The Industry will do its utmost to ensure that the Great Slave Lake communities share in the benefits that will derive from the development of Beaufort Sea hydrocarbon resources. It will employ as many regional residents as possible, provided they are able to qualify for such employment. Insofar as this possible, it will use regional transshipment and transportation businesses, contractors, and trades and service personnel, and will fulfill a portion of its supply needs by purchases from the regional wholesale-retail sector.

10.3 CENTRAL ARCTIC, EASTERN ARCTIC AND KEEWATIN

Communities of the Central Arctic include, among others, Cambridge Bay, Gjoa Haven, Spence Bay and Pelly Bay (Figure 10.3-1). Eastern Arctic communities include Igloolik, Cape Dorset, Frobisher Bay and Pangnirtung as well as the communities which are given special attention in Chapters 12 and 13 on the Parry Channel and Baffin Bay-Davis Strait portions of the proposed tanker routes. The Keewatin communities are Baker Lake, Rankin Inlet, Chesterfield Inlet, Whale Cove, Repulse Bay, Coral Harbour and Eskimo Point.

Such communities may be affected by Beaufort Sea development in two main ways. First, some residents may take employment with the Industry; second, some residents, having taken employment, may move their families to the Beaufort region.

While the Industry would welcome application for employment from all northern regions, it could not make commitments to establish rotational schemes for all communities. There are simply too many such communities, and the logistics of picking people up and returning them to their communities would pose major problems. The Industry would, however, consider pick-ups and drop-offs at some key communities.

The Industry would not encourage a significant movement of people from Arctic communities to the Beaufort region, since this could drain the skill and leadership pools of donor communities. It could, however, participate in the selective transfer of individuals and families depending on local circumstances.

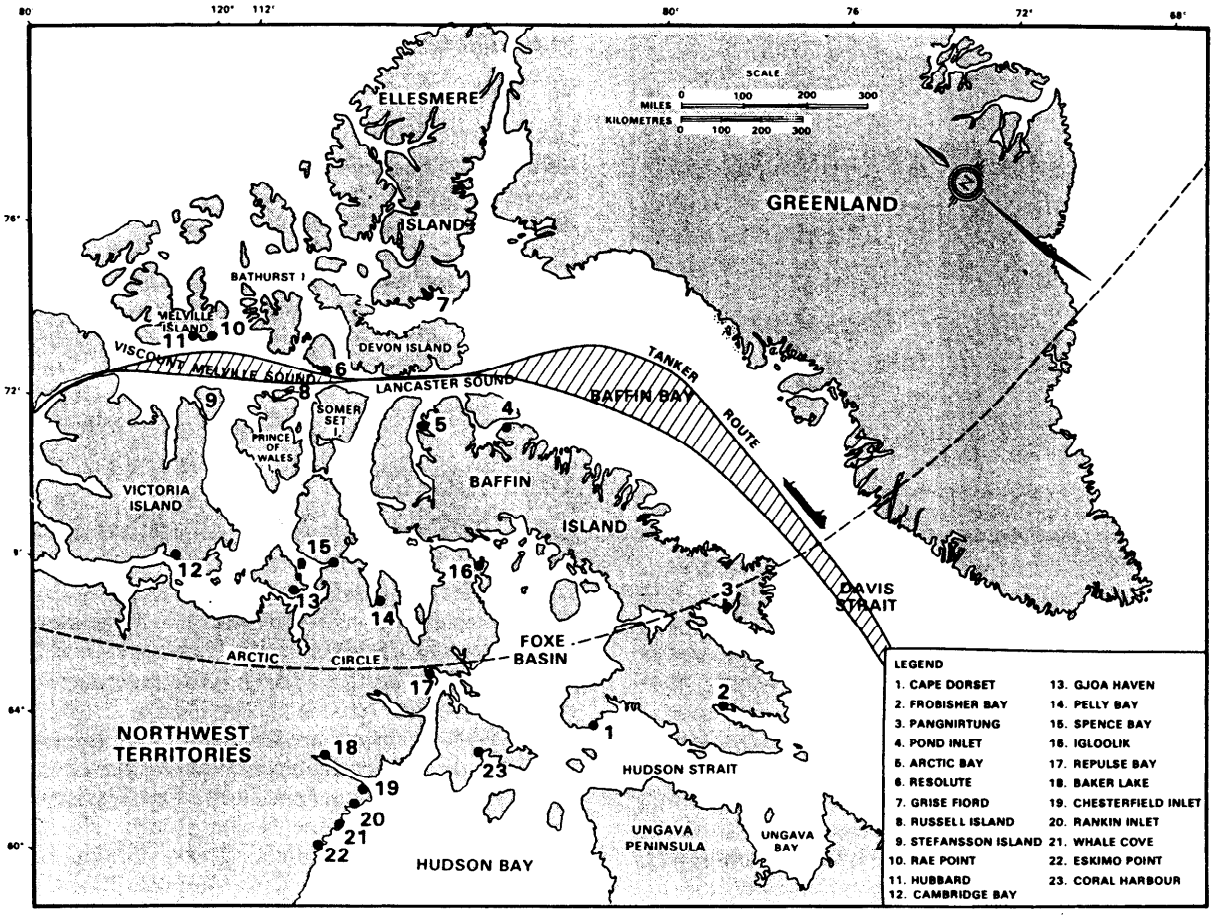


FIGURE 10.3-1 *Regional setting: Central Arctic, Eastern Arctic, and Keewatin communities.*

CHAPTER 11

INLAND CORRIDOR COMMUNITIES

The Beaufort Sea region has large potentials for both oil and gas production, and various overland pipeline routes are being considered to convey oil and gas resources to market (Figure 11-1). One of these is the Mackenzie Valley corridor, which could provide a technically feasible route for both an oil and a gas pipeline. Another is the Dempster route which could link Mackenzie Delta and Beaufort Sea gas resources with Canadian markets via a northern Yukon route. A third alternative is the Polar Gas Y line, which would link Beaufort and Delta gas resources with a proposed major pipeline conveying gas from the Arctic Islands to markets in eastern Canada.

The first section of this chapter deals with the social and economic consequences of building and operating an oil pipeline along the Mackenzie Valley. As is stated in Volume 2, such a pipeline would originate on Richards Island in the Mackenzie Delta and would follow the proposed route of the Arctic Gas Pipeline southward along the Mackenzie Valley to Edmonton, a distance of some 2,200 kilometres. A large diameter pipeline is envisaged. Subsequent sections of the chapter deal in turn with the Dempster Lateral Pipeline, the Polar Gas Y line, and a small-scale oil pipeline that could link near-shore Mackenzie Delta oil reserves with the Norman Wells pipeline, which has recently obtained federal government approval.

The Dempster Lateral application was submitted to the federal government by Foothills Pipelines Limited as part of a pipeline system which would move natural gas from Prudhoe Bay, Alaska, to the continental United States, and from the Mackenzie Delta to the markets of southern and eastern Canada. The main pipeline, the Alaska Highway Gas Pipeline, would be a 122 cm (48 inch) line running from Prudhoe Bay to, approximately, Fairbanks, Alaska, and from there southward via the Alaska Highway to Caroline, Alberta, where it would split in two and enter the United States at Kingsgate, B.C. and Monchey, Saskatchewan. From Prudhoe Bay to the 49th parallel, this route would cover a distance of 4,400 kilometres. The Dempster Lateral, an 86 cm (34 inch) line, would connect with the Alaska highway pipeline near Whitehorse, the junction being a distance of some 1200 km from Mackenzie Delta gas processing facilities.

The route that the Polar Gas "Y" line would probably follow would originate in the Sverdrup Basin of the Arctic Islands, cross Viscount Melville Sound to Victoria Island, and trend southward to Dolphin and Union Strait where it would cross to the mainland near Coppermine. From there it would trend southward and eastward, finally joining the Trans Canada

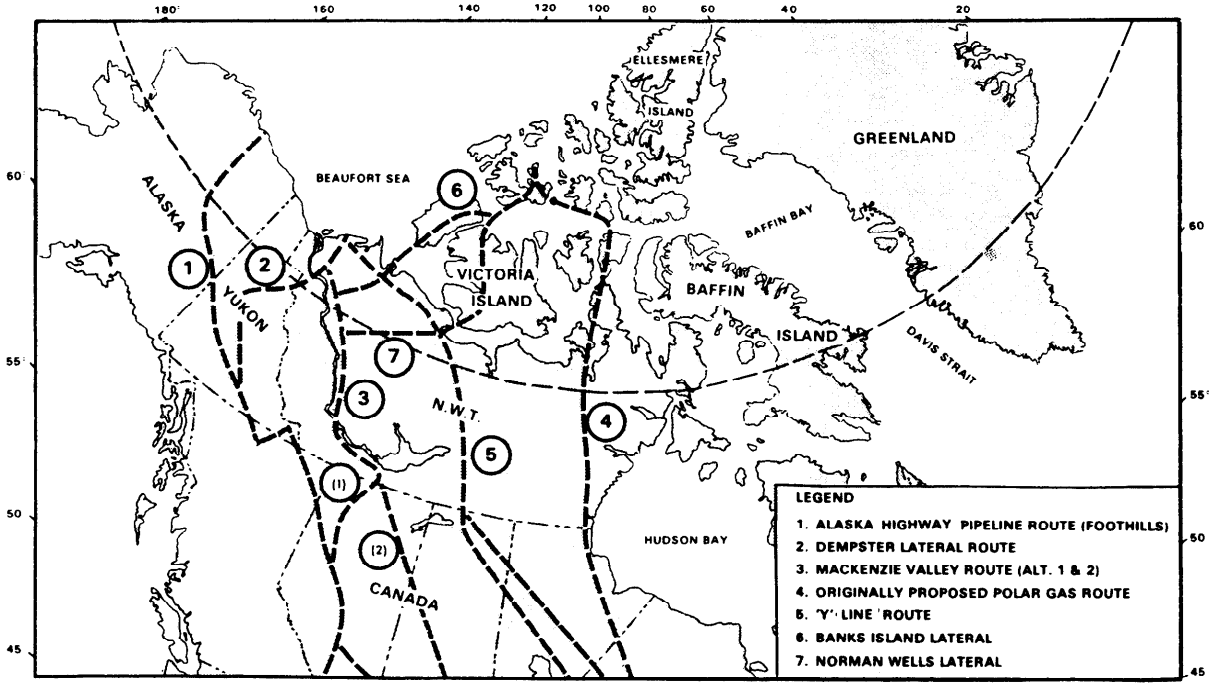


FIGURE 11-1 *Major possible oil & gas pipeline routes from the Arctic to southern Canada.*

pipeline at Longlac, Ontario, or Winnipeg, Manitoba. The total length of this route would be about 4,000 km. A 76 cm (30 inch), 850 km spur from the main pipeline would connect it with the gas reserves of the Mackenzie Delta and Beaufort Sea. The spur would join the main line near Coppermine. Polar Gas has also given some consideration to more westerly route alternatives that would trend southward within or near the Mackenzie Valley.

The two pipeline projects have the status of active proposals, and are not part of this EIS. For the sake of completeness, and without taking a stand on the proposals or prejudicing them in any way, they are given some discussion later in the chapter on the basis of available material.

Volume 2 of this EIS should be consulted with respect to current Industry thinking regarding pipeline transportation of oil and gas from the Beaufort. While the Industry is giving the question of pipelines considerable thought, plans are by no means final and no specific application has as yet been submitted. A recent application by Interprovincial Pipelines Limited to build a 30 cm (12") pipeline southward from Norman Wells has been approved, subject to a number of terms and conditions. This would suggest there is less resistance to the notion of a major pipeline along the Mackenzie than was the case a few years ago. The Industry is of the firm opinion that such a major pipeline is a sound proposition from the standpoint of corporate and national economics, and that its construction and operation need not be disruptive to the people of the region and the environnment. It is the contention of the Industry that the region would, in fact, greatly benefit from pipeline construction and operation.

Because it has been a participant in the pipeline debates of the past decade, the Industry is fully aware of the regional issues surrounding a Mackenzie Valley pipeline. It agrees that it would be highly desirable to settle native claims before a pipeline is built, but would raise the question of how long such claims may take to become resolved. The Industry believes that, in addition to strong efforts toward resolving native claims, a practical way must be found to allow development plans to go ahead without prejudicing claims, and with appropriate compensation for native land use.

As an additional point, the Industry would contend that an industrial corridor along the Mackenzie Valley already exists. The Mackenzie River is one of northern Canada's most important and most heavily utilized transportation routes and a highway has been built along the river nearly as far north as Wrigley. The level of oil and gas exploration in the Valley has been considerable for the past two decades and few could argue that the region is still a pristine wilderness. The construction of a pipeline from the Mackenzie Delta to the Alberta border would therefore do little to change the essential character of the region as it now exists.

As the foregoing suggests, this chapter is mainly about the effects of a possible oil pipeline along the Mackenzie Valley followed by a gas pipeline, perhaps in the early 1990's. Section 11.1 addresses the issues which would surround the construction and operation of such a line. Section 11.2 deals with the Dempster Lateral gas pipeline and is based mainly on the Foothills Pipelines Limited application for this line. Section 11.3 deals with the Polar Gas "Y" line and is based on available information. A final short section, 11.4, deals with the concept of a small-scale oil pipeline, from the Mackenzie Delta to Norman Wells, that could precede construction of major pipelines.

11.1 MACKENZIE VALLEY OIL PIPELINE

The communities on which the discussion of this section is focussed are located in the Mackenzie Basin of the Northwest Territories, which is referred to as the "Mackenzie Valley" in this volume. For present purposes, the Mackenzie Valley includes Great Slave and Great Bear lakes, and communities which lie on or near these waterbodies.

Several of the communities included in the discussion have had previous attention. While this may appear to be duplication, it is more a case of deliberate overlap. Communities like Fort McPherson and Arctic Red River will be affected by the construction of an oil pipeline but they will also be influenced by the development of production facilities in the Beaufort region. Similarly, Hay River and Fort Simpson will play important logistical roles in the construction of a pipeline, as well as in Beaufort development.

In the most general of terms, the construction of an oil pipeline would lead to major activity in the Mackenzie Valley for only brief periods, perhaps for no more than three years. While it will involve people from communities along the right-of-way (to the extent that these people want to become involved), construction will, in general, take place some distance from communities. A pipeline is a linear facility, and while the point that it does not, in terms of total acreage, take up much land has been made many times in the past, it is worth making again. Pipeline construction (and operation) is not a land extensive activity in the same sense as, for example, the development of facilities in a major oil field. Once

in operation, a pipeline is, moreover, relatively unobtrusive. *

11.1.1 SOCIAL AND ECONOMIC BACKGROUND

11.1.1.1 Prehistory

The Mackenzie Basin has a prehistory which extends over several thousand years and several cultural phases. There is evidence of the Cordilleran Tradition at Fisherman Lake, where sites are thought to be older than 9,000 years. Similar sites have been reported in Yukon. Plano Tradition sites, extending from 9000 to 6000 BP, occur at Fisherman Lake, Great Bear Lake, and in the eastern Mackenzie Basin. Sites within the Northern Archaic Tradition, dating from 6000 BP to about 2500 BP, occur a Whirl Lake, the N.T. Docks Complex, Fish Lake, and Fisherman Lake. There is a gap in discovered sites, though not likely in human occupation, between 2500 BP and 2000 BP. After this, there is a gradual emergence of the Dene cultures, which currently populate the Mackenzie Valley and much of the rest of northwestern Canada. A support document to this volume contains detailed information on the history, ethnography, archaeology and paleontology of the Mackenzie Basin (Fedirchuk and Millar, 1981).

11.1.1.2 Historical Background

The original inhabitants of the Mackenzie region were native people who lived in semi-nomadic bands which moved within fairly distinct geographic boundaries. The Arctic coast was inhabited by Eskimos, the lower Mackenzie between the Yukon and Mackenzie rivers by Loucheux; the area west-northwest of Great Bear River south to what is now northern Alberta by Hare and Slavey people. The Nahanni people lived in the Mackenzie Mountains, the area between Great Bear and Great Slave Lakes was the home of the Dogrib, and the Chipewyan lived east and south of Great Slave Lake. For many centuries, these peoples followed the seasonal availability and migratory habits of the area's animal resources, from which they derived food, shelter, clothing, fuel and tools.

The first contact between the indigenous residents and European explorers occurred in the late 18th century. The earlier part of the 19th century saw the introduction of the fur trade in which Europeans offered blankets, metal tools and pots and guns in exchange for furs. The rivers provided the highways for this trade. Since most native people gathered at the best fishing spots along the rivers every summer, such locations became the sites of trading posts and the first permanent settlements.

While the traders were introducing native people to new goods and technology, the churches began to establish missions and to convert them to Christianity. The presence of mission medical facilities and schools tended to keep people closer to settlements, and thus interfered to a degree with the fur trade. However, the two influences combined to bring about a gradual interdependence between native and non-native societies, an interdependence which became strong and persuasive throughout the north.

Through the last half of the 19th and the early 20th centuries, increasing demands for fur, the Klondike Gold Rush, and other mineral exploration resulted in greater northward migration of non-native adventurers and, to some extent, settlers, and led to the negotiation and signing of Treaty Number Eight in 1899 and 1900. This treaty covers several northern Dene and Cree groups and relates to territory in northern British Columbia, Alberta and Saskatchewan as well as the south shore of Great Slave Lake. The present boundaries of the Northwest Territories were established in 1911. Discovery of oil at Bosworth Creek (Norman Wells) in 1920 and deposits of gold, silver and uranium in the area attracted many non-native people to the Mackenzie Valley and led to the signing of Treaty Number Eleven in 1921. In general, this treaty covers Dene groups throughout the whole of the Mackenzie Valley north of the region covered by Treaty Number Eight. Both treaties, however, applied only to Indians. Eskimos were not signatories.

During the 1920's and 30's economic activity in the Mackenzie Valley continued to increase as more and more non-native people moved into, or visited, the region, attracted by the prospect of its wealth. In 1931 the Northern Transportation Company Ltd. was established to facilitate access and trade. In 1933 pitchblende (uranium) was discovered at Port Radium (near Echo Bay), a factor which, along with other developments, enabled Imperial Oil to open a refinery at Norman Wells to serve a regional fuel market. The Second World War led to the construction of

*The subsequent construction of a gas pipeline -if it took place - would lead to a repetition of many of the events and effects described in this section for the oil pipeline. However, because the Norman Wells pipeline and the major oil pipeline would already have firmly established a corridor and construction related facilities, the effects of gas pipeline construction would not likely be as great as the effects of oil pipeline construction.

several air fields in the region as well as the Canol pipeline from Norman Wells to Whitehorse. The projects brought thousands of southern workers into the north.

After the war the trapping industry, on which many native people depended for cash income, suffered severe setbacks. At the same time the federal government began to implement programs designed to alleviate adverse social conditions among the native people. These measures included provision of non-denominational schools, better health facilities, permanent housing, local development programs, and training programs designed to teach native people skills and attitudes required in the soon to emerge (as was then hoped) modern economy of the north. The increasing difficulty of making a living by harvesting furs and game, the growing availability of housing and government services, and the prospect of casual, seasonal and even permanent employment, brought about a rapid concentration of native people in the growing northern communities. People continued to hunt, trap and fish, but neither as extensively nor as nomadically as formerly.

In 1951 an eight member Northwest Territorial Council (five appointed, three elected from the Mackenzie District) was established, and in 1953 the Department of Northern Affairs and Natural Resources was created to administer northern social services, infrastructure, Crown land (virtually the whole of the northern territories is Crown land), forests, fur and mineral resources. During the late 1950's and 1960's, government programs were heavily oriented toward the development of the mineral resources of the northern territories, and the integration of regional labour with such development. The establishment of the Pine Point Mine near Hay River and the construction of the Great Slave Lake Railway and the Mackenzie Highway are examples of developments of that era.

The 1960's also saw an evolution of government in the Northwest Territories. The 1965 Carrothers Commission precipitated the movement of the Government of the Northwest Territories from Ottawa to Yellowknife. As well, because of Commission recommendations, elected representatives became a majority on the Territorial Council. This trend toward increased regional self-government has continued to the present, and has resulted in a fully elected Legislative Assembly and an Executive Committee whose members assume Ministerial responsibilities.

However, increased mineral development and the discovery of potentially large reserves of oil and gas have also resulted in a greatly increased federal government presence in the Northwest Territories. Land and resources are still almost entirely under direct federal control and, since the Government of the Northwest Territories can only act independently of the Department of Indian Affairs and Northern Development within narrow limits, the Northwest Territories in effect still do not have responsible government. In recent years native groups and other territorial political leaders have made increasingly strong and well argued demands for a greater degree of self-government, resource revenue sharing and control over major development projects. These demands have, in general, been linked with specific resource development projects like the Mackenzie Valley Gas Pipeline and Norman Wells Oil Pipeline.

PLATE 11-1-1 *People from the Mackenzie Valley have already had considerable industrial experience. Above, training session. Below, "Hire North" work crew clearing the Mackenzie Highway right-of-way in the early 1970's.*

11.1.1.3 Demography

The population of the Mackenzie Valley in June 1980 was estimated by the Government of the Northwest Territories to be 24,713 (54% of the total Northwest Territories population). Forty percent of this number resided in Yellowknife, and the communities of Hay

River-Enterprise, Pine Point and Fort Smith accounted for 14%, 7% and 9% respectively. The balance of the population (30%) was located in 20 Mackenzie Valley communities ranging in size from Kakisa, (estimated population 40) to Fort Simpson (estimated population 1,080). Table 11.1-1 summarizes recent population estimates by community.

TABLE 11.1-1

MACKENZIE VALLEY COMMUNITIES POPULATION ESTIMATES

Community	1976 Census	1978 GNWT	1980 GNWT
Fort McPherson	710	813	787
Arctic Red River	120	87	87
Colville Lake	55	74	74
Fort Good Hope	443	446	454
Norman Wells	367	352	364
Fort Franklin	422	512	552
Fort Norman	232	329	332
Wrigley	143	175	163
Fort Simpson	1,231	1,080	981
Jean Marie River	62	48	49
Nahanni Butte	95	93	93
Fort Liard	299	327	344
Trout Lake	57	60	62
Rae Lakes	164	178	178
Lac La Martre	213	225	235
Snowdrift	224	262	273
Yellowknife (& Detah)	8,474	9,981	9,891
Rae/Edzo (& Snare Lake)	1,158	1,269	1,381
Fort Providence	604	556	565
Kakisa	40	40	40
Hay River/Enterprise	3,412	3,438	3,362
Pine Point	1,915	1,763	1,662
Fort Resolution	501	521	519
Fort Smith	2,482	2,347	2,265
Totals	23,423	24,976	24,713

Sources: Census of Canada, 1976; GNWT, 1978; GNWT, June 1980

As can be seen from these data, some contrasting trends have emerged since 1976. The first is that the group of predominantly native communities have been experiencing slow but steady growth. The larger, mostly non-native communities, which are the focal points of private economic activity, such as Hay River-Enterprise, Pine Point, Fort Smith and Fort Simpson, have shown population losses. These losses are no doubt due to out-migration in response to decreased economic activity as a result of the negative decision on the Mackenzie Valley Gas pipeline and uncertainty concerning northern development. Yellowknife is an exception to the trend. The growth of the territorial capital reflects increases in both federal and territorial government personnel.

Estimates of the ethnic distribution of the Northwest Territories population identify people as Indian, Inuit or Other; a category which includes non-natives, Metis and non-status Indians. The majority (67%) of the 1980 population of the Mackenzie Valley was classified by the GNWT as "Others." However 89% of these "Others" (60% of the total population) were situated in the largest urban centres, namely Yellowknife, Hay River-Enterprise, Fort Smith and Pine Point. In the remaining 20 communities in the Mackenzie Valley, "Others" were only 24% of the population, while Indians held the majority at 75%.

Since Metis and non-status Indians are included among the "Others," the distribution estimates presented in Table 11.1-2 must be further qualified. The Metis Association of the Northwest Territories has completed a census which reports the 1979 Metis population of the Mackenzie Valley to be at least 3,422*. These estimates have been included in Table 11.1-2, but since the base year differs from the rest, percentages of total would be misleading and are not shown.

Although total population and ethnic distribution estimates are available for 1980, the most recent age distribution data are for 1978. Individuals of the working age group (ages 15 to 64) made up 66% of the total population of the Mackenzie Valley. The working age population of the four larger, predominantly non-native centres alone accounted for 49% of the total population.

As can be seen from Table 11.1-3, in the 20 communities which are located along the Mackenzie River, 58% of the total population was made up of working age individuals, compared to 69% for communities around or near Great Slave Lake. In addition, individuals under the age of 15 made up 37% of the total for Mackenzie River communities, while this age group represented only 28% for Yellowknife, Hay River, Pine Point and Fort Smith.

As in the case of the Beaufort communities, the native populations of the Mackenzie Valley contain higher proportions of younger people than are typically found in Canadian populations. Populations could therefore grow rapidly, which raises the question of how these populations will, in future, support themselves. They will undoubtedly continue to hunt, trap and fish, but the carrying capacity of the land is limited. Many will have to depend increasingly on employment in activitis such as oil and gas production and transportation.

11.1.1.4 The Economy

The economy of the Northwest Territories, in general, and the Mackenzie Valley, in particular, has been dominated for some time by three sectors. In terms of revenue, expenditures and wage employment, the minerals and hydrocarbon sector and the government sector are the most important broad groupings

* Data were not available for some communities.

TABLE 11.1-2

MACKENZIE VALLEY COMMUNITIES ETHNIC DISTRIBUTION ESTIMATE - 1980

Community	Indian	Inuit	Other	Total	Metis*
Fort McPherson	610(79%)	8(1%)	160(20%)	787(100%)	101
Arctic Red River	77(89%)	—	10(11%)	87(100%)	19
Colville Lake	71(96%)	—	3(4%)	74(100%)	N/A
Fort Good Hope	375(83%)	4(1%)	75(16%)	454(100%)	87
Norman Wells	55(15%)	8(2%)	301(83%)	364(100%)	43
Fort Franklin	502(91%)	—	50(9%)	552(100%)	8
Fort Norman	234(70%)	—	98(30%)	332(100%)	8
Wrigley	157(96%)	—	6(4%)	163(100%)	N/A
Fort Simpson	501(51%)	11(1%)	469(48%)	981(100%)	217
Jean Marie River	46(94%)	—	3(6%)	49(100%)	N/A
Nahanni Butte	76(82%)	—	17(18%)	93(100%)	N/A
Fort Liard	321(93%)	—	23(7%)	344(100%)	25
Trout Lake	60(97%)	—	2(3%)	62(100%)	N/A
Rae Lakes	174(98%)	—	4(2%)	178(100%)	N/A
Lac La Martre	233(99%)	—	2(1%)	235(100%)	N/A
Snowdrift	247(90%)	—	26(10%)	273(100%)	N/A
Yellowknife (& Detah)	1075(11%)	93(1%)	8723(88%)	9891(100%)	785
Rae/Edzo (& Snare Lake)	1281(93%)	—	100(7%)	1381(100%)	N/A
Fort Providence	438(78%)	—	127(22%)	565(100%)	69
Kakisa	38(95%)	—	2(5%)	40(100%)	N/A
Hay River/Enterprise	448(13%)	—	2914(87%)	3362(100%)	770
Pine Point	357(21%)	—	1305(79%)	1662(100%)	N/A
Fort Resolution	179(34%)	—	340(66%)	519(100%)	256
Fort Smith	326(14%)	27(1%)	1912(85%)	2265(100%)	945
Totals	7890(32%)	151(1%)	16672(67%)	24713	3422

Source: Population Estimates, GNWT, June 1980
*Metis Association of N.W.T., November 1979
N/A - Not Available

of activity. Renewable resource harvesting, although not impressive in terms of conventional measures of value, is important to native people. This section will briefly describe the characteristics of these sectors and in addition touch on those which make up the balance of the regional economy. Data presented here generally describe total Northwest Territories values, since separate statistics for the Mackenzie Valley itself are not typically available. However, it can be safely assumed that in most cases the Mackenzie region accounts for a high proportion of total Northwest Territories activity.

In terms of measures such as value of output, employment and income generation, the minerals and hydrocarbon sector is by far the most important sector of both the Northwest Territories and Mackenzie Valley economies. Table 11.1-4 lists the mines which are currently in operation in or near the Mackenzie Valley, along with their locations, products and number of direct employees. The value of total Northwest Territories metals production in 1979 amounted to $383 million (only one producing Northwest Territories mine -Nanisivik - is not located in or near the Mackenzie Valley). New prospects in the general vicinity of the Mackenzie Valley which are due to enter production in the next several years include Cadillac Mines (silver) and Mactung (tungsten) in the Mackenzie mountains and Contwoyto Lake (gold) northeast of Great Bear Lake.

Even though the Norman Wells oil field has been in operation since the 1920's, the oil and gas industry as a whole is still very much at the exploration phase in the Mackenzie Valley. Exploration is expected to continue at current rates for the forseeable future and to grow as finds become more commercially attractive, especially if proposed production and transpor-

TABLE 11.1-3

MACKENZIE VALLEY COMMUNITIES AGE DISTRIBUTION ESTIMATE - 1980

Community	0-14	15-49	50-64	65+	Total
Fort McPherson	262(32%)	438(54%)	63(8%)	50(6%)	813(100%)
Arctic Red River	*32(36%)	*45(51%)	*6(7%)	*4(5%)	87(100%)
Colville Lake	*27(36%)	*38(51%)	*5(7%)	*4(5%)	74(100%)
Fort Good Hope	166(37%)	232(52%)	24(5%)	24(5%)	446(100%)
Norman Wells	108(31%)	209(59%)	25(7%)	10(3%)	352(100%)
Fort Franklin	205(40%)	227(45%)	53(10%)	27(5%)	512(100%)
Fort Norman	111(34%)	170(52%)	16(5%)	32(9%)	329(100%)
Wrigley	48(27%)	95(54%)	22(13%)	10(6%)	175(100%)
Fort Simpson	333(31%)	617(57%)	85(8%)	45(4%)	1080(100%)
Jean Marie River	13(27%)	26(54%)	6(13%)	3(6%)	48(100%)
Nahanni Butte	*26(28%)	*50(54%)	*11(12%)	*6(6%)	93(100%)
Fort Liard	144(44%)	157(48%)	14(4%)	13(4%)	327(100%)
Trout Lake	17(28%)	33(55%)	7(12%)	3(5%)	60(100%)
Rae Lakes	*50(28%)	*96(54%)	*21(12%)	*11(6%)	178(100%)
Lac La Martre	89(40%)	106(47%)	12(5%)	18(8%)	225(200%)
Snowdrift	78(30%)	139(53%)	26(10%)	19(7%)	262(100%)
Yellowknife	2565(26%)	6471(65%)	775(8%)	170(1%)	9891(100%)
Rae/Edzo	641(50%)	471(37%)	99(8%)	58(5%)	1269(100%)
Fort Providence	224(40%)	272(49%)	40(7%)	20(4%)	556(100%)
Kakisa	15(38%)	19(48%)	3(7%)	3(7%)	40(100%)
Hay River/Enterprise	999(29%)	2068(60%)	285(8%)	86(3%)	3438(100%)
Pine Point	660(37%)	1006(57%)	84(5%)	13(1%)	1763(100%)
Fort Resolution	175(34%)	267(51%)	84(5%)	34(6%)	521(100%)
Fort Smith	758(32%)	1300(55%)	182(8%)	107(5%)	2347(100%)
Totals	7746(31%)	14551(58%)	1909(8%)	770(3%)	24976(100%)

Source: Population Estimates, GNWT, December 1978.
*Not Available, estimate based on regional percentages.

TABLE 11.1-4

PRODUCING MINES IN OR NEAR THE MACKENZIE VALLEY

Company	Location	Major Minerals	Employees 1979
Giant Yellowknife Mines Ltd.	Yellowknife	Gold	342
Cominco Ltd. (Con Mine)	Yellowknife	Gold	298
Pine Point Mines Ltd.	Pine Point	Lead/Zinc	590
Canada Tungsten Mining Corp	Tungsten	Tungsten	208
Echo Bay Mines Ltd.	Port Radium	Silver/Copper	195
Terra Mining & Exploration Ltd.	South of Great Bear Lake	Silver/Copper	72

Source: The Northwest Territories Mining Industry, 1975-1979, N.W.T. Chamber of Mines, Price Waterhouse Associates, Sept. 29, 1980.

tation systems are approved. Projects such as the Norman Wells oil field expansion and the associated oil pipeline to Zama, Alberta, should prove a stimulus to exploration.

Since World War II, government has become enormously important in the economic life of northerners. In per capita terms, both the number of civil servants and levels of government expenditures are very high in the Northwest Territories. Several factors account for this: 1) the drive, following World War II, to bring social amenities and services in all regions of Canada to a common high standard; 2) the growth and proliferation of government interests and concerns in Canada during recent decades; 3) the divided jurisdiction over the northern territories, which requires the presence of both federal and territorial government agencies; 4) "indivisibilities" of government services, which mean that certain minimal levels of administrative staff and money must be provided with respect to government services, regardless of the small size of client populations; and, perhaps most importantly, 5) the fact that government services have to be provided over a vast area (about a third of Canada's land mass) to widespread communities, which poses difficult transportation and communication problems. Because of the very limited territorial tax base, the Government of the Northwest Territories is heavily subsidized by the federal government.

Government is the largest employer in the Northwest Territories. In 1979, 235 local government employees received a payroll amounting to $3.4 million, 3,235 territorial employees received a payroll of $64.7 million and 2,338 federal employees received a payroll totalling $40.2 million. In addition to this direct employment and income, the economic influence of government is felt through local purchasing of goods and services, capital investment in infrastructure, transfer payments, and the associated multiplier effects of such expenditures. In the small Mackenzie Valley communities, government is by far the most important and consistent generator of cash income.

As mentioned previously, because of data limitations and methodological problems, the economic value of hunting, trapping and fishing has often been underestimated. A commonly used indicator of renewable resource harvesting activity is fur returns, which however represent only one component of the harvest. Table 11.1-5 summarizes the 1979-80 fur return data for Mackenzie Valley communities. As can be seen, 1,757 trappers filed returns indicating a total income from furs amounting to $2.6 million. However, as can also be seen, almost half of these trappers

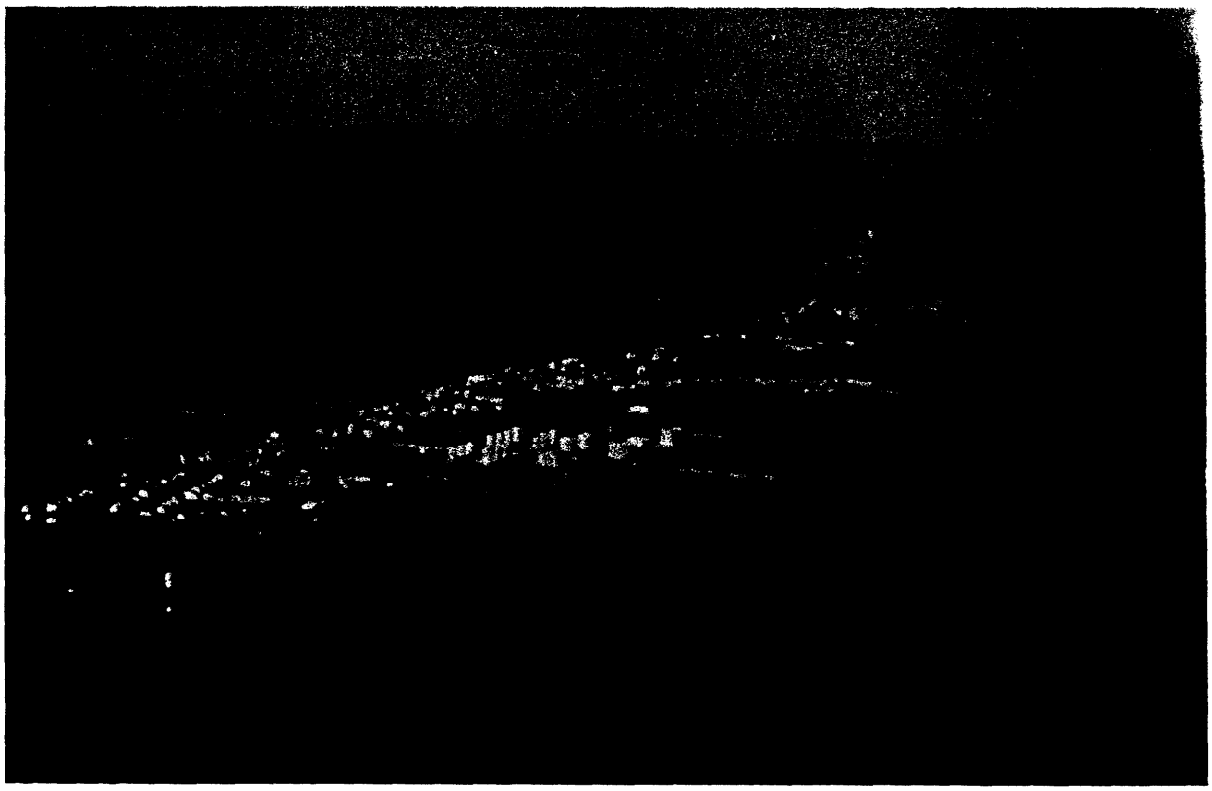


PLATE 11.1-2 *Norman Wells, Esso's pioneer oil town of the Mackenzie Valley. The oil field is undergoing expansion and will soon be linked with the south via a twelve inch pipeline.*

TABLE 11.1-5

INCOME FROM FUR SALES BY COMMUNITY, 1979-80

Community	No. of Trappers	$600-2000	$2000-4000	Over $4000	Total Fur Income
Fort McPherson	151	41	23	10	$ 187,930
Arctic Red River	31	10	4	4	66,513
Colville Lake	20	8	4	4	44,593
Fort Good Hope	121	33	13	18	222,647
Norman Wells	4	1	1	1	9,815
Fort Franklin	84	22	17	13	155,687
Fort Norman	53	11	7	11	87,205
Wrigley	45	9	10	8	84,634
Fort Simpson	103	27	10	10	148,188
Jean Marie River	9	5	—	—	7,616
Nahanni Butte	18	5	2	—	14,581
Fort Liard	64	15	5	8	85,082
Trout Lake	19	3	2	5	38,815
Rae Lakes	25	9	5	4	52,412
Lac La Martre	43	10	10	8	92,320
Snowdrift/Reliance	81	27	10	1	68,783
Yellowknife	141	29	21	4	131,826
Rae/Edzo	215	66	24	13	241,151
Fort Providence	130	37	18	21	286,344
Hay River	100	15	10	8	123,082
Fort Resolution/ Pine Point 168	54	24	17	269,140	
Fort Smith	132	32	16	15	200,293
Totals	1,757	469	236	183	$2,618,806

Source: Department of Renewable Resources, GNWT.

earned less than $600, thereby indicating that trapping is not a main source of income for a substantial proportion of them. Another source of cash income from renewable resource harvesting is the Northwest Territories commercial fishery, much of which is located on Great Slave Lake. Total landings in 1976-77 amounted to 1,291,000 kg (2,847,000 lbs.), which was valued at $920,000. During 1978-79, landings increased to 1,632,500 kg (3,599,000 lbs.), valued at $1,171,000. Much more fish is caught for food, but no estimates of the subsistence fish catch or its economic value are available.

The balance of this section will briefly discuss the following additional sectors of the Mackenzie Valley economy: forestry, agriculture, construction, transportation and utilities, trade and tourism.

(a) Forestry

All forestry activity in the Northwest Territories takes place in the Mackenzie and Liard river valleys. There are four main commercial sawmill operations, located at Fort Simpson, Hay River, Fort Resolution and Fort Smith. There are also several small community mills. All of these operations combined for a production of 59,000 m^3 (2.1 million cubic feet) of lumber in 1978-79. The industry has consistently encountered marketing problems and although there is now a Northwest Territories Grade Stamp Agency to ensure uniform quality, no northern operator is equipped to produce kiln-dried lumber. Output has varied drastically according to market conditions in recent years, and future production is difficult to predict. Due to the underdeveloped state of the forestry industry, considerable lead-time would be needed for operators to meet significant additional demands.

(b) Agriculture

Agriculture presently plays a very minor role in the Northwest Territories, partially because of climatological limitations, but also because leasing of agricultural land was suspended in 1975, pending additional research and resolution of aboriginal claims. However, small market vegetable garden operations of up to ten acres each are allowed and several are now operating in the Fort Simpson and Hay River areas. It is estimated that up to six million acres of land in the Slave River Lowlands and the Liard and upper Mackenzie valleys would be suitable for agricultural use. If land policy questions are resolved, several agricultural operations could become established, but they would experience very high costs of production. Farm income would likely have to be supplemented by seasonal wage labour in order to provide a reasonable standard of living for farm families, a pattern that is prevalent in northern Alberta.

(c) Construction

Construction activity in the Mackenzie Valley is volatile, varying from year to year in response to general economic conditions and resource development. A relative constant, however, is housing construction and infrastructure construction and maintenance. Most local construction firms offer general contracting services and are located in the larger communities such as Yellowknife, Hay River, Fort Smith and Fort Simpson. The value of construction activity in these four centres totalled $80.6 million in 1975, $35.6 million in 1978, but only $9.2 million in 1979.

(d) Transportation, Utilities and Communications

The transportation, utilities and communications sectors are critical to the economic and social development of the Mackenzie Valley. The water based transportation system operates out of its primary base in Hay River with three operators: Northern Transportation Company Ltd., Arcnav Marine Ltd. and Arctic Transportation Ltd. NTCL is by far the largest operator and in 1979 shipped about 240,000 tons of package freight and bulk oil northward on the Mackenzie River. Since the system's capacity was considerably enlarged in the mid 1970's in anticipation of major oil and gas development that has not yet materialized, there is now substantial excess capacity.

The road system in the Northwest Territories is not extensive and lies almost entirely in the upper Mackenzie Valley. In 1976, fifty thousand tons of cargo were shipped by road between Northwest Territories origins and destinations. As well, 34,000 tons were shipped out of the Northwest Territories and 116,000 tons were moved in.

The Mackenzie Valley is strongly dependent on air transport. Pacific Western Airlines operates regular jet service to all the large communities and general northern operators serve the balance of the communities with non-scheduled and charter services. Some resource development companies operate their own air services.

The Mackenzie Valley is served by Northwest Tel with telecommunications, and by CBC with radio and television facilities. Electric power is supplied to Hay River-Enterprise and Fort Providence by Alberta Power and to the remainder of the valley by the Northern Canada Power Commission, mainly by means of diesel generators in each community.

(e) Retail Trade

The value of retail trade in the Northwest Territories has increased steadily in recent years, from about $68 million in 1974, to almost $150 million in 1980. In 1980, general merchandise and apparel accounted for 52% of total retail trade, hardware and furnishings for 19%, food for 17%, and automotive dealers for 12%. In most Mackenzie Valley communities, particularly the small native communities, this sector is represented by one general merchandising establishment. This is usually a Bay or a Co-op, but in a few cases it is an independent small retailer. Only Hay River, Yellowknife, and Fort Smith have relatively fully developed retail sectors. The wholesale sector is largely limited to building supplies, soft drinks and bulk fuel, and is again concentrated in the larger communities.

(f) Tourism

Tourism is becoming increasingly important to the Northwest Territories economy, and travel related services, whether for business or pleasure, account for a very large proportion of service sector activity. It is estimated that in 1979 there were 139 hotels, lodges and outfitters with 368 full-time and 555 part-time employees. In addition, there is a large number of restaurants, service stations and retail establishments that benefit from traveler's expenditures. In 1979 there were about 115,000 non-resident visitors to the Northwest Territories, about one-quarter to one third of whom would have been tourists. With the Liard Highway due to open in 1983 and the north becoming better known to southerners, it is likely that tourism will continue to grow in future.

11.1.1.5 Social Conditions

The problems arising out of growth and change during past decades are still being experienced by Mackenzie Valley native people. Although educational attainment is steadily increasing, native children are at a disadvantage compared to non-native students. The economic expectations of native people have risen but there are not enough permanent jobs available on the north to accommodate the quickly growing number of students leaving school. This growing labour force has, in fact, been met by a slight decline in wage employment opportunities since the mid-seventies and, as a result, there has been an increased dependence on social assistance and other transfer payments. The number of social assistance cases in the Northwest Territories grew from 1,446 in 1979 to 1,618 in 1980, or by 12%, while total payments rose from about $4.8 million to $6.2 million, or by 31%. Total unemployment insurance claims increased from 2,330 in 1976, to 2,800 in 1977, and 3,502 in 1978, before dropping to 2,632 in 1979.

PLATE 11.1-3 *Many people from the Mackenzie Valley have been employed at Esso's facilities at Norman Wells.*

Recent experience in the Northwest Territories has shown that there is often a relationship between social problems in a community and alcohol abuse. Increased availability and consumption of alcohol is associated with increased levels of crime, injuries, accidents and child welfare and family problems. Increased alcohol consumption would, in turn, appear to derive partly from larger cash incomes in periods when wage employment is more generally available. The lower availability of jobs, combined with greatly increased efforts by the native communities themselves to control alcohol (several have voted for rationing or prohibition), should result in some decrease of the incidence of social problems. (The problem of alcohol abuse is also discussed in Chapters 3 and 8.)

In many of the communities of the Mackenzie Valley, conditions of poor housing, crowding, and related family problems have continued despite substantial government and local efforts toward improvements. The low monetary income base of most communities, and the very high costs of providing them with accommodation and services, means that little private initiative can be taken with respect to matters such as housing, and that housing and services must be heavily subsidized. Government efforts to improve matters cannot proceed rapidly because of continuous budgetary limitations. It is difficult to foresee a resolution to this situation without the infusion of much higher revenues into the regional economy. Without sufficient revenues, the resources for social improvement simply cannot be mustered, and the present depressive circumstances will persist.

11.1.2 SCENARIO FOR FUTURE DEVELOPMENT

A preliminary plan for the overland transportation via pipeline of Beaufort-Delta crude oil and gas via pipelines has been produced for the Industry by Canuck Engineering Ltd. This study draws on previous Mackenzie Valley pipeline proposals in terms of proposed construction techniques, route alignment and facility location. It has thus benefited from the extensive review by various public hearings and regulatory bodies of the engineering, environmental and socio-economic factors which would influence the characteristics of such a proposal.

11.1.2.1 Project Description

In the Canuck Engineering scenario, project activity would begin in January, 1983, with right-of-way location surveying. Delivery of materials and equipment to the north would commence in the summer of 1983 and initial facilities construction, including communications facilities, the northern oil terminal, two of the pump stations and the construction support facilities would begin in the fall of 1983. Construction of the other two initial pump stations would start in the summer of 1984. Clearing and mainline construction would begin in the winter of 1984-85, and proceed simultaneously among several spreads for three five-month winter seasons. Operations and maintenance facilities construction would begin in the summer of 1985 and all major river crossings would be done during the summer of 1986. Pump station, oil terminal, operations and maintenance facility and river crossing construction would be completed by November 1986, and mainline construction would be finished at the end of the 1986-87 winter season. The pipeline would be scheduled to go into service in mid 1987. Volume 2 should be consulted for further details.*

11.1.2.2 Determinants of Impact

Northern pipelines have for several years been a factor in public debates and political confrontations on issues such as northern political evolution and aboriginal claims. To at least some extent because of misunderstandings about their technical character, they have been the objects of fear, apprehension and hostility. As a result, the public mind, both northern and southern, has come to associate them with harmful socio-economic impact.

The Industry does not believe that such a negative image is deserved. At the same time, Industry does not expect that a pipeline can be built without engendering change in the lives of people along the right-of-way. Yet change is a relative concept. In terms of the demographic, economic, social and cultural disturbances and opportunities it would induce, the construction and operation of an oil pipeline would be a minor factor, in comparison with much more continuous, extensive and long-term processes, such as the development of oil and gas resources of the Beaufort Sea.

During their operations and maintenance phase, pipelines typically require a small permanent work force. In the case of the current proposal, this work force would build from less than 200 at startup to about 300 jobs after ten years of operation. Pipelines do not generate a great deal of maintenance activity and, although linear in nature, once the right-of-way land easements have been settled, they do not impede other transport modes or preclude most other uses of the land.

Nevertheless, pipeline constuction activity, particu-

*The Canuck Engineering dates are the dates preferred by the Industry. As the reader is no doubt aware the dates could change due to a variety of circumstances, many of which are beyond the Industry's control.

larly the building of large diameter lines such as the one under consideration here, could be expected to be a disturbing event to people along the right-of-way for a few months. Normal activities such as trapping and the performance of community services could be interrupted because people would want to take more remunerative jobs on the pipeline. Construction labour force requirements would be short-term but large , and would exhibit marked seasonal peaks. Figure 11.1-1 depicts construction manpower requirements north of 60°N and how they would be phased by season. The three winter seasons of main line construction, which would coincide with regional trapping activity, would peak at 6,879 people in 1984-85, 13,489 in 1985-86, and 8,940 in 1986-87. By contrast, the summer seasons of 1984, 1985 and 1986 would require 1,114, 2,666, and 2,457 people, respectively.

Most personnel would be involved in mainline construction, which would move quickly past any given location in winter, when there is little chance of interfering with or even encountering other activities. Personnel would be accommodated in isolated, self-contained and self-sufficient camps, and would not draw upon the services of communities.

The effects on any given community would depend on the extent of local hire and the nature and extent of contact outsiders would have with residents. Previous northern pipeline proposals have called for short duration main line construction, as does this one, but as can be seen from Figure 11.1-1, the present concept also calls for some construction to continue for 13 years after the pipeline itself has been completed. The level of manpower required for this prolonged latter phase, which would bring the line up to full capacity by the construction of additional pump stations, is modest. Approximately 150 persons would be needed in most winters, and 400 to 650 would be needed in the summers. However, the fact that there would be continuous construction for a prolonged period could influence potential migrants to move to the Mackenzie Valley in pursuit of longer term jobs. The Industry would mitigate transience by hiring personnel who are not northern residents only in southern centres.

Communities could also be affected by the logistical and transporation activity required to support the project. Supplies which would be needed in the Northwest Territories (spreads 1-8 inclusive) would include 626,000 tonnes of fuel and 1,087,000 tonnes of material and equipment. These large requirements could strain the capacity of the Mackenzie River barge system and the Mackenzie Highway, especially if these transport routes were also moving freight to the Beaufort Sea region and playing their normal role in western Arctic community supply. Volume 2 should be referred to concerning supply and logistic matters.

Construction and related activities which would likely occur at or in the vicinity of communities are as follows:

(a) Inuvik

- Construction of regional and district offices, including a maintenance facility, would occur at Inuvik.

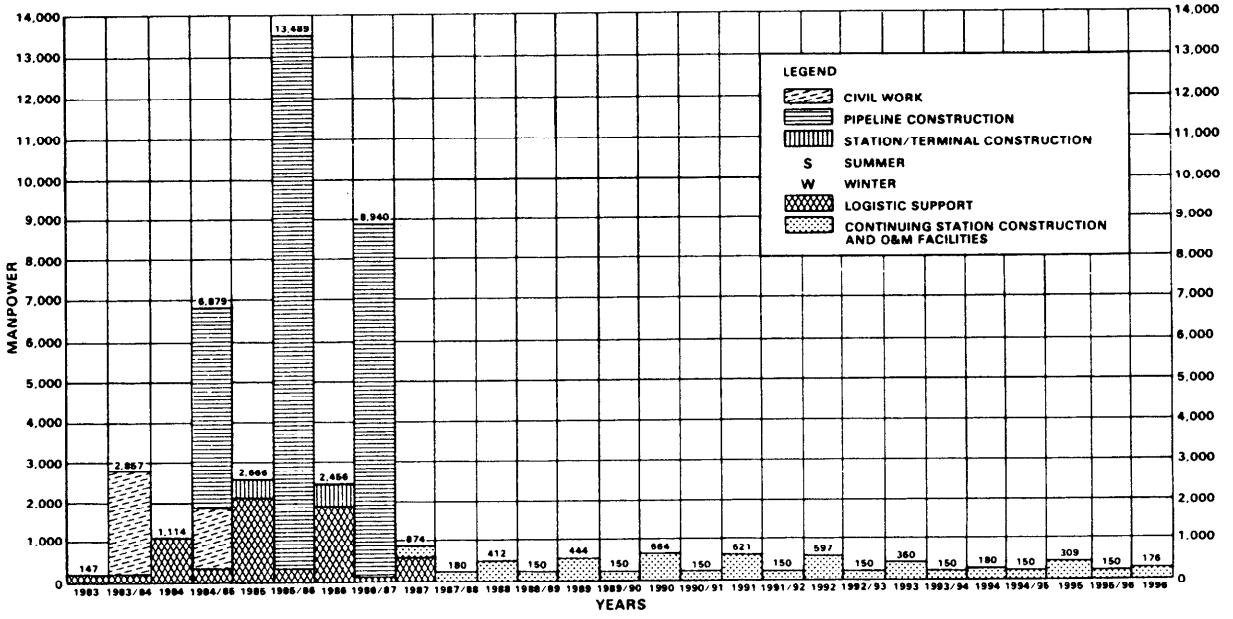


FIGURE 11.1-1 *Mackenzie Valley oil pipeline. Projected manpower requirements.*

- There would be increased use of the existing wharf.

- The site of pump station #3 would be located about 30 km from town and be connected to town by a permanent road. This pump site would be used as a stockpile and maintenance camp location. The pump station would be in service in 1990.

- The right-of-way would be 20 km east of town.

(b) Fort Good Hope

- The right-of-way would be 8 km east of the settlement.

- A borrow pit would be located near the community and would be connected to the right-of-way by a winter road.

(c) Norman Wells

- Construction of district office operations and maintenance facility would take place at Norman Wells.

- The right-of-way would be 2.5 km east of the community.

- Several borrow pits would be located 7 to 20 km south and east of the community.

- There would a be new wharf and stockpile location 6 km south of the community and this would be connected by a permanent road to pump station #9, located 10 km from the community.

- This would be a mainline camp location.

(d) Fort Norman

- The right-of-way would be 1 km east of the community.

- The community would be the site of a new wharf; a stockpile; a mainline and river crossing camp; and a borrow pit.

- The community would be the site of major river crossing construction activity (Bear River crossing).

(e) Wrigley

- The right-of-way would be 4 km east of the community.

- There would be a new wharf and stockpile site located 25 km north of community. These facilities would be connected by permanent road (5 km) to the site of pump station #11, which would also be the site of a mainline construction camp and new 2,400 foot airstrip.

- A borrow pit would be located 6 km south of the community.

(f) Fort Simpson

- Construction of district office operations and maintenance facility would occur at Fort Simpson.

- There would be increased use of the existing wharf.

- The right-of-way would be 4 km east of town on the east bank of the Mackenzie River.

- The Mackenzie River would be crossed 8 km upstream. A river crossing camp would be located at the site.

- Two borrow pits would be located at the Mackenzie River 11 km downstream on the east bank.

- Pump station #13 and a mainline camp would be located 16 km downstream on the Mackenzie River.

- There would be a stockpile located at the Liard River ferry crossing.

(g) Jean Marie River

- The right-of-way would be 18 km west of the settlement.

- Pump station #14, a stockpile, and mainline camps would be located at the Mackenzie Highway crossing about 20 km southwest of the settlement.

11.1.3 IMPACT ASSESSMENT

11.1.3.1 Employment

As was shown earlier, the number of employees active in oil pipeline construction would peak at over 13,000 during the middle year of a three year period of major construction. However, following peak construction activity, it would take some 13 years to develop the pipeline to its full capacity. There would be a continuing demand for construction workers, particularly the building trades, throughout this period as additional pump stations were built. This continuing demand would be small relative to peak labour requirements, but at 150 to 600 workers, it could still be an important source of regional employment. Given suitable training and experience,

PLATE 11.1-4 *For the more traditional communities, the lands and waters of the Mackenzie Valley continue to yield a rich harvest. Earnings from the wage economy make more effective harvesting possible.*

many of the longer term jobs could be filled by northern residents.

In addition, there is the possibility of the construction of a gas pipeline along the same corridor some three or four years later. Although personnel requirements would be somewhat lower than for the oil pipeline, they would nevertheless still be substantial.

Peak construction manpower requirements for the oil pipeline would occur during the winter seasons. Table 11.1-6 shows the distribution of trades and skills that would be required during those peak seasons. The highest demands would occur for supervisory and administrative personnel, equipment operators, and unskilled labourers, each of which would peak at about 2,000. There would also be a significant requirement for drivers and equipment service personnel. At least during periods of high activity, anyone in the Mackenzie Valley who had some basic construction skills and who wanted a job, would likely be able to find one in pipeline construction, provided that union membership and seniority requirements would not pose obstacles.

TABLE 11.1-6

MACKENZIE VALLEY OIL PIPELINE
OVERLAND CRUDE OIL PIPELINE SYSTEM

MANPOWER REQUIREMENTS BY CLASSIFICATION

Classifications	North of 60th	South of 60th	Total
Supervision and Administration	1,977	480	2,457
Equipment Operators	2,002	492	2,494
Equipment Mechanics	431	100	531
Equipment Service and Appren.	1,008	216	1,224
Truck Drivers	1,634	242	1,876
Bus Drivers	517	121	638
Welders and Fitters	624	207	831
Welders' Helpers and Appren.	632	224	856
Skilled Workers	617	161	778
Unskilled Labourers	2,281	489	2,770
TOTALS	11,723	2,732	14,455

Source: Canuck Engineering, 1981.

In addition to direct manpower requirements, oil pipeline construction would generate indirect and induced employment. It is assumed that employment multipliers would approximate those used for earlier Mackenzie Valley pipeline proposals. If this were the case, an additional 0.2 jobs would be created for each job held directly on the pipeline, giving an employment multiplier of 1.2. Indirect employment would therefore reach a peak of approximately 2,700 people during the third winter of construction. Direct and indirect construction manpower are detailed by season in Table 11.1-9, which is presented and discussed more fully in the demographic section which follows*.

TABLE 11.1-7

MACKENZIE VALLEY OIL PIPELINE
NORTHERN REGIONAL HEADQUARTERS - INUVIK, N.W.T.
OPERATIONS & MAINTENANCE PERSONNEL REQUIREMENTS

	Years of Operation				
	1	3	5	10	13
Regional Manager	1	1	1	1	1
Administration, Personnel, Public Relations, Safety and Training	2	2	2	2	2
Engineering, Environmental, Lands and Rights-of-Way	2	2	2	2	2
Clerical	4	4	4	4	4
Total	9	9	9	9	9

Source: Canuck Engineering, 1981

*It should be noted that the employment multiplier applying to pipeline construction is expected to be much lower than the multiplier which would apply to activity in the Beaufort Sea region in Chapter 7.

The organization proposed to operate and maintain the pipeline system would include a head office in Edmonton, a regional office in the Northwest Territories, at Inuvik, and district offices and accompanying maintenance bases at Inuvik, Norman Wells, and Fort Simpson. Table 11.1-7 summarizes the staffing requirements of the northern regional headquarters over the operational life of the project. A total of nine people, including regional management and administration, engineering, environmental and clerical support staff, would be required at regional headquarters from the beginning of oil pipeline operations. The district offices located at Inuvik, Normal Wells and Fort Simpson would require much larger staffs. It is estimated that about 174 personnel would be required in the Northwest Territories to operate and maintain the pipeline system during its initial three years of operations.

Table 11.1-8 details oil pipeline operation and maintenance personnel requirements for all three district offices located north of 60°N. Each office would build from the 50 to 60 person level to about 100 people over the first 13 years of the project's operation. A wide range of experience, skills and trades would be required, ranging from district superintendent and engineering positions to general maintenance man-labourer type type positions. The largest demands would include topping plant operators, technicians, and maintenance man-labourers. With appropriate training programs, a considerable percentage of these positions could be filled by northerners within a few years of the commencement of pipeline operations.

Employment multiplier effects associated with operations and maintenance manpower would also approximate those used in earlier Mackenzie Valley Pipeline proposals. In general, such multipliers assume a one to one relationship between direct and indirect employment opportunities—that is, one additional indirect job for each direct job created, for a multiplier of 2.0*. Total direct and indirect employment opportunities by community are presented in Table 11.1-10, which is discussed in the following demographic section.

11.1.3.2 Demographic Effects

Table 11.1-9 summarizes estimated direct and indi-

*This does not diverge significantly from the long-term multiplier assumed for Beaufort development in Chapter 7.

TABLE 11.1-8

MACKENZIE VALLEY OIL PIPELINE
NORTHERN REGION OPERATIONS & MAINTENANCE PERSONNEL REQUIREMENTS
DISTRICT OFFICES

	Inuvik District					Norman Wells District					Fort Simpson District				
	Years of Operation					Years of Operation					Years of Operation				
Personnel	1	3	5	10	13	1	3	5	10	13	1	3	5	10	13
District Sup't.	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
District Engineer	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Pilot	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1
Flight Engineer	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1
Clerical/Secretarial	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Maintenance Supervisor	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Foreman	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Mechanic	3	3	3	5	5	3	3	3	5	5	3	3	3	5	5
Operator	4	4	4	6	6	4	4	4	6	6	4	4	4	6	6
Welder	2	2	2	4	4	2	2	2	4	4	2	2	2	4	4
Maintenance Man/ Labourers	9	9	9	12	12	9	9	9	12	12	9	9	9	12	12
Chief Technician	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Technician	15	15	19	29	29	14	14	19	26	26	14	14	14	26	26
Storekeeper	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Terminal Operator	4	4	4	4	4	—	—	—	—	—	—	—	—	—	—
Topping Plant Operator	5	5	15	30	30	5	10	15	25	25	5	5	10	25	25
Topping Plant Maintenance/Spare	1	1	1	2	2	1	1	1	2	2	1	1	1	2	2
Total Personnel	58	58	72	107	107	51	56	66	93	93	51	51	56	93	93
Stations in Operation	1	1	3	6	6	1	2	3	5	5	1	1	2	5	5
										Total Northern Region:	160	165	194	293	293

Source: Canuck Engineering, 1981.

TABLE 11.1-9
MACKENZIE VALLEY OIL PIPELINE
CONSTRUCTION PHASE MANPOWER DEMANDS
AND POPULATION EFFECTS, BY SEASON
1983-1991

Description	S 83	W 83/84	S 84	W 84/85	S 85	W 85/86	S 86	W 86/87	S 87	W 87/88	S 88	W 88/89	S 89	W 89/90	S 90	W 90/91	S 91	W 91/92
Direct Employment[1]	147	2857	1114	6899	2666	13489	2456	8940	874	180	412	150	444	150	664	150	621	150
Indirect Employment[2]	29	571	223	1376	533	2698	491	1788	175	36	82	30	89	30	133	30	124	30
Populations Increase:[3]																		
Single In-migrants	7	143	56	344	133	675	123	447	44	9	21	8	22	8	33	8	31	8
Married in-migrants including families	58	1142	446	2752	1066	5396	1964	3576	350	144	328	120	178	120	532	120	496	120
Total	165	1285	502	3096	1199	6071	2087	4023	394	153	349	128	200	128	565	128	527	128

NOTES:
[1] Since all direct employees will be housed in self-contained camps and work rotational schedules they are not counted as increases to the population.
[2] Assumptions: - 25% of all indirect jobs will be filled by single in-migrants.
- 25% of all indirect jobs will be filled by local residents or southerners on rotation living in temporary or camp-type accommodation
- 50% of all indirect jobs will be filled by married in-migrants with an average household size of 4.0.
[4] The effect for each season are shown separately. They are not cumulative.

Source: Canuck Engineering, 1981, and Industry estimates.

rect employment by season during the construction phase and the population increases which could be expected to result from such employment. These estimates are very sensitive to the assumptions made with respect to labour force behaviour in response to job opportunities.

All direct pipeline construction workers, whether local or in-migrants, would be housed in self-contained, isolated construction camps while on the job and would therefore represent no net increase to the permanent population of the region. On the basis of experience, it would seem reasonable to assume that 25% of all indirect jobs would be filled by local residents or southerners on rotation living in temporary accommodation. It would also seem reasonable that 25% of the indirect jobs would be filled by single in-migrants and the remaining 50% by married in-migrants with an average household size of 4.0. (This latter figure represents a rough average household size in the Inuvik and Fort Smith regions of the Northwest Territories according to the 1976 census data).

The population increase which would result in the Mackenzie Valley would rise rapidly in the early years of construction to a peak of about 6,000 people in the winter of 1985-86, and would fall off again rapidly as employment declined. Major increases in population would, in other words, be short-term in duration, and would occur primarily in the larger, predominantly non-native communities of Inuvik, Hay River and Yellowknife.

Population increases associated with pipeline operations and maintenance would be permanent and could be more important to the growth of some Mackenzie Valley communities in the longer term.

TABLE 11.1-10

MACKENZIE VALLEY OIL PIPELINE
OPERATIONS AND MAINTENANCE PHASE
POPULATION EFFECTS, SELECTED COMMUNITIES

Description	Years of Operation 1	3	5	10
Inuvik				
Direct Employment	67	67	81	116
Indirect Employment(1)	67	67	81	116
Total Employment	134	134	162	232
Projected Population Increase(2) (including families)	524	524	634	908
Norman Wells				
Direct Employment	51	56	66	93
Indirect Employment (1)	51	56	66	93
Total Employment	102	112	132	186
Projected Population Increase (2)	181	199	234	330
Fort Simpson				
Direct Employment	51	56	66	93
Indirect Employment(1)	51	56	66	93
Total Employment	102	112	132	186
Projected Population Increase (2)	203	223	263	370
N.W.T. Totals				
Direct Employment	169	179	213	302
Indirect Employment	169	179	213	302
Population Increase	908	946	1131	1540

Assumption:
That all direct and indirect job opportunities will be filled by new in-migrants to show a maximum possible population effect in any given year. These numbers are not cumulative.

Notes:
1. An operations phase multiplier of 2.0 was used; that is for every direct job an additional indirect job will be created.

2. Total employment was divided by the average number of workers per household and the result was multiplied by the average household size utilizing 1976 census values for these factors. They are as follows: Inuvik - 0.92 and 3.6; Norman Wells - 1.77 and 3.14; and Fort Simpson - 1.83 and 3.64.

Source: Canuck Engineering, 1981, and Industry estimates.

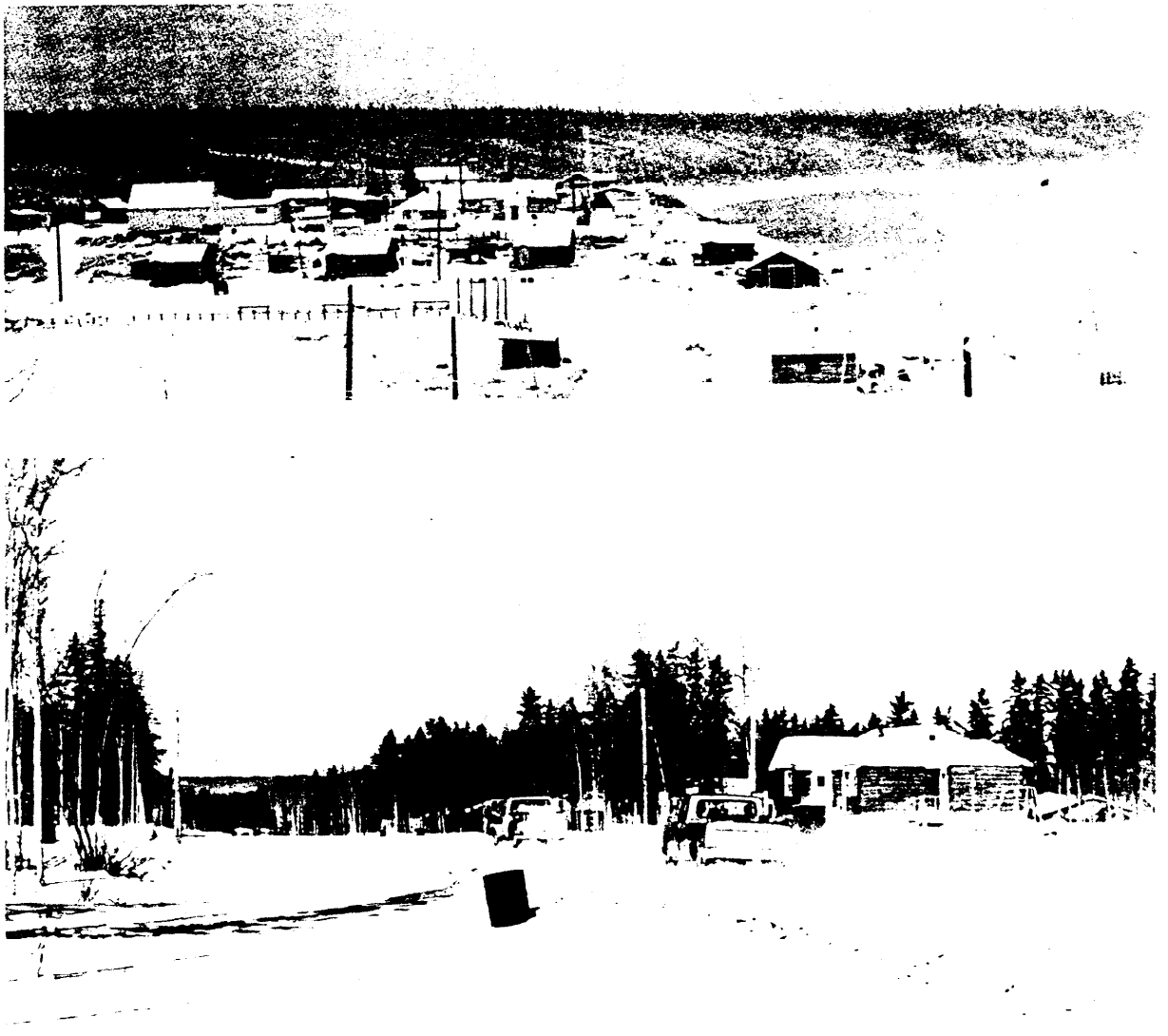


PLATE 11.1-5 *Two Mackenzie Valley communities that lie near the proposed pipeline right-of-way. Above, Fort Good Hope. Below, Wrigley, near which the Mackenzie Highway terminates. Courtesy: Outcrop.*

Since such increases would be associated with operations and maintenance employment, they would occur mainly in Inuvik, Norman Wells and Fort Simpson. Table 11.1-10 presents a breakdown by community of direct and indirect employment and related population growth.

As mentioned earlier, within several years of project startup, a high percentage of the operations staff could consist of northerners. However, in order to demonstrate the maximum possible population effect of the project, this analysis has assumed that all direct and indirect jobs would be filled by new migrants. To translate these jobs into population impact, total employment was divided by the average number of workers per household, and the result was multiplied by the average household size, utilizing 1976 census values. The resulting population increase would be about 950 people (about 525 in Inuvik, 200 in Norman Wells, and 225 in Fort Simpson) after three years of operation, increasing to a total of about 1,540 after ten years of operation. While these are sizeable increases, they are still small in comparison with increases anticipated at Inuvik because of Beaufort field development and production.

Population increases typically present the need for a higher volume and variety of public facilities (roads,

water, sewer, recreation, etc.) and services in a community. As well, any population change which is large relative to the base population, and which occurs rapidly, can lead to events and problems that communities will find disturbing. However, in an area like the Northwest Territories, the in-migration of people with technical and management skills can be beneficial.

Perhaps the greatest potential for harm in rapid population growth could result from the speculative in-migration of unskilled labour. Such labour would likely go to the larger communities primarily during the construction phase, and, given the prospect of continuing activity engendered by Beaufort development, could persist as a problem in such communities for a considerable period. Given the high activity levels expected for some Beaufort communities, there is a prospect that some transient labour would find its way to Inuvik and perhaps Tuktoyaktuk. However, the high rate of activity in these communities, especially in Inuvik, and probable high turnover rates could mean that many transients could find jobs.

Two additional factors should be considered. Firstly, almost regardless of timing, there will be several attractive intervening opportunities for speculative migrants in much more accessible locations such as Alberta. Secondly, the Alyeska experience is often referred to as an illustration of what could happen in the Northwest Territories. In fact, during the construction of the Alyeska pipeline, such factors as accessibility, construction plans and policies, degree of government planning and control, and Alaska's history of in-migrating booms, combined to create an atmosphere which was much more conducive to rapid and more permanent population growth than would be likely in the Northwest Territories.

11.1.3.3 Economic Implications

(a) Overview

The construction, operations and maintenance of a Mackenzie Valley oil pipeline would have a number of implications for the economy of the Northwest Territories, and especially for the economy of the Mackenzie Valley. In regional terms, the overall economic impact of the project would likely be small, even during construction, in relation to the total activity in the northern oil and gas sector. The technical character of pipeline construction, the specialized manpower and material requirements, the short mainline construction period, and the limited capacity of the economy of the Mackenzie Valley to provide inputs or to absorb expenditures, are all factors which would not be conducive to the generation of significant and pervasive effects.

The economic effects of the pipeline would vary from community to community and, in many communities, would be felt with any force only during the construction period. Community specific economic effects would depend upon a number of factors: the attitudes of local people and firms toward pipeline-related employment and contracting opportunities; government programs to assist local people and firms to take advantage of such opportunities; complementary policies and programs on the part of the Industry; and the degree to which community capital and labour might already be committed to other projects such as Beaufort Sea field development.

The public sector in the Northwest Territories would also be affected as a result of pipeline construction, operations and maintenance. Government programs would probably experience increased demands upon their personnel and resources, and budgets would likely have to be adjusted upward. However, the pipeline would be a factor in increasing government revenues via income tax and other levies.

(b) Agriculture

In general terms, the construction, operations and maintenance of a Mackenzie Valley pipeline would likely have little effect on this sector of the regional economy, which is located near the Northwest Territories-Alberta boundary. The existing market garden portion of the sector is small and only partially commercially oriented. It is difficult to see how it could develop fast enough to take advantage of the large, but short-term food requirements of the construction work force. Over the longer term, if the market garden industry expanded and sought commercial contracts, the smaller but continuing food requirements of the increased permanent population could provide some revenues.

(c) Forestry

In regional terms, the construction, operations and maintenance of the pipeline would not have a large or continuing effect on the forest industry. However, the potential exists for the encouragement of some growth at the level of the community or specific firm, particularly during the construction period.

Construction of the pipeline would require a large amount of saw logs, timber, rough sawn lumber, skids, stakes, posts and sawdust. These forestry products could be partially supplied from the existing commercial sawmilling operations, which include active mills at Fort Simpson, Hay River and Fort Resolution. Commercial sawmilling has also occurred at Jean Marie River but the mill is now inactive. A very small community mill at Wrigley could also supply some of the demand for lumber or timbers.

At this point, it is possible to say only that the business pipeline construction may engender for Mackenzie Valley sawmills would be determined by operator willingness to pursue opportunities, by the policies and programs developed by the Industry, and by the willingness of governments to assist local businessmen. It must be noted that during pipeline construction, timber cutting and sawmilling operations might experience higher than normal staff turnover and increased pressures for higher wages, factors which would likely force operators into a situation of ignoring opportunities the pipeline and Beaufort development could present.

(d) Fishing and Trapping

Commercial fishing and trapping are important sources of income for many native people and, as such, are significant to the local economy of most communities.

It is unlikely that the construction, operations and maintenance of the pipeline would have any direct effect on commercial fishing, much of which is concentrated on Great Slave Lake. Some indirect affects would be likely. The sector contains a number of part-time participants, some of whom might leave the industry as a result of the employment opportunities and higher incomes available in the construction and service sectors during pipeline construction. This need not be detrimental to the commercial fishery, since it is small and tends toward overcrowding, and there is a need to improve productivity. If marginal operators left the fishery permanently or left to return with additional capital from pipeline employment, productivity could rise. Moreover, the food purchasing requirements associated with pipeline activities could expand the market for commercial fish sales. The effects of an enlarged market would be most apparent in Great Slave Lake communities such as Hay River.

With respect to trapping, pipeline construction would be of concern to all of the Mackenzie Valley communities whose populations consist largely of native people. The local economy of communities would change if, as is likely, a considerable number of trappers would obtain construction work. Part-time trappers would be more likely to take such employment than full-time trappers. If this indeed happened, the overall productivity of the trapping sector might not decrease as there is the prospect that construction employment would enable trappers to increase their capital by the purchase of such items as snowmobiles, and to increase their funds for the purchase of inputs such as gasoline. Thus, pipeline construction could give rise to an improved and more productive trapping industry.

Some disruption of trap lines, and some local decreases in furbearer yields, could occur as a result of construction activity. The Industry would work with governments and local hunters and trappers to develop and implement methods of compensation for capital and income losses.

(e) Minerals and Hydrocarbons

Construction, operation, and maintenance of a Mackenzie Valley pipeline would influence the growth of the minerals and hydrocarbon sector of the Northwest Territories in several ways. In the short-term, building the pipeline would sharply raise demand for sand and gravel. When construction was complete, additional hydrocarbon exploration and development activities could follow, and could continue over a prolonged period.

Further comments on the effects of the pipeline are given below on an industry-by-industry basis:

- Construction of a pipeline would, as mentioned, raise the demand for sand and gravel. This would occur mainly in the central and upper Mackenzie Valley. The industry is currently composed of a number of small-scale operators and is not difficult to enter.

- Large volumes of sand and gravel needed for pipeline construction should provide a number of opportunities for new and existing firms. Because the sand and gravel business does not require much capital, and no higher skill level than that of heavy equipment operator, it would seem ideally suited for local enterprise in the Mackenzie Valley communities. The Industry is prepared to discuss opportunities with local businesses and to work with government to ensure that small contractors get their fair share of pipeline related contracts.

- The presence of the pipeline in the sedimentary area running along the Mackenzie River Valley could stimulate additional exploration activity, perhaps leading to the development of oil and gas fields that would not normally be developed because of their small size. It is impossible to do more than sketch out this possibility at this time and to emphasize that additional exploratory activity has occurred in other areas following pipeline construction. However, many other factors such as geological conditions and overall energy supply, demand, and price considerations have also been influential in decisions to explore areas in the vicinity of newly completed pipelines.

- The construction of a Mackenzie Valley pipeline would likely have little direct impact on mining in

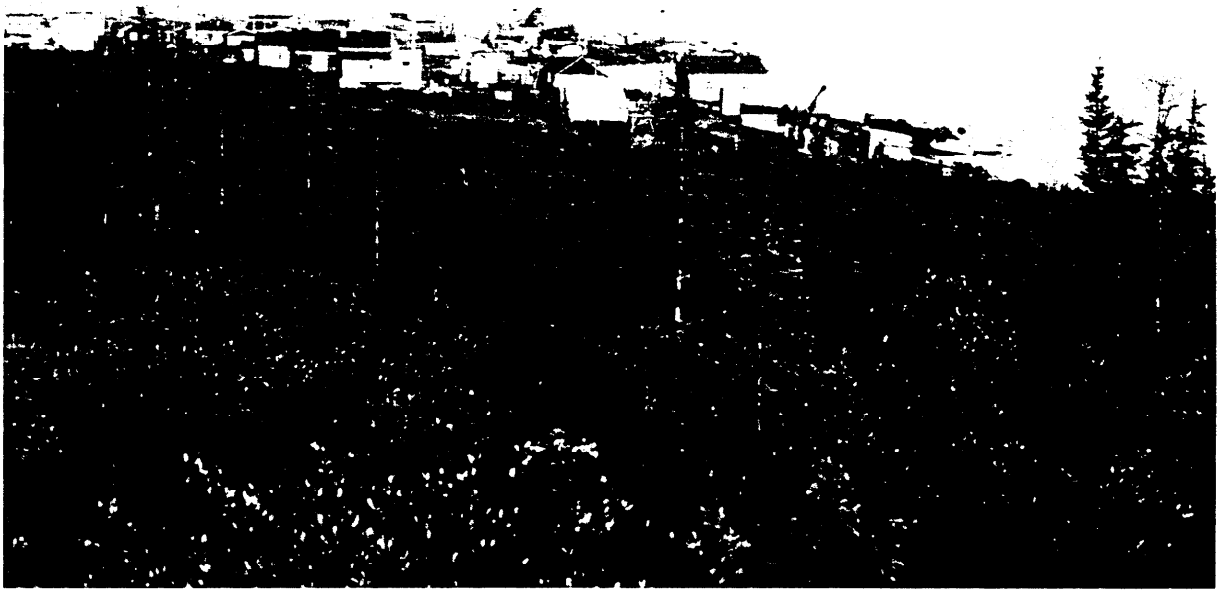


PLATE 11.1-6 *Fort Franklin on Great Bear Lake. The community is well off the pipeline right-of-way, but it is probable that local residents will participate in employment.*

the Mackenzie Valley or adjacent areas of the Northwest Territories. Some increase in the mining industry's long standing difficulties in obtaining and keeping labour might occur, particularly during peak pipeline construction activity.

(f) Manufacturing

The construction, operation and maintenance of a Mackenzie Valley pipeline would have some effect on the rudimentary manufacturing sector of the regional economy, depending on the degree to which opportunities were seized by resident business firms and government agencies. As an immediate effect, there would likely be an increase in the sales of native arts and crafts (which are not manufactured goods in the ordinary sense), and this would be concentrated primarily in the construction period. However, a more likely possibility, with , with greater longer term implications for economic growth, could be the manufacture of items such as concrete weights for the pipeline and portable camp housing. The manufacture of such items would perhaps not make sense for the oil pipeline alone, but they could be feasible if this pipeline were to be followed by a gas pipeline, and would make even more sense if they could be linked to field development in the Beaufort Sea.

(g) Trade

Retailers and wholesale suppliers would likely experience a surge of activity during construction, some increases in staff turnover and some upward pressures on operating costs as wage levels rose. These effects should not continue into the operations and maintenance period in most communities. However, it is unlikely that, once regional cost and price structures had risen, they would come down by an equivalent amount after pipeline construction had been completed.

(h) Construction

Most of the prime construction activities associated with the building of a major pipeline would be of a scale beyond the capabilities of the construction sector of the Mackenzie Valley. However, some activities, such as earthmoving, pad construction and line-clearing, could provide significant business opportunities for northern firms.

(i) Tourism

Construction of a Mackenzie Valley pipeline would benefit the tourist industry of the Mackenzie Valley. A principal effect could be to increase southern Canadians' awareness of northwestern Canada and its frontier character. Some increase in tourist traffic during construction and in the years immediately following construction might be anticipated. This increase would unlikely be of sufficient magnitude to justify the construction of new facilities but it might help to make struggling operations more profitable.

No pressures on existing or proposed recreational areas should be anticipated as a direct result of pipeline construction. Some trailer camps might experience an increase in business if people seeking employment moved northward into the Mackenzie Valley during construction. These pressures would most likely occur in the Hay River and Fort Simpson areas.

(j) Transportation and Communications

Construction, operation and maintenance of the pipeline would have a number of impacts on the transportation and communications sector. The Industry's policy would be to ensure that its activities and those of its contractors would not overload existing transportation and communications systems to the detriment of the regional population and economy. If it were necessary to do so, the Industry would develop special transportation and/or communications capacity in order to ensure that existing capacity was available for ordinary regional needs.

Pipeline construction would result in a large increase in shipping activities in the Mackenzie Valley via truck, tug-barge and air. Air transport would primarily be used for the movement of construction personnel, although some emergency movements of materials and routine shipments of perishables would also occur. The volume of material that would have to be transported during construction would represent an approximate doubling of river tonnages. Even though there is much excess capacity in the river system currently, new requirements would have to be carefully managed. On occasion, some overloading of available trucking capacity could occur, and additional capacity might have to be added or allowed to operate in the Mackenzie Valley. The availability of the rail line to Hay River provides additional flexibility in handling peak requirements.

No communication system overloads are foreseen as a result of pipeline construction activities and an expanded and improved communication network would result from pipeline operations and maintenance requirements.

(k) Services

Pipeline construction and subsequent operations and maintenance activities would provide a number of opportunities for the establishment or expansion of service businesses. These businesses could provide expediting, messenger, security, janitorial and other services during construction and could also provide a number of security, snow removal and seasonal painting services during operations and maintenance. Many of the contracts would be small relative to the contracts let for other project activities. However, in terms of the existing scale of the service industry in most communities in the Mackenzie Valley, the effect could be appreciable.

(l) Government

It is anticipated that a number of government departments and programs with statutory or delegated responsibilities for regulating, inspecting or monitoring various activities relating to pipeline construction, would experience increased work loads during the construction period, and would therefore require increased personnel and budgets. Few of these increased work loads would extend into the operations and maintenance phase.

Government departments and personnel charged with the responsibility for community services would find increasing loadings on their activities during construction, and possibly during the early part of the operations and maintenance period. During construction, staff turnover rates would likely be high and program operating costs would rise. Some social service programs would experience increased work loads and new initiatives might be called for in some communities. Staff allocation might have to be adjusted on a regional level.

The construction and operation of the proposed pipeline would result in increased revenues for the Government of the Northwest Territories from property, fuel, personal income and corporate income taxes. However, this increased revenue might still not be sufficient to cover increased expenditures. Vastly greater increases in revenues would be realized by the federal government as owner of the resources of the Beaufort region.

11.1.3.4 Social Implications

The discussion of the social implications of the oil pipeline project is organized into sections dealing with impacts on: housing and infrastructure; traditional and subsistence activities; socio-cultural activities; health service delivery; social service delivery; criminal justice; and the education system.

It is probable that the effect of the project on the small predominantly native communities would differ significantly from the effect on communities in which non-native residents form a large part, or the majority of the population. The larger communities are those which, due to location, infrastructure, and available services, would attract by far the largest proportion of pipeline related activity. These include Hay River, Yellowknife, Fort Simpson, Norman Wells and Inuvik.

Generally speaking, due to their size, administrative capabilities, and experience with rapid growth in the past, Hay River and Yellowknife, in particular, should be able to cope effectively with the social problems induced by the pipeline. Inuvik would also generally have no trouble coping with more disturbing social effects related to the pipeline, but the town would be under rather more severe pressure in that it would also be the focus of rapid growth associated with Beaufort field development. Norman Wells, as it now exists, could be expected to encounter some pressures due to pipeline construction and operation, but problems associated with this project should be less severe than those which it would have already encountered as a result of the Esso Resources field expansion. The community would, therefore, likely have had experience with methods that would help it to cope with problems the oil pipeline could raise. Although Fort Simpson should also be better prepared to deal with social implications of pipeline construction and operation as a result of the Interprovincial Pipe Line, the scale of the activities related to the Beaufort Sea oil line would be much greater and could result in additional difficulties, particularly during periods of peak activity. Because Fort Simpson has year-round highway access from the south, there would be few barriers to relatively unskilled people arriving from the south in search of jobs. Such people could be a disturbing and at times disruptive influence in the community and could compete with local people for jobs requiring few skills.

(a) Effects on Housing and Community Infrastructure

Pipeline construction is not expected to have a bearing on housing demand or community infrastructure in any of the native communities of the study area, since it would be unlikely to result in changes to the populations of these communities. Hay River and Yellowknife would experience short-term increases in demand for housing during the construction phase, but both communities are already experienced with demands of this nature and should be able to handle them. During the construction phase, pipeline related demands for housing in Inuvik would occur, but would be minor in comparison with demands related to Beaufort development. Norman Wells would experience some increased housing pressures, but if pipeline construction were phased properly with Norman Wells field development, this should present no problem. Fort Simpson is the community which could experience the greatest difficulty, especially if the project were to attract the unskilled and unemployed transient workers mentioned previously. The Industry would mitigate transience by hiring personnel who are not northern residents only at southern centres.

Operations and maintenance phase housing demands would occur in Inuvik, Norman Wells and Fort Simpson. Inuvik would need to provide for an additional 100 to 150 permanent households, but this level of demand would be minor in comparison with housing requirements arising out of Beaufort field development. Norman Wells would experience a demand equivalent to about one-third again as much as that generated by the current Esso Resources field development. Community administration should be able to accommodate this additional growth through appropriate planning. A requirement for an additional 50 to 60 permanent housing units in Fort Simpson should be easy to meet since the community currently has excess housing and land suitable for housing development.

(b) Impacts on Native Subsistence Activities

Construction of a Mackenzie Valley pipeline should have minimal effects on subsistence activities by native people in the Mackenzie Valley for three main reasons. First, it is unlikely that many residents of small native communities would seek pipeline construction jobs. Such jobs would not be especially attractive to native people because they would be of short duration and would not automatically or necessarily include a rotational work schedule similar to those which have applied to other projects, and which would apply to the oil pipeline during the operations and maintenance phase. Secondly, trapping is a shared activity. Even though pipeline construction would occur in winter, which is also the trapping season, the absence of a few hunter-trappers from a community would probably result in others taking up the slack. Thirdly, if a rotational work schedule were available to native pipeline construction workers, they would be able to trap, hunt or fish when they were at home.

Research on Coppermine (Hobart, 1981; Roberts, 1977) suggests that participation in wage employment need not interfere with harvest activities under certain conditions. The first condition is a job rotation schedule that allows sufficient time for harvest-

PLATE 11.1-7 *Dene culture, based on ancient traditions, is alive and well in the Mackenzie Valley. Above, drummers. Below, hand games.*

ing between shifts. The second condition is that renewable resources are sufficiently available so that they can be harvested relatively easily during work breaks. These studies show that for the native people of Coppermine, Arctic Bay and Pond Inlet working in oil industry rotational employment programs, cash income earned actually enabled them to improve their hunting and trapping capital, and that time off was sufficient to pursue hunting and trapping.

The pipeline could disturb native hunting, trapping and fishing along the right-of-way to some extent. While the right-of-way would try to avoid places that are especially important to native people, it would not be possible to avoid them all. Some traplines would, inevitably, be crossed by pipeline construction. Where damage was unavoidable, the Industry would be prepared to pay compensation for loss of property and livelihood in accordance with an agreed formula.

It is recognized that renewable resource harvesting is important in both economic and socio-cultural terms. There may be a change in levels of harvesting activity as people shift to wage employment when it is especially available; for example, during pipeline construction. However, apart from such surges in the demand for labour, regular rotational native employment programs have shown considerable success in allowing and even encouraging native people to follow a dualistic economic pattern.

Like people everywhere, northern native people are concerned about obtaining enough income during the course of a year to survive at what in their terms is an acceptable standard of living. Generally, they prefer that this income should come from the resources of the land, but if the land cannot produce enough, or if it provides uncertainly from year to year, or if the cash income that is received from harvesting furs fluctuates unpredictably, they are the first to know it, and the first to assess what other sources of income they can turn to. Even though it has also been unpredictable from year to year, wage employment is another source to which native people have increasingly turned. They do not, however, take wage employment because they prefer it to harvesting the land, but because it can add some stability to their lives and can make it possible for them to buy goods they could not have otherwise. Wage employment allows them to continue to be hunters, trappers and fishermen without suffering some of the extreme penalties that are, unfortunately, often a part of those occupations.

A proportion of the literature on the impact of pipelines and similar projects appears to argue that pipelines are somehow bad for native people and the native economy. The Industry would accept that this would be the case only if pipelines destroyed the options that the native people prefer. This would certainly not be the case with most pipeline projects and will certainly not be the case in the Mackenzie Valley. Indeed, pipeline construction and operations will open up options that the native people can use as they choose - options for short-term employment, options for rotational employment, and, for those that want them and are prepared to do the work required, options for careers with the oil and gas industry.

(c) Socio-Cultural Effects

The people of the Mackenzie Valley should not find pipeline construction especially disturbing in social and cultural terms for several reasons. The first two reasons are that the total number of native people employed on the project would be a relatively small part of the total native population, and that peak periods of construction activity would be relatively short. The third reason is that wage employment on

the pipeline and continued traditional pursuits are not necessarily competitive. Native people could work on pipeline construction for a time and then return to their communities. The fourth reason is the fact that southern personnel would be isolated from small native communities in self-contained camps. Because, typically, they work long shifts, seven days a week, pipeline workers would be disinclined to spend much time in the nearest town or village, assuming there was one nearby. In addition, the period of peak activity would occur during winter, discouraging travel to and from native communities.

An exception with respect to the foregoing would be the location of a considerable amount of activity in close proximity to Fort Norman. Cooperation between construction management, community leaders and the local RCMP detachment would be necessary to ensure that the contact which will inevitably take place is not disturbing to the community. There should really not be much of a problem because the native people of Fort Norman have coexisted regionally with the non-native people of Norman Wells for many decades now. Having witnessed undertakings such as the growth of the Norman Wells oil field and the construction of the Canol Pipeline, these people are familiar with industrial development and both its positive and negative consequences.

Two of the larger communities, namely Hay River and Fort Simpson, would bear a greater risk than the others of having normal community life interrupted due to pipeline construction activities. Hay River would be affected by the stockpiling and transportation of construction material and equipment. These activities would raise the local demand for labour and this could prove attractive to migrant job seekers. However, Hay River has played a leading role in transportation for many years and is accustomed to inflows of job seekers during the summer months. The general vicinity of Fort Simpson would be the site of considerable activity including: hauling of pipe and camp re-supply materials on the Mackenzie Highway; stockpiling and transshipment of project materials; construction of a pump station; construction of an operations and maintenance facility; and work associated with taking the pipeline across the Mackenzie River. This activity would provide considerable attraction to transient job seekers, but Fort Simpson has neither Hay River's capacity nor experience in dealing with such people. Since the population of Fort Simpson is about 60% native, and since previous periods of high economic activity have proved disruptive to these people, it is likely that pipeline construction phase would result in some social instability.

The operations and maintenance phase of the pipeline should result in no significant socio-cultural problems in any of the Mackenzie Valley communities.

(d) Impacts on Health Delivery

Since contacts between project construction personnel and native communities of the study area would be limited, it is unlikely that communities would experience increased problems from exposure to communicable diseases. With respect to the larger and more active communities, they are well experienced with transients, and it is unlikely that there would be any new problems that would not have already been encountered.

Each of the construction camps would be equipped with emergency medical facilities, and personnel and workers requiring more complex care would be evacuated by air to Inuvik, Hay River, Yellowknife or Edmonton. This being the case, there should be no adverse effects on the health service delivery systems of native communities in the Mackenzie Valley. However, it is likely that hospitals in Inuvik, Fort Simpson, Hay River and Yellowknife would experience some increased demand due to treatment of project related accident victims. This would not likely present a problem in Inuvik, Hay River or Yellowknife due to existing or planned increases in hospital capacity. Fort Simpson, however, has only a small hospital staffed by a physician and eight nurses and would probably be unable to cope with anything but occasional emergency requirements. The Norman Wells Nursing Station has occasionally had capacity problems in recent years, but measures taken to meet demands which could result from Esso Resources field development activity should be more than adequate to meet any demands resulting from subsequent pipeline construction activity.

The health care needs of the increased permanent population which would result from pipeline operations and maintenance activity in Inuvik, Norman Wells and Fort Simpson would readily be accommodated by existing or planned capacity of facilities in Norman Wells and Fort Simpson. While some additional pressure might be imposed on facilities in Inuvik, such pressures would be minor in comparison with requirements posed by Beaufort development.

(e) Effects on Social Service Delivery

While the reasons for it are not clearly understood, increased wage income levels in a native community have often been associated with a deterioration of community cohesiveness and increased welfare dependence. Potential social problems in native communities of the Mackenzie Valley during project construction would include alcohol abuse, child neg-

lect, family stress and breakdown and welfare dependency. Both the incidence of such problems and the adequacy and quality of services designed to deal with them would have to be monitored closely.

Increased income often means a higher incidence of alcohol consumption in native communities, at least in the short-run. Too much alcohol can lead directly to other problems such as child neglect and family breakdown. In recent years there has been greatly increased concern among native people about alcohol abuse and the problems which follow from it. This has resulted in efforts toward the strict control of alcohol, and many native communities have voted for liquor prohibition or rationing. How the communities of the Mackenzie Valley would respond to the problem of alcohol abuse during pipeline construction is difficult to judge. Material presented in earlier chapters suggest that most native communities are able to come to terms with increased alcohol availability, but in many cases only after considerably higher levels of consumption have become built into community norms. If there is a positive way of dealing with the alcohol problem, and the kinds of problems it in turn engenders, it must surely lie in helping community groups that are trying to deal with these problems. Such groups must be given every encouragement and the level of financial support that makes their work effective.

With the exception of Fort Simpson, the more active communities in the study area would be unlikely to experience significantly increased dependency, mental health problems, family stress or child neglect. These communities are already well experienced with booms and downturns, and their predominately non-native populations have, in the case of many people, moved north in the expectation of benefiting from development. Because over half of its population consists of native people, Fort Simpson may be more vulnerable to community stress, although the experience that was gained in dealing with a boom induced by highway construction in the 1970's should be helpful in the future.

The operations and maintenance phase of the Mackenzie Valley pipeline is unlikely to increase income levels sufficiently to influence the incidence of social problems in either native or non-native communities. In sum, while the social services delivery system would have to be increased to handle problems during construction, it could probably be scaled-down after the pipeline was completed and activity in the Mackenzie Valley returned to more normal levels.

(f) Impacts on Criminal Justice

In most of the native communities of the Mackenzie Valley, there is at least some correlation between the incidence of criminal offences and the level of alcohol abuse. Since it is excpected that the project construction phase would result in some increased alcohol consumption, there would likely be an increase in the offence rate as well.

The larger and more active communities, especially those which would experience an increase in transience and affluence due to higher levels of economic activity, could also expect to experience increased levels of criminal activity. In comparison with the present experience of these communities, the directly pipeline related increases should be modes in Inuvik, Yellowknife and Norman Wells, slightly higher in Hay River due to its greater accessibility to transients, and substantially higher in Fort Simpson. Offence rates in Fort Simpson increased sharply after the opening of the Mackenzie Highway. Since it would be the site of substantial construction phase activity, residents would likely earn increased incomes which would lead to greater liquor consumption and an accompanying increase in offense rates. The higher offence rates would necessitate more police, court and corrections services.

The foregoing is not meant to imply that increased enforcement and correction (meaning, for the most part, incarceration) is the only way to deal with boom induced criminal activity. Crimes committed by native people are usually of a petty, unpremeditated nature, and suggest that offenders would not have committed the crimes had they not been drinking, or if they had a better sense of the rules which distinguish criminal from legitimate behavior in the non-native world. A superior solution to crime in northern communities would, then, surely involve an easing of the kinds of stresses which make people drink excessively in the first place and the building of a greater consciousness of how people should behave in communities. Sentencing for crimes of a more petty nature could, as is the practice in Scandinavia and Greenland, include the performance of communal work, since there is probably no better way of learning to respect public property (or the property of others) than participation in building or maintaining that property.

The decline in incomes which would likely result from the transition between construction phase and operations and maintenance activity would likely lead to some reduction in alcohol abuse and, therefore, in offence rates and the need for police and court activities. The resulting rates could gradually decline to those associated with the minor increases in permanent population which would result from operations and maintenance phase employment.

(g) Effects of the Education System

Construction phase activity could generate short-term but substantial increases in school enrollment in the larger communities. Operations and maintenance phase populations would produce only minor enrollment demands which should fall well within existing or planned school capacities in Inuvik, Norman Wells and Fort Simpson.

With respect to student retention rates, there would be possibly contradictory effects. On the one hand, the higher wages that would be offered during the construction phase might tempt some students to leave school early to take advantage of wage opportunities. On the other hand, students recognizing that oil and gas development activity would generate a continuing demand for well trained workers, might tend not only to complete their secondary education but to pursue post-secondary educational opportunities, especially at Thebacha College at Fort Smith. This latter tendency would be related more to longer term careers during the operations and maintenance phase than to getting jobs during construction.

PLATE 11.1-8 *Fort Simpson. This important transshipment centre originated as a Northwest Company trading post in 1804. It will be an important site during pipeline construction and operation.*

11.1.4 MITIGATIVE AND OPPORTUNITY PROPOSALS

This section will not duplicate the discussion that appears elsewhere in this document and which describes Industry policies that would deal with the socio-economic effects of Beaufort development, but will rather focus on a few items which are especially relevant to the proposed pipeline.

The oil pipeline would undergo rapid construction, but would continue to generate a moderate level of activity for many years thereafter, thus raising a continuous demand for skilled trades people. This demand, combined with that induced by field development, production facility construction and long-term production, would seem to necessitate the development of an ambitious and comprehensive employment and on-the-job training program. The recent approval of the Norman Wells field development and the related pipeline was accompanied by requirements for the development of such programs by the Industry, and the commitment of complementary financial contributions by the federal government.

Although the need for community consultation in planning a major pipeline is obvious, it is particularly important in planning the location and timing of project activities so as to minimize interference with renewable resource harvesting on lands the communities consider important. A consultation program which recognizes the importance of local inputs to project planning would therefore have to be developed by the Industry.

It is probable that a pipeline construction project of the proposed magnitude would use major contractors whose employees are unionized. Since most northern businessmen and contractors are not unionized, special efforts would be taken to separate, both temporally and physically, project activities such as clearing and site preparation from mainline construction, in order to maximize northern contractor involvement.

The nature of the proposed pipeline is such that several issues would require further definition and reserarch. For example, the proposal calls for the development of numerous sources of borrow materials and very substantial total volumes of aggregates. Two related questions would require further analysis. Firstly, the question of the adequacy of aggregate supplies to meet both pipeline and long term community needs should be addressed. Secondly, the development of borrow sites would require building winter roads, and the potential for interference with renewable resource harvesting would have to be examined.

The combined effect of project related demands for skilled people of all kinds could result in depletion of essential skills in Mackenzie Valley communities. A study should be initiated which would determine mechanisms through which skills which are locally essential can be readily identified. This study should

include an action plan dealing with the continuation of services to communities.

11.2 DEMPSTER ROUTE

This section briefly discusses the socio-economic impact which may result if the Dempster Lateral pipeline is constructed to transport Mackenzie Delta-Beaufort Sea natural gas to market. Foothills Pipe Lines (Yukon) Ltd. was requested, as a condition of the approval for the Alaska Highway Gas Pipeline project, to file an application to construct and operate the Dempster Lateral in order to utilize the Alaska Highway pipeline to transport Canadian as well as United States gas to market. In June, 1979, Foothills filed its application for the Dempster Lateral Gas Pipeline Project with both the National Energy Board and the Federal Department of Indian and Northern Affairs. Volume 6 of that filing was the socio-economic impact statement and the following material is based on that document.

11.2.1 PROJECT SCENARIO

The proposed Dempster Lateral Gas Pipeline would originate on Richards Island in the outer Mackenzie Delta and would run parallel to the Dempster and Klondike highways through the northwestern Northwest Territories and northern Yukon. The proposed route veers westward from the Klondike Highway around Braeburn Lake and continues south, joining the proposed Alaska Highway Gas Pipeline about 50 km west of Whitehorse. The 86 cm diameter pipeline, about 1,200 km in length, would be built for a natural gas throughput of 34 million m^3/day. The gas would originate from three fields in the Mackenzie Delta, namely Taglu and Niglintgak on Richards Island, and Parsons Lake on the mainland, and from fields discovered offshore in the Beaufort Sea.

Permanent facilities along the right-of-way would include eight compressor stations, each occupying about 3.9 ha, and four meter stations, each occupying about 4.9 ha. Construction would take three years, and during each year, there would be two seasons, a winter season from January 15 to April 15 and a summer season from May 15 to October 30. Breaks between seasons may be necessary to allow for factors such as the migration of the Porcupine caribou herd. Construction of compressor and meter stations would take place in the two years immediately following pipeline construction. There would be 12 pipeline spreads, and construction crews would be housed in self-contained camps, each occupying about 3 to 4 ha. Administrative and expediting-warehousing personnel would also be required during project preconstruction and construction.

Transportation of supplies to construction spreads would precede spread construction by six months to one year. Most supplies would be moved by rail, truck, and barge. Major transshipment centres would be Whitehorse, Fort Nelson, Hay River, and Inuvik. A materials supply depot, occupying about 5 ha, would be established at Inuvik.

During pipeline operation, area offices, providing office and shop space on 3.2 ha sites, would be maintained at Carmacks, Dawson City, Eagle River, and Inuvik. These offices would serve as maintenance centres for the project. The Head Office and Technical Maintenance Centre would be shared with the Alaska Highway Gas Pipeline in Whitehorse. Meter stations, compressor stations, valve sites, and the right-of-way would be maintained from the Area Offices and Technical Maintenance Centres. About 20 to 25 persons would be needed at each area office. Since the Head Office and Technical Maintenance Centre in Whitehorse would already have been staffed for the Alaska Highway Gas Pipeline, only 16 additional people would be needed there for the Dempster Lateral Gas Pipeline.

When the Dempster Lateral application was initially submitted, it was envisaged that construction would occur from 1984 to 1986. Because of delays in the Alaska Highway Gas Pipeline and other factors, construction of the Dempster line is now unlikely until the late 1980's or the 1990's.

11.2.2 IMPACT ASSESSMENT

The Dempster Lateral pipeline would follow the route shown in Figures 11-1 and 10.1-1. It would pass near the communities of Tuktoyaktuk, Inuvik, Aklavik, Fort McPherson and Arctic Red River in the Northwest Territories, and Dawson City, Stewart Crossing, Pelly Crossing, Carmacks and Whitehorse in Yukon. Other Yukon communities, such as Old Crow and Mayo, might also be affected by it. It would join the Alaska Highway Gas Pipeline near Whitehorse.

In the Foothills application, baseline information and analysis is not organized or presented by community, but rather by broad groupings of economic and social variables. Material is organized into four major groupings with related sub-headings as follows: Key Social and Economic Variables (employment, population, incomes and cost of living); Infrastructure (transportation services, housing and serviced land, municipal services, health and social services, public safety, education services, communication systems, community recreation, government); Business and Industry (mining, tourism, local business, oil and gas, hydroelectric power); and Renewable Resource Use (hunting and trapping, fishing, reindeer herding, forestry).

In the application, Foothills (1979) states:

> It is the Applicant's belief that the Dempster Lateral Gas Pipeline Project can be constructed and operated with a minimum of adverse effects on the regional social and economic environment, and that a number of beneficial results of the project will accrue to the region. The Applicant's confidence in its ability to achieve this comes from the experience that it and others will have gained on the Alaska Highway Gas Pipeline Project. Further, the Applicant has developed policies aimed at minimizing potential adverse impacts and maximizing project-related benefits. The Applicant is relying on the cooperation of governments and others to assist in minimizing problems and making the most of opportunities the project will provide.

The analysis and policies supporting the foregoing statement are contained in Volume 6 of the Foothills application which readers may choose to consult.

11.3 POLAR GAS Y LINE

No application has as yet been submitted to government concerning the Polar Gas Y Line, although Polar Gas stated an intention to submit one about two years ago. It is understood that this application may now go forward in late 1982. The brief analysis which follows is in no way intended to prejudge any such material when it becomes public.

11.3.1 PROJECT SCENARIO

Polar Gas has for several years been actively considering the construction of a pipeline that would convey natural gas from the Sverdrup Basin of the High Arctic to eastern Canadian markets via a route that would follow the west coast of Hudson Bay. About two years ago, the company wrote the National Energy Board stating its intention to file an application for an alternative, more westerly route, that would enable it to transport gas from the Mackenzie Delta and Beaufort Sea in addition to the Arctic Islands gas.

Thus far, consideration has been given to four possible alternatives to the Hudson Bay route. Each of these would follow a common route from the High Arctic to the Northwest Territories mainland. This common route would proceed from Melville Island across M'Clure Strait, Victoria Island and Dolphin and Union Strait to a point near Coppermine. At Coppermine, two of the alternatives, the Y line routes, would proceed in a southeasterly direction to connect with existing pipelines at either Winnipeg, Manitoba, or Longlac, Ontario. The two other routes would proceed from Coppermine westward across the north shore of Great Bear Lake. One of these routes would then travel southward east of the Franklin Mountains, while the other would follow the Mackenzie Valley. Because Mackenzie Valley pipeline routes have already been discussed in this chapter, only the Y line alternatives will be given further consideration here.

Data concerning the Y line routes are preliminary, but the proposed pipeline from the Arctic Islands to Longlac, Ontario, would be approximately 4,100 km in length. This compares to the Hudson Bay route which would be 3,760 km long. The lateral from Coppermine to the Mackenzie Delta would add another 850 km to the overall length of the Y line. While the lateral would only by 76 cm (30 inch) pipe, the section from the Arctic Islands to Coppermine would be 91 cm (36 inches) in diameter. From Coppermine south, the diameter of the pipeline would be 107 cm (42 inches). Proposed throughput would be 38 MM m^3/day (1.35 Bcf/d) from the High Arctic, with an additional 22 MM m^3/day (0.8 Bcf/d) from the Delta, for a total of 60 MM m^3/day (2.15 Bcf/d) delivered to southern markets. The ultimate capacity of the pipeline could be increased to 3.5 Bcf/d (99 MM m^3/d) if the number of compressor stations were increased from the 27 original stations to 53 stations.

11.3.2 IMPACT ASSESSMENT

The routing of the Y line alternatives would avoid virtually all established communities in the Northwest Territories. This would create challenging logistical problems, but it would mean that the construction of the pipeline would have little effect in terms of direct disturbances to northern communities. Harvesting areas used by communities could, in some cases, be affected by pipeline construction, but since construction would proceed rapidly, the duration of any disturbances would be brief.

The pipeline would undoubtedly employ people from many northern communities during the construction and operations phase, and its effect on territorial income levels could be considerable. However, any more precise statement on this or other socio-economic factors must await the submission of the Y line application.

11.4 SMALL PIPELINE ALTERNATIVE

The Beaufort Environmental Impact Statement has primarily addressed the nature and consequences of large-scale, relatively rapid development scenarios,

but there are other projects which could also be envisaged. For instance, it may be desireable and feasible to develop the several on-shore and near-shore oil discoveries in the Mackenzie Delta which were made by several operators during the early 1970's. Esso is currently undertaking feasibility studies regarding the possibility of producing the Adgo and Atkinson discoveries at a rate or roughly 3,500 m^3/day. This oil would be transmitted to Norman Wells via a small diameter buried pipeline following a similar, if not identical, route to that proposed and discussed in Section 11.1. A small-scale project such as this would have impacts, environmental, social and economic, similar in nature to the pipeline alternatives discussed previously, with the important difference that the impacts, both postive and negative, could be much smaller and briefer in nature.

Because of the smaller reserve base necessary to justify a small diameter oil pipeline to Norman Wells (small relative to threshold reserves for a large diameter, elevated line) there may be an opportunity for an early development of this nature. This would result in a more phased development of Beaufort production with a number of significant benefits. There would, of course, be opportunities for wage employment and northern business development. Furthermore, by phasing development in this way, Northern residents and community leaders can determine, on a small scale, how the social and economic impacts, both positive and negative, associated with production are best controlled and managed to yield maximum benefits. Such knowledge would be very valuable in considering subsequent larger scale, rapid developments.

CHAPTER 12

PARRY CHANNEL COMMUNITIES

A major component of the Beaufort Sea development scenario is the transportation of oil and gas by tanker to markets on the east coast of North America. The tanker route would follow the Northwest Passage eastward through the Arctic Islands and then proceed southward through Baffin Bay and Davis Strait. Much of the route would be through Parry Channel, a long east-west body of water which includes such major bodies of water as Viscount Melville Sound, Barrow Strait, and Lancaster Sound (Figure 12.1-1). Although it is unlikely that there would be any major shorebased facilities along the route, year-round shipping through Parry Channel could nevertheless have some impact on the residents of Resolute Bay, Grise Fiord, Arctic Bay and Pond Inlet.

The eastern Arctic has not yet experienced the extensive industrial activity that has occurred in the Beaufort Sea and Mackenzie Valley regions of the western Arctic. The area's residents are still strongly dependent on hunting, fishing and trapping. During the last five years, an extensive body of knowledge has been developed on the biological character of the Barrow Strait-Lancaster Sound region. Environmental Assessment Panels' reports on proposals to explore for oil and gas in Lancaster Sound and to transport liquefied natural gas from the Arctic Islands by tanker, as well as the Green Paper on Lancaster Sound, all express concern about the environmental sensitivity of Barrow Strait and Lancaster Sound. These reports recognize the level of dependency of the adjacent communities and residents on renewable resource harvesting, and point out their vulnerability to activities and accidents that could damage the environment.

The purpose of this chapter is to examine the effects

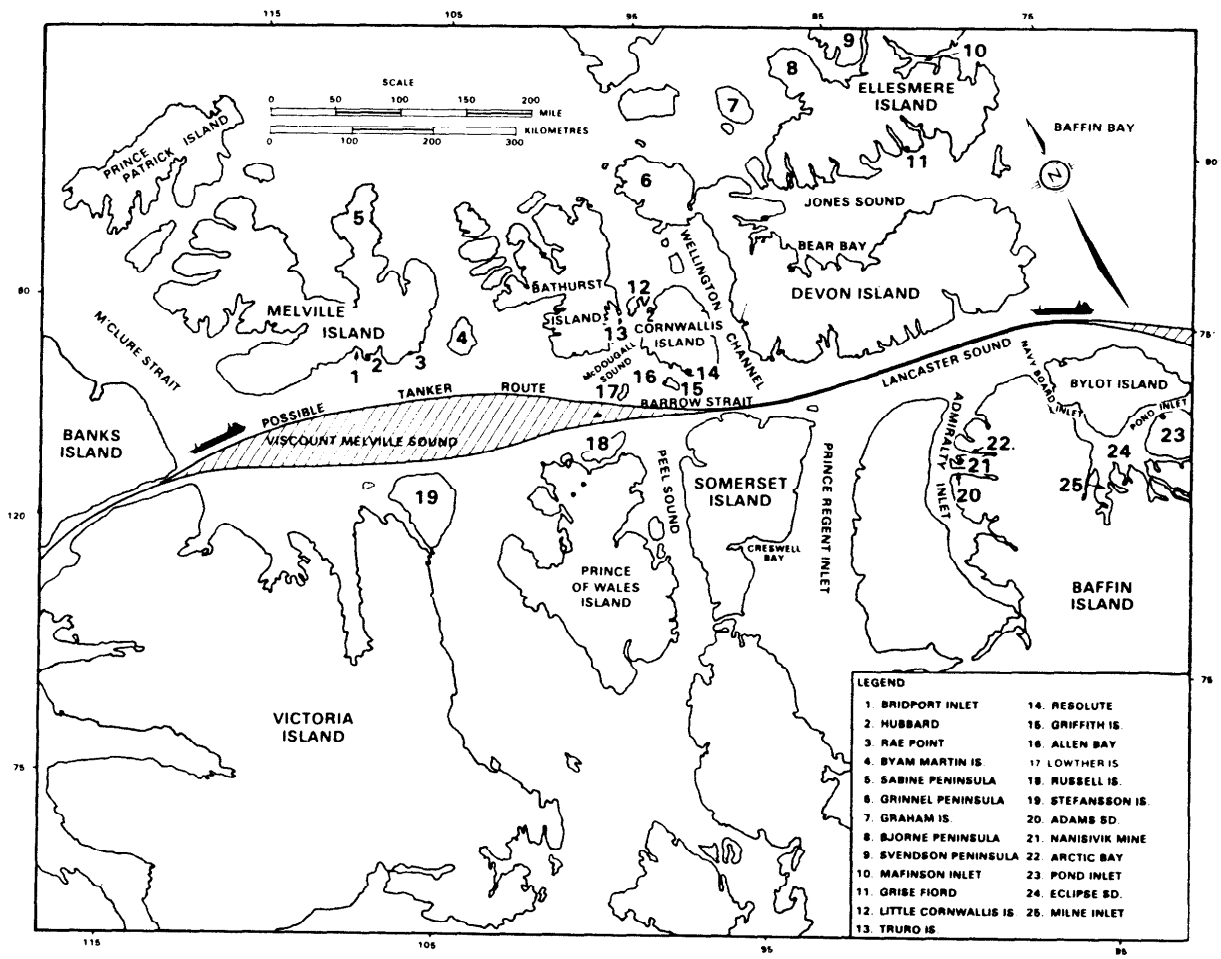


FIGURE 12.1-1 *Regional Setting: Parry Channel.*

that year-round shipping of oil and gas may have on the communities of Resolute Bay, Grise Fiord, Arctic Bay and Pond Inlet. An economic and geographical background is provided, followed by a discussion of proposed oil and gas activities in the Barrow Strait-Lancaster Sound region. Potential positive and negative impacts will then be reviewed, and the chapter will close with a summation of Industry policy proposals.

12.1 HUMAN AND ECONOMIC GEOGRAPHY

12.1.1 HISTORICAL BACKGROUND

The eastern Arctic has been inhabited by people of Eskimo stock for at least 4,000 years. The initial inhabitants, known as the Arctic Small Tool people, apparently migrated to the region from Alaska and occupied much of the Arctic Archipelago and coast until about 1000 B.C., when they were displaced by people of the Dorset culture, which may have evolved from the Small Tool tradition in the eastern Arctic. The Dorset people were in turn displaced by people of the Thule tradition, who migrated from Alaska at the beginning of the second millenium A.D. The Thule people are considered the direct ancestors of modern Eskimos, now called Inuit.

In the eastern and High Arctic, the Inuit's initial lasting exposure to non-native culture came with the whaling ships of the early 19th century. As the bowhead whale population declined rapidly because of whaling near the turn of the century, Inuit contact with the non-natives increasingly focussed on the fur trade, which began in earnest in the early 1900's. The Inuit traded furs, skins, ivory and seal oil for guns, ammunition and other southern goods. This activity occurred mainly in the Pond Inlet area where the Hudson's Bay Company established a post in 1921. A second permanent post was located in Arctic Bay in 1936. The establishment of these trading posts provided geographical focal points at which the Inuit could congregate and eventually settle in permanent homes. The trading posts also became places where the Federal Government established schools and other government services.

In 1947, the Federal Government established a weather station at Resolute, on Cornwallis Island, a step which was intended to help assert Canada's sovereignty over the Arctic Islands. As a further step taken in the early 1950's, the government convinced Inuit families to move from Pond Inlet and Port Harrison, Quebec, to new settlements at Resolute Bay and Grise Fiord. How the government attracted people to these locations is unclear, but people living there say that they were promised plentiful fish and

PLATE 12.1-1 *Eastern Arctic representatives attend Beaufort Sea Community Advisory Committee meeting. Industry information offices have been established at Frobisher Bay, Tuktoyaktuk and Inuvik.*

game and the opportunity to return home in two years if the new locations proved unsuccessful.

The post Second World War era has witnessed many changes in the eastern Arctic. Following the war, the Canadian government initiated a wide range of programs in the Arctic including education, health, housing, community infrastructure, social assistance, and local economic development. These programs were undertaken partly in response to the difficult circumstances in which many Arctic residents found themselves following the collapse of the fur trade, but they also represented an attempt to raise social and economic standards in the Arctic to levels comparable to the rest of Canada.

Many communities of the Arctic are not very old as places in which people live permanently, as opposed to places to which they originally came to trade, or because a mission was located there. The 1950's and 1960's saw a major movement of people 'off the land' toward a more urbanized lifestyle. Many people, especially older people, who now live in permanent communities such as Pond Inlet and Arctic Bay still strongly identify with the areas in which they were born and grew up. People still leave the communities seasonally to go to fish camps or to undertake prolonged hunting expeditions.

The Inuit of the eastern Arctic, and indeed the entire Arctic, may now be at a critical point of their history. Their urbanization has brought them many services, but has perhaps made them excessively dependent upon the government which must provide these services. As well, urbanization has localized hunting and trapping, and has depleted fur and game resources located within easy access of communities. Expectations have also risen, and there are few Inuit families which do not have snowmobiles, television sets, and modern appliances. Though this is not really a situation of their own making, Inuit live in a highly subsidized social environment and earn incomes which allow them to meet only a small part of their annual costs. Total subsidization of Northwest Territories residents averages out to about $7,000 per capita. In the eastern Arctic, it is likely higher.

Considerations such as the foregoing would suggest that the development of new sources of income should be a major priority for regions such as the eastern Arctic. Activities such as the transportation of oil by tankers could open a range of opportunities over the years in areas such as seamanship, communications, meteorology, ice reconnaisance, and environmental monitoring. Some of these activities could be performed by residents of the eastern Arctic without requiring them to relocate out of the region and others could require relocation on a rotational basis. Arrangements could also be made to have residents of eastern Arctic communities participate in Beaufort construction, drilling and production on a rotational basis. The Industry would wish to emphasize that considerable flexibility is possible with respect to industrial employment, and that taking such employment need not be incompatible with the Inuit lifestyle. Given the income and capital needs of eastern Arctic communities, such employment should in fact be highly supportive of that lifestyle.

12.1.2 THE PARRY CHANNEL COMMUNITIES

There are four communities in the Parry Channel region. Each has its own special character and history.

Pond Inlet is located on Eclipse Sound on northern Baffin Island, and is the ancestral homeland of the Inuit of the region (Figure 12.1-1). It is rich in prehistory and history. The region around it contains many archeological sites, particularly those of the Thule culture. Scottish and American whalers reached the area before 1820, and it was from that area, in the 1860's and 1870's, that an epic journey led by the Angakok Kridlak reunited the Inuit of Baffin Island and Greenland, a contact that had been broken for centuries. The Hudson's Bay Company opened a trading post at Pond Inlet in 1921, the RCMP arrived in 1922, and Anglican and Roman Catholic missions were established in 1926. Today, Pond Inlet has hamlet status within the Northwest Territories municipal system. The population is about 700, and over 90% of this is Inuit.

Arctic Bay, which also has hamlet status, is located on the north shore of Adams Sound, off Admiralty Inlet. While the site shows evidence of having been occupied for several thousand years, modern permanent settlement dates to the establishment of a Hudson Bay post in 1920. The current population, which is 95% Inuit, is just under 400.

Grise Fiord is located on the southern coast of Ellesmere Island. While again there is evidence of very ancient occupation of the area, the modern settlement dates to 1953 when the Federal Government moved Inuit from Port Harrison, Quebec, and Pond Inlet to Alexandra Fiord. Five years later, the RCMP moved their post from Craig Harbour, a distance of some 50 km to Grise Fiord, and the Inuit were again relocated to this new site. The current population of the community is about 100. It has settlement status within the Northwest Territories municipal system.

Resolute, on the south coast of Cornwallis Island was also the product of relocation. In 1953, Inuit from Port Harrison and Pond Inlet were relocated to Resolute to take advantage of the superior game resources of Cornwallis Island. With its airport,

which was built in 1947, the community has become a key transportation, communications and administrative centre, and is very important to oil, gas, and mineral exploration in the High Arctic. The current population is just under 200, of which about 90% is Inuit. The community is a settlement within the Northwest Territories municipal system.

The four communities now have a combined population of about 1,300, and have experienced some population changes of significance during recent years. The population of Arctic Bay has decreased since 1977 because people who had migrated there to take advantage of employment offered by the construction of the Nanisivik Mine returned to their home communities with the completion of construction. Some residents of Arctic Bay moved to Nanisivik to take jobs at the mine during the production phase. The populations of Resolute and Grise Fiord decreased because some of the residents of these communities returned to the communities they originally came from, namely Port Harrison and Pond Inlet. Pond Inlet showed strong growth until recently, when out-migration began to nearly equal the number of births. The population of the four communities is markedly skewed toward the younger age groups. Despite some of the trends mentioned above, there is a strong prospect that community populations will grow dramatically over the next twenty years.

The economic dependence of the four communities on the regional renewable resource base is the subject of the next section. Here there will be a brief discussion of employment opportunities within the communities and the experience with industrial employment.

Employment opportunities within the communities are limited. The Government of the Northwest Territories tends to be the largest employer, followed by local cooperatives, the hamlet or settlement council and the Hudson's Bay Company. The range of jobs undertaken locally in 1976, on either a full or part-time basis, is shown in Table 12.1-1. It will be noted that men tend to take jobs as heavy equipment operators, labourers, truck drivers, janitors or maintenance men, while jobs going to women tend to fall into the domestic, clerical or secretarial fields. The labour force of the communities is not, however, strongly differentiated along vocational or trades lines, and many local men and women are sufficiently handy to fill most of the limited range of jobs available locally.

PLATE 12.1-2 *Pond Inlet, a north Baffin community of 700 people on Eclipse Sound. The people here are worried that shipping oil through nearby Lancaster Sound could affect the marine mammals they hunt.*

TABLE 12.1-1

EMPLOYMENT RECORD FOR INUIT, PARRY CHANNEL COMMUNITIES, 1976

Current occupation	Number listed	Level of current employment: Full time	Part time	Seasonal/ casual	Not classified
(men)					
Heavy equipment operator, assistant, apprentice	26	10	1	11	4
Trucker driver, driver's helper	30	13	2	10	5
Maintenance man, janitor	17	16			1
Mechanic, mechanic's helper	12	10		2	
Carpenter, carpenter's helper	15	7	1	5	2
Painter, painter's helper	1				1
Welder	2	1			1
Electric power and wire communications worker	5	1		1	3
Electrical helper	1			1	
Gas pumping station operator	1	1			
Labourer	50	13	4	18	15
Roustabout	5			2	3
Physical science technologist	2	1		1	
Manager, administrator	9	3	2	1	3
Clerk	15	9	2	2	2
Policeman	2	2			
Interpreter	2	1		1	
Teacher, teacher's aide	3	2		1	
Case aide	1	1			
Not classified	41	3	1		37
Material handler	5	4	1		
Construction labourer	4	1		2	1
Hunter and trapper	15	6	1	7	1
Diesel plant operator	2	2			
Service unit operator, oil well worker	1	1			
Subtotal	257	108	15	65	69
(women)					
Clerk-secretary	14	3	11		
Clerk	14	3	2	2	7
Laundry woman - janitor	9	4	3		2
Janitor, cleaning lady, domestic	42	3	12	4	23
Maintenance, cleaning lady	3	1	2		
Radiotelephone operator	1			1	
Interpreter	6	2	2		2
Painter's helper	1				1
Cook, cook's asssitant	9	2		3	4
Not classified, other	130	1	3	1	125
Teacher, teacher's aide	8	6			2
Labourer	10	1	1	1	7
Physical science technologist	2	1		1	
Administrator	2	2			
Heavy equipment operator	1			1	
Communications worker	1	1			
Subtotal	253	30	36	14	173
Total (men & women)	510	138	51	79	242

Source: From Petro Canada, Arctic Pilot Project, Socio-Economic Statement North of 60° Latitude (original data from Territorial Employment Record and Information System (TERIS), Government of the Northwest Territories).

Table derived from Lancaster Sound Regional Study: Background Report III.

The local business sector has shown considerable development in Pond Inlet and Resolute. In Pond Inlet, there is some organization of business around tourism and fish and game resources of the locality, while many air charter and related firms have located at Resolute.

The residents of the communities, especially of Pond Inlet and Arctic Bay, have now had considerable industrial employment experience. Two projects have been especially significant - the Panarctic Oils, High Arctic Exploratory Drilling Program and the Nanisivik Mine.

The Panarctic program began in 1972. Crews from Pond Inlet and Arctic Bay were rotated to and from Arctic Islands drill sites by aircraft. The rotational system involved having the men spend 20 days at the work site and 10 days in their home communities, allowing them time to hunt and trap. The Lancaster Sound Regional Study makes the following comment on the Panarctic employment program (Dirschl, 1980):

> "Over the years Panarctic's rotation system has varied in detail, but it has always been viewed by Inuit in a positive manner - the length of time between shifts has permitted Inuit to hunt during their time off if they preferred, while the lengths of the shifts, with the large amounts of over-time earned, have meant that workers returned with large amounts of cash. Often up to a dozen men from each community have been employed at one time at Panarctic sites. Panarctic continues to employ men from Arctic Bay and Pond Inlet, though not in the numbers hired in previous years."

The Nanisivik program commenced in 1974 when many jobs become available to people from Arctic Bay, some 27 kilometres away, as labourers and heavy equipment operators. Arctic Bay experienced boom conditions not only because of such employment, but also because people moved to the community from other parts of Baffin Island to take construction jobs. When the mine was completed in 1976, people began to leave the community. Now in the operational phase, the Nanisivik Mine employs some 20 to 30 people from Arctic Bay. Most of these people continue to live at Arctic Bay and commute to the mine by bus.

More employment opportunities of the kind offered by Panarctic and Nanisivik will be needed in the future. The rate of population growth is likely to be high in the Parry Channel communities during the next 20 years, and it is unlikely that either employment or business opportunities available in the communities, or the renewable resource base, will be able to sustain a significantly larger population. This would suggest a situation in which increasing levels of subsidization (welfare) would play a major role, unless there was significant out-migration or a considerable expansion of the employment base.

The passage of tankers would not in itself add greatly to the regional employment base, since tanker crews require only so many people and these people must be highly skilled. Local Inuit could find a place on such crews, but only after considerable training. A more important source of expanding employment would be the activities that would have to take place onshore because of the year-round passage of tankers. These would include traffic control functions, reconnaisance and research. Many of these tasks could be performed in a manner that would be compatible with the small village life-style of the region.

The opening of the Northwest Passage to year-round navigation could induce considerable additional activity based on the minerals of the region, and perhaps on other activities such as tourism. Such prospects are discussed in Section 12.2.2. In total, such activities could add substantially to the regional employment base, and provide the people of the Parry Channel with a much more stable economy in the long run.

12.1.3 CURRENT NATIVE HARVESTING

Inuit hunting patterns changed as outpost camps were abandoned, people moved into permanent settlements and, in some cases, entered the wage economy. Nevertheless, subsistence hunting remains important as a source of protein, cash (through the sale of animal products), and cultural identity. The core areas used for hunting in recent years tend to centre on the communities, although much larger areas are used during occasional hunting trips and during pursuit of wide ranging species. In addition, some Inuit, supported by government policy, have recently returned to permanent outpost camps where they are highly dependent on subsistence hunting.

The present analysis deals with those aspects of resource harvesting that could be affected by the passage of tankers. The Arctic Pilot Project recently undertook an analysis of such activities (APP, 1981). Since this assessment was based on a thorough review of relevant literature and on field work it is quoted verbatim hereunder with some minor modifications. Other more general information on resource harvesting in the Northwest Passage region is available in Volume 3B.

"This section provides an overview of the harvest levels for each of the communities and then summar-

izes the present hunting patterns of the inhabitants of each community. For map references, see Figure 12.1-1.

12.1.3.1 Harvest Levels

Table 12.1-2 provides a summary of recent estimates of the annual harvest of marine mammals in the four communities. A camp at Kuvinaluk near Creswell Bay, Somerset Island, is not included in the table. Although animals killed by residents of Grise Fiord and Pond Inlet are rarely taken in Parry Channel, the harvests of these villages are included in the table, as the animals killed (with the possible exception of ringed seals) are elements of the same populations that occur in Parry Channel. The data presented in the table are of variable quality but are useful in providing a general view of the relative importance of each species. The data in Table 12.1-2 underestimate the extent of the seal harvest. Kemp *et al.* (1977) interviewed 70% of the hunters in Resolute and estimated that 545 ringed seals were taken by Resolute hunters in 1975. The corresponding figure from government data was 243 ringed seals. Similarly, the average ringed seal harvest at Pond Inlet is listed as 1,256 animals in Table 12.1-2, but detailed studies in 1973 and 1979 (Treude, 1977; Finley and Miller, 1980) show the actual harvest to be about 2,500 animals. These differences probably derive from the fact that the government figures are based on Fur Export Tax Returns and include only those pelts that are sold by the hunters. A variable proportion of the ringed seals harvested are actually sold, depending on price and condition of the pelt.

The 'Other Seals' in Table 12.1-2 are primarily the large bearded seals. In 1979, 25 bearded seals were taken at Grise Fiord, and 38 at Pond Inlet (Finley and Miller, 1980). Six bearded seals were taken at Resolute in 1976 (Kemp *et al.*, 1977). An occasional hooded seal is also taken at the Pond Inlet floe-edge. Other animals taken in marine areas include Arctic fox (coastal fast ice) and birds. The latter include thick-billed murres, eiders, geese and red-throated loons.

TABLE 12.1-2

AVERAGE ANNUAL HARVESTS OF MARINE MAMMALS BY COMMUNITIES IN THE VICINITY OF PARRY CHANNEL

	Resolute Bay	Arctic Bay	Pond Inlet	Grise Fiord
Beluga[1]	10	0	0	13
Narwhal[1]	4	97	113	3
Walrus[1]	1	2	3	18
Harp Seal[2]	1	10	17	98
Ringed Seal[3]	135	1225	1256	526
Other Seals[3]	27	16	3	1
Polar Bear[4]	34	12	13	33

Note: Based on data from Fisheries and Marine Service, DFO, Yellowknife
[1]Average of 4 years from 1975 to 1978.
[2]Average of 4 years from 1974 to 1977.
[3]Average of 3 years from 1975 to 1977 (Data unreliable - see text)
[4]Annual quotas from Schweinsburg et al. 1980.

PLATE 12.1-3 *Maintaining an isolated facility and a few miles of road is expensive in the Arctic. Heavy equipment at Resolute.*

12.1.3.2 Hunting Patterns

This section discusses the use of Parry Channel by the residents of the four communities. It is based on studies by Freeman (1976), Kemp *et al.* (1977), Finley and Miller (1980), and a series of interviews with hunters in Pond Inlet and Grise Fiord by K.J. Finley of LGL Ltd. for Petro-Canada as part of the eastern Arctic Marine Environmental Study (EAMES) program. In addition, interviews with experienced hunters in Resolute, Arctic Bay, Grise Fiord and Pond Inlet were conducted by K.J. Finley for the Arctic Pilot Project in September 1980. The latter interviews were intended to provide information about important hunting areas used by the Inuit, and important mammal habitats, and to gain information on Inuit concerns about the effects of liquefied natural gas (LNG) carrier traffic on resource-harvesting activities. No comments about the socio-political consequences of the project were solicited, since these were outside the scope of the study.

(a) Grise Fiord

Only a few hunters from Grise Fiord have travelled much in Lancaster Sound; there have been very few trips to Parry Channel in the past 15 years. One hunter who had lived at Dundas Harbour, on the south coast of Devon Island, was quite knowledgeable about that area. Another hunter who used to travel more extensively when he had a dog team recalled that as recently as 1968 he had crossed

Devon Island to Dundas Harbour, and then followed the coast west to Resolute.

It appears that the people of Grise Fiord make little, if any, use of Lancaster Sound at present. Recent trips to the area have been confined to coastal waters and fast ice shelves.

(b) Pond Inlet

Virtually all marine hunting activities by the Inuit of Pond Inlet occur in the Pond Inlet-Eclipse Sound-Navy Board Inlet area. This is true in winter and during the open water season when outboards and small boats are used. Relatively little hunting is done at the floe-edge across the north end of Navy Board Inlet or along the southern shore of Lancaster Sound. Most floe-edge hunting occurs at the east end of Pond Inlet.

Inuit from Pond Inlet do not use the ice-free waters of Lancaster Sound for hunting or fishing. A small amount of hunting (primarily for polar bears - Schweinsburg *et al.*, 1980) is done along the eastern and northern coasts of Bylot Island, but this occurs during the spring and is done on the coastal fast ice. There seems to be no recent use of the pack ice in offshore waters of Lancaster Sound by Pond Inlet hunters.

(c) Arctic Bay

Most of the marine hunting activities by the residents of Arctic Bay occurs in Admiralty Inlet. Floe-edge hunting occurs in the northern Admiralty Inlet-southern Lancaster Sound area in late winter and spring. Ringed seals and polar bears are the major species taken during the February to May period. The Inuit also hunt narwhals along the Admiralty Inlet floe-edge and in cracks and leads in the northern part of the inlet in June and July.

There are no harvesting activities by Arctic Bay residents in the offshore ice-free waters of Lancaster Sound. Only a few of the hunters have experience in hunting on the offshore ice of the sound. In most years, this ice is in intermittent movement, making travel extremely dangerous. Hunting on the offshore ice used to occur in late winter, conducted only with the use of dog teams. With the complete switchover to snowmobiles for transportation, there have been no recent hunting forays onto the offshore ice of Lancaster Sound.

PLATE 12.1-4 *Grise Fiord, a community of about 100 people on the south shore of Ellesmere Island, looking out onto Jones Sound. The people moved here from Port Harrison, Quebec, and Pond Inlet during the mid-1950's.*

One hunter interviewed in Arctic Bay remembered crossing the pack ice in Lancaster Sound to reach southeast Devon Island in the 1940's. Seals were uncommon on the offshore ice at the time and he had been unable to feed his dogs. The hunter said that polar bears were also scarce on the offshore ice but became numerous on the coastal ice of Devon Island.

It is clear that Arctic Bay residents now restrict their use of Lancaster Sound to the southern margin of the sound in the vicinity of northern Admiralty Inlet.

(d) Prince Regent Inlet

Although there are no communities in Prince Regent Inlet, there has been limited hunting on the ice of northern Prince Regent Inlet in recent years. In the period 1975 to 1979, four polar bears were taken by hunters from Arctic Bay and four by hunters from Pond Inlet (Schweinsburg *et al.*, 1980). These activities are probably related to travel between these communities and Somerset Island.

(e) Resolute

Resolute is the only community that borders on Parry Channel. Marine hunting activities by residents of Resolute are concentrated in Barrow Strait; consequently the people of this community are concerned about the potential effects of year-round shipping activity through Barrow Strait. The marine hunting patterns of Resolute hunters are discussed by season in the following paragraphs.

Winter ice conditions in Barrow Strait can be quite variable, but there are several recurrent patterns. Knowledge of these patterns is important to the hunters. Ice cover has usually formed in sheltered coastal areas by late September. Hunters may begin to hunt ringed seals on the relatively thin ice during October, when the seal's breathing holes are fairly easy to locate. Polar bears also hunt seals in these areas, and are in turn hunted by Inuit.

Hunting is conducted during the dark period from early November through early February. At this time seals are hunted at breathing holes in thin ice along recurring ice cracks (Nukutik). The most common such hunting area is along a crack that forms between Cape Martyr and Griffith Island. Kemp *et al.* (1977) believe that about 80% of the hunting during the dark period is concentrated in the area bounded by Resolute Bay, Allen Bay and Griffith Island.

The most intensive hunting period is during the spring when light is available and conditions for travel on the sea ice are good. Ringed seals and polar bears are the major species taken during this period. Ice conditions determine the locations in which seals are most common and most accessible to the hunters. Both polar bears and Inuit tend to concentrate their hunting efforts in such areas. Important areas with recurring ice cracks and leads are between Griffith and Lowther islands, off the east end of Russell Island, and the thin ice associated with the floe-edge between the coastal fast ice and the offshore ice sheet in eastern Barrow Strait.

The ice sheet in the centre of Barrow Strait remains in restricted motion until February or March in most years. The border zone between the offshore ice sheet often separates from the coastal fast ice, forming temporary open water leads. These leads freeze rapidly and are used by subadult, non-breeding seals. The breathing holes in this thin ice are relatively easy to find. Because polar bears also hunt these subadult seals, the bears are also available to Inuit. This flaw zone occurs along both the north and south shores of eastern Barrow Strait, but is more pronounced along the north side, since the prevailing winds tend to raft ice against Somerset Island on the south side.

During the winter and spring, most hunting occurs at the floe-edge and at the recurrent ice cracks. Little hunting is conducted specifically for seals on the offshore ice of Barrow Strait. The offshore ice is used as a travel route to hunting areas on Somerset and Prince of Wales islands and on nearby sea ice. During these snowmobile trips, polar bears are taken when encountered.

During the open water season the diversity of marine mammal species increases, but the area of hunting decreases, compared with the spring period. Small boats and outboards are used primarily in coastal waters along southern Cornwallis Island and less often in McDougall Sound. Ringed seals are the main objective of these hunts, although small numbers of bearded seals, beluga whales and walruses are also regularly taken. Resolute Inuit rarely venture into unprotected offshore waters in the small boats."

12.1.3.3 Conclusion

From the foregoing, it would appear that only the harvesting activities of the Inuit of Resolute could be influenced by the frequent passage of tankers. Most of the marine hunting activities of the Resolute Inuit occur in coastal areas during the dark period. As the length of the day increases, the hunting area is expanded to include the areas of Griffith and Lowther islands and across Barrow Strait to Russell Island. The offshore ice is used as a travel route to gain access to hunting areas on Prince of Wales and Somerset islands. The major concerns of the Resolute Inuit are the potential interference by ship tracks with winter offshore travel to more distant hunting areas and the possible disruption of annually recurring ice cracks.

No mention has been made in the foregoing text of the regional dependence on terrestrial animals and on fish which are harvested in inland areas. Caribou, char, and various types of wildfowl (for both meat and eggs) are indeed important to the Parry Channel people. The passage of ships should however have no direct bearing on the harvesting of such species.

12.2 SCENARIO FOR FUTURE DEVELOPMENT

12.2.1 BEAUFORT SEA RELATED DEVELOPMENTS

Dome, Esso and Gulf have proposed that oil production could begin in 1986. Production rates would vary depending on the scenario used but one means of transporting this oil to southern markets would be by oil tanker through the Northwest Passage. There is also potential for gas production in the Beaufort Sea region. Production would probably not commence until 1992. Although gas could also be transported south by icebreaking liquefied natural gas (LNG) tankers, this is less likely than by overland pipeline. Volume 2 of this EIS should be consulted with respect to possible Beaufort development plans.

The Parry Channel communities' greatest potential for impact from Beaufort Development would occur from the transportation of oil and possibly liquefied natural gas south by tanker through the Northwest Passage. Projected rates of production for an intermediate scenario indicate that in the year 2000 there could be as many as 16 tankers delivering oil from the Beaufort region. Assuming that each round trip would take 30 days and that each tanker would make 12 trips a year, there could be an average of one ship per day passing any point in the Northwest Passage.

The Industry recognizes the potential impacts which ship traffic of this magnitude could have upon the residents of the Parry Channel communities. Concerns have been expressed about the effect of ships upon the region's marine mammals and sea birds, the impact of ship tracks upon the movements of Resolute hunters across Barrow Strait and Lancaster Sound, and the highly remote possibility of a ship ping disaster and accompanying oil spill. The Industry is prepared to work with the people of the Parry Channel communities in order to more accurately determine and control the effects Arctic tanker traffic may have on their lives.

An extensive program has been developed to ensure that the tankers being designed will be as safe as possible. The icebreaker KIGORIAK has been in service for over two years and has gained valuable information on design and icebreaking techniques. For testing purposes, Dome plans to build and operate a Class 6 (experimental 10) vessel which will be tested extensively for technical information, and will be used to help determine the effects of year-round shipping on the environment.

12.2.2 OTHER POTENTIAL DEVELOPMENTS

The Geological Survey of Canada predicts that the ultimate oil and gas potential of the Arctic Islands is approximately 320 trillion cubic feet of gas and 17 billion barrels of oil. The Arctic Pilot Project is the first industrial venture that proposes to exploit the hydrocarbon reserves of the Arctic Islands. The project would involve developing the gas fields of the Sabine Peninsula of northern Melville Island. Two hundred and fifty million cubic feet of gas per day would be produced from these fields. This gas would be transported by pipeline to a harbour facility at Bridport Inlet on south Melville Island where it would be liquefied and then transported by tanker to southern markets. The scheduled start-up date for this project is approximately 1986.

The Arctic Pilot Project has conducted an extensive community relations program in the eastern Arctic. It has attempted to keep local residents informed of their plans and to work with them on perceived problems emanating from the project. The project has committed itself to employing as many native people as possible and to using northern based support services.

The Parry Channel region is also known to contain significant mineral deposits. One lead-zinc mine, the Nanisivik Mine, is already in production. It began operations in 1976. In 1978, it produced 128,486 metric tonnes of zinc concentrate and 11,900 tonnes of lead concentrate, all of which was shipped from Arctic Bay. Current reserves of 5.3 million tonnes are composed of 1.54% zinc, 1.23% lead and 51 g/t silver. Some 200 people are employed at the mine.

Arvik Mines, owned by Cominco, has two significant deposits on Little Cornwallis Island. The Polaris deposit should be in production in 1982. It contains 22.7 million tonnes of ore which consists of 14.1% zinc and 4.3% lead. When in operation, the mine is expected to employ 250 people. Arvik's other deposit, the Eclipse Deposit, is much smaller, containing about a million tonnes of ore. It is located some 50 km north of the main Polaris Deposit.

A large iron ore deposit owned by Baffinland Iron

PLATE 12.2-1 *Butchering walrus. Marine mammals are extremely important to the people of Parry Channel. Ringed seal is by far the most prominent species taken, and walrus is taken occasionally.*

Mines is located near Mary River some 10 km south of Milne Inlet on northern Baffin Island. Five deposits contain reserves of 112 million tonnes of 68% iron. The potential for additional reserves is excellent, but the project as a whole is not economically viable at present.

The potential for substantial additional mineral occurrences exists. The Lancaster Sound Regional Study (Dirschl, 1980) notes the following:

> "Intense exploration has been undertaken for lead-zinc mineralization of the Mississippi Valley type within favourable Helikian and Ordovician carbonate zones of northern Baffin Island and the Cornwallis lead-zinc district. The Cornwallis lead-zinc district encompasses all Cornwallis and Little Cornwallis islands, Grinnell Peninsula of Devon Island, the east edge of Bathurst Island, Little Truro Island, and other small islands. Exploration in this area has no less than 12 lead-zinc occurrences in addition to the deposits discussed above."
>
> "Uranium exploration has been undertaken in north-central Baffin Island and on the west side of Somerset Island.... To date no significant evidence of uranium has been found. Exploration for copper mineralization has been undertaken in a large belt... on the north part of Victoria Island. Several occurrences have been defined."
>
> "Ultrabasic and kimberlite intrusions that are diamond-bearing (geological structures) have been defined on Somerset Island. Unfortunately exploration to date indicates that the diamond content is quite low."
>
> "Coal occurrences are found on most of the islands adjoining the Northwest Passage, including Prince Patrick, Banks, Melville, Bathurst, Cornwallis, Devon, and Baffin islands. Coal exposures are found in rocks from upper Devonian to Tertiary in age. Most occurrences are of bituminous coal found in Lower Cretaceous sediments. Coal deposits near the Salmon River and west of Pond Inlet on north Baffin Island were mined intermittently for heating purposes from 1925 to 1960. These deposits may be of increasing importance to the people of northern Baffin Island due to the increase in the cost of oil products" (Dirschl, 1980).

The Parry Channel region's economic future is not limited to non-renewable resource development. Fishing and tourism could also be significant. Currently, fishing is not performed on a commercial basis, and most people fish only to satisfy their own needs. However, it is possible that the activity could be developed into a viable small-scale industry which could provide employment and income for local people. Fishing lodges, featuring sportfishing holidays, could also add to the local economy.

Increased air traffic has made the north more accessible to southerners. This factor, combined with the beauty and history of the eastern Arctic, presents some communities with considerable opportunities for tourism. As an industry, tourism is relatively labour intensive, and requires only limited entry capital. However, if managed incorrectly, tourism does have potential for negative effects on the environment.

Oil has recently been discovered near Lougheed Island. This was the second oil discovery in the Arctic Islands in the last two years and has raised hopes that significant oil reserves exist in the region.

The near future will likely witness increased attention on other areas of the eastern Arctic. Norlands has already made one unsuccessful application to drill exploratory wells in Lancaster Sound. Petro-Canada has begun to develop plans for exploratory drilling in this same area and in Baffin Bay, hoping to implement its program within the next three to five years. Southern Davis Strait will also continue to be a focus of activity for the oil industry with Petro-Canada currently drilling in this region and with Canterra Energy (formerly Aquitaine) and Esso planning to resume their exploration programs within the next few years.

Oil and gas have the potential to be a major component in the eastern Arctic's economic future. The next few years will almost certainly disclose substantial reserves of oil and gas. The remoteness of most Arctic hydrocarbon discoveries will permit a substantial latitude with respect to how much residents of the region will be affected by oil and gas development. If this is the wish of regional residents, resource companies can bring all their workers and supplies from the south, leaving northern communities virtually untouched by development. On the other hand, if residents wish it, these same companies would endeavour to employ local people in a variety of positions, support the establishment of northern businesses, and assist in the development of the communities.

Even with the opportunities described above, Parry Channel communities still really do not have many development options. They will be able to be participants in non-renewable resource activity and in other modern activities, but it is extremely important that they do not lose their access to the region's renewable resources because, in the long run, this resource base represents a stable and continuously attainable source of income.

12.3 INTERACTION

12.3.1 BEAUFORT SEA DEVELOPMENT — PARRY CHANNEL COMMUNITIES

The Parry Channel communities will likely experience little impact from the year-round transportation of Beaufort oil and possibly gas by tankers through Barrow Strait and Lancaster Sound. The crossing of ship tracks, possible oil spills, and direct effects on wildlife have been the most prominent concerns expressed by Parry Channel residents with respect to such transportation and are, understandably, viewed by residents as posing a threat to their way of life and their economy.

Residents of Resolute have expressed particular concern about ship tracks. Local hunters and trappers use the ice extensively in the winter months for harvesting both on the ice itself and for crossing to Griffith and Lowther islands. From January to June they cross Barrow Strait to Somerset Island to trap and to hunt polar bear. They fear that the tracks will be difficult, if not impossible, to cross with their skidoos and komatiks.

Studies, such as recent Industry ship track studies (see Volume 4, Chapter 4), and experience, indicate that ship tracks may not be as serious a problem as presently perceived by Resolute hunters. In the Beaufort Sea, the broken ice left behind ships tends to fill in the tracks immediately under most conditions and freeze very quickly, in a matter of minutes in most instances. Residents of Tuktoyaktuk are able to operate snowmobiles over ship tracks in and out of Tuktoyaktuk harbour. The Industry recognizes that there is insufficient information to determine the precise effects of ship tracks, however, and it will work with hunters to determine how and when ship tracks can be most safely crossed. Special attention will be paid to whether it is preferable for ships to use the same track continuously, or whether a number of tracks should be used in sequence.

With respect to oil spills, local residents feel that oil spills are inevitable and that the result would be catastrophic. The Industry is doing everything possible to reduce the chances of a major spill occurring, and has spent a great deal of effort on the design of safe oil tankers. It should be born in mind that the transport of oil in bulk is not a new activity to the Arctic; substantial annual volumes of bulk oil are currently transported to communities, defence installations and weather stations by the Coast Guard during the summer season. In addition to the initial safety built into the ships, Industry is preparing detailed contingency plans for dealing with a major oil spill in the Northwest Passage should one ever occur. For more information on this topic and the possible implications of major oil spills, the reader is referred to Volume 6.

During forthcoming years, the Industry will work with the residents of the Parry Channel communities to ensure that they fully appreciate the high degree of safety associated with tanker design. It will also ensure that local residents are fully aware of the contingency measures which would be implemented if a spill did occur. The importance of the marine environment to the communities and, indeed, all Canadians is fully recognized by the Industry and it will make every effort to minimize threat to the environment.

With respect to direct effects on marine mammals, a primary fear is that frequent year-round ship passages will frighten the seals, narwhals and whales away. More specific concerns include: the underwater sound from the ships' propeller will drive away

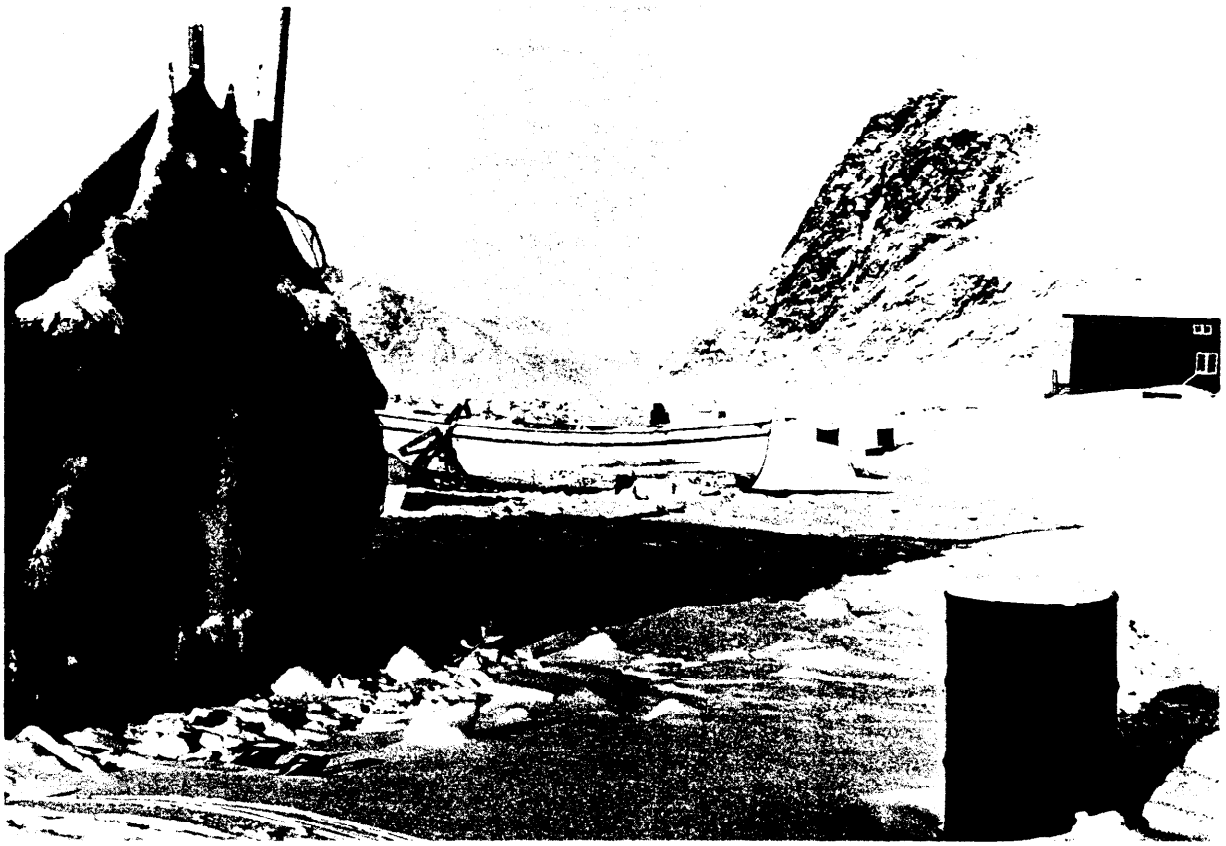


PLATE 12.3-1 *Wherever one goes in the eastern Arctic there is convincing evidence of man's use of the land, sea and ice. Scene at Grise Fiord.*

the whales and especially the narwhal; the icebreaking tankers will kill seal pups while they are in their dens in the ice; and seals and whales will follow the artificial leads created by the ships and subsequently become trapped in them and eventually die.

The Industry's experience to date in the Beaufort Sea indicates that ship presence and other marine activities have not had any detrimental effects on marine mammals, but research will continue into potential problems. The proponents feel strongly that northerners must be included in these research activities in order that effective use can be made of their environmental experience and to be certain that the research results are satisfactory to all parties. Readers should refer to Volume 4, Chapter 4 for a thorough assessment of the possible effects of navigation on marine fauna and related matters in the Northwest Passage region.

The passage of ships is not projected to have a detrimental effect on caribou, which may move from one Arctic island to another. The movement of caribou populations is primarily east-west through the islands north and south of Parry Channel, and such interchanges would not be affected by ship tracks (FEARO, 1980).

The apprehensions of residents of the Parry Channel communities do not only concern specific projects or programs of development, but also possible changes of a longer term, cumulative nature. Regional people are understandably worried about the buildup of shipping via the Northwest Passage, a point that is made by the Environmental Assessment Review Panel that considered the Arctic Pilot Project:

"Many intervenors felt that the Arctic Pilot Project would be the first of many proposals involving shipping through the Northwest Passage on a year-round basis. Credence was given to this concern by reports of large-scale (30 to 50 ships) proposals to move oil, gas, and minerals to southern markets through the Northwest Passage from Alaska and from Canada's western and High Arctic regions. Consequently, many felt that the Arc-

tic Pilot Project should not be examined in isolation but that rapid increases in shipping, up to 1,000 annual transits by the year 2,000, also had to be considered before the project could be viewed in a proper perspective (FEARO, 1980)."

In the case of the Arctic Pilot Project, the panel recognized the limitations on the extent to which any particular proponent could account or take some responsibility for projects that occurred concurrently or succeeded its project. While the present panel may also be willing to recognize such limitations, the point that people are worried about, cumulative impact, and that such impact has to be dealt with, nevertheless remains. The Arctic Pilot Project panel said the following in this respect:

"The panel recognizes that an individual proponent cannot be held responsible for future developments not under its control; rather the federal and territorial governments, in consultation with Inuit residents, and industry should be responsible for long-range planning and a determination of development priorities."

"The Department of Indian Affairs and Northern Development and the Government of the Northwest Territories must assume leadership in such an endeavour and should move rapidly to demonstrate that planning for such development is in place."

To deal with prospective increased future shipping frequency, the Arctic Pilot Project panel recommended the establishment of a marine authority for the Arctic:

"The Department of Transport is the government agency responsible for regulating shipping. The panel recommends, therefore, that the Minister of Transport establish a control authority to monitor, assist, and regulate ship movements in the Arctic, particularly the Northwest Passage, on behalf of the Government of Canada."

"To assist it further, the Department of Environment and Fisheries and Oceans should establish an advisory committee which would recommend and approve studies necessary to allow biological information to be effectively integrated into the route selection process. Membership on this committee should include the proponent, Inuit, the territorial government and other federal departments. Moreover, government departments should evaluate their regulatory mechanisms to make them applicable for year-round shipping in the Arctic."

The Industry supports the foregoing proposal which is presently being implemented. It would go a long way toward satisfying concerns about the build-up of shipping and possible cumulative impacts. To say that large volumes of shipping are unsafe requires that one postulates the conditions under which such shipping takes place. Given proper control, shipping volumes could perhaps increase to several times the levels proposed by the present proponents without significant impacts occurring.

12.3.2 POTENTIAL BENEFITS

There are a variety of ways in which Parry Channel communities can benefit from Beaufort oil and gas development. Although it is unlikely that the shipment of hydrocarbons by icebreaking tanker through the Northwest Passage will provide immediate employment opportunities for these communities, it could certainly provide opportunities in the longer term. As well, there may be opportunities for rotational employment in the Industry's Beaufort Sea operations. There is also the prospect that residents of the Parry Channel communities could work on the ships plying the Northwest Passage. They could be flown by helicopter to the ships where they would remain for perhaps one round trip and then be flown back to their communities.

The Industry is exploring other ways by which Parry Channel communities could benefit from Arctic oil and gas development. The regional use of Arctic oil and gas is currently being studied by Dome Petroleum. This includes examining the viability of using oil, butane, pentane, distillates, etc., for space heating and electrical generation purposes. The possibility of using Industry vessels to transport bulk items (eg. vehicles) to northern communities on the route is also being considered.

12.3.3 INDUSTRY POLICIES AND PROPOSALS

It is the Industry's view that the resource harvesting activities of possibly only one community, Resolute, could be affected by the normal operation of tankers through Parry Channel. Possible effects on the other communities will either be beneficial or neutral.

Studies undertaken to date strongly suggest that the crossing of ship tracks will not pose major problems for Resolute hunters. Tests have revealed that tracks refreeze quickly and they can be crossed a short time after a ship has passed. Ice rubble left by ships is not expected to raise problems any more severe than those already encountered by Inuit who travel across ice. However, in the event that leads and rubble fields prevent or seriously inhibit native harvesting, the Industry is fully prepared to take whatever remedial steps appear to be appropriate based on discussions

PLATE 12.3-2 *Hearings have become part of the Northern lifestyle. Local people and "outsiders" during a pause at EARP hearings on the Arctic Pilot Project at Resolute, 1980.*

with the affected people.

In addition to continuing its work on the effects of ship tracks and other concerns the Industry would propose the following:

- Studies of the character, extent and economic importance of renewable resource harvesting must continue. A quantification of harvesting in the eastern Arctic has now been underway for two years. The project is being undertaken by the Baffin Region Inuit Association and Industry is a major contributor to its funding.

- Although the passage of tankers is likely to have little direct impact on eastern Arctic communities, Industry recognizes that it will have an important bearing on the opening-up of the Arctic. It will do whatever is reasonable to assist in helping people of the region to cope with economic and social change. Though it would not likely do so as fully and intensively as in the Beaufort region, it will pursue types of employment, training, business development, and social programs in the Parry Channel communities similar to those in the Beaufort Region.

- In cooperation with the Government of the Northwest Territories and the Federal Government, the Industry will cooperate with the Parry Channel communities, or the organizations they designate, to research and monitor the local impact of involvement with oil and gas based development. Research and monitoring should include aspects such as effects on communities and on social preferences and lifestyles.

- It is unlikely that the transportation of oil by tanker will affect the property or livelihood of Parry Channel residents. However, should such losses occur, compensation policies that apply in the Beaufort region will also apply here.

- Through community information and consultation programs, the Industry intends to ensure that the Parry Channel communities, and other communities in the eastern Arctic, are fully informed of its plans and intentions. A regional information office has been established at Frobisher Bay and is staffed by an information officer fluent in Inuktitut.

CHAPTER 13

BAFFIN BAY - DAVIS STRAIT COMMUNITIES

Two very large land masses, Baffin Island and Greenland, are of concern in considering the passage of tankers through Baffin Bay and Davis Strait (Figure 13.1-1). The tankers would follow a route remote from the Baffin communities, and there is little possibility that they would interfere with harvesting patterns along the east Baffin coast.

Because of more favourable navigational conditions in the eastern waters of Baffin Bay and Davis Strait, tankers would pass relatively close to Greenland. While it is unlikely that such passage would damage either marine mammal harvesting or the commercial fishery, Greenlandic communities are concerned about possible negative impacts.

13.1 BAFFIN ISLAND

The Integrated Route Analysis prepared for the Arctic Pilot Project contains a review of the dependence of Baffin communities on the renewable resources of Baffin Bay and Davis Strait. This review is repeated here with minor modification (APP, 1981):

> "Communities on the Baffin Bay and Davis Strait coasts of Baffin Island include Clyde, Broughton Island, Pangnirtung and Frobisher Bay. In addition, a small number of outpost camps are also occupied.
>
> The resource harvest patterns of these communities have been studied by Haller *et al.* (1967), Meldrum (1975), Imperial Oil Ltd. *et al.* (1978) and Finley and Miller (1980). Additional information is available in McLaren (1958a, 1958b), Smith (1973), Usher (1975), Smith and Taylor (1977), Davis *et al.* (1980), and the marine mammal harvest statistics compiled by the Department of Fisheries and Oceans, Canada, in Yellowknife.

All four east Baffin Island communities rely on the marine system for most of their annual game requirements. Marine mammals are most impor-

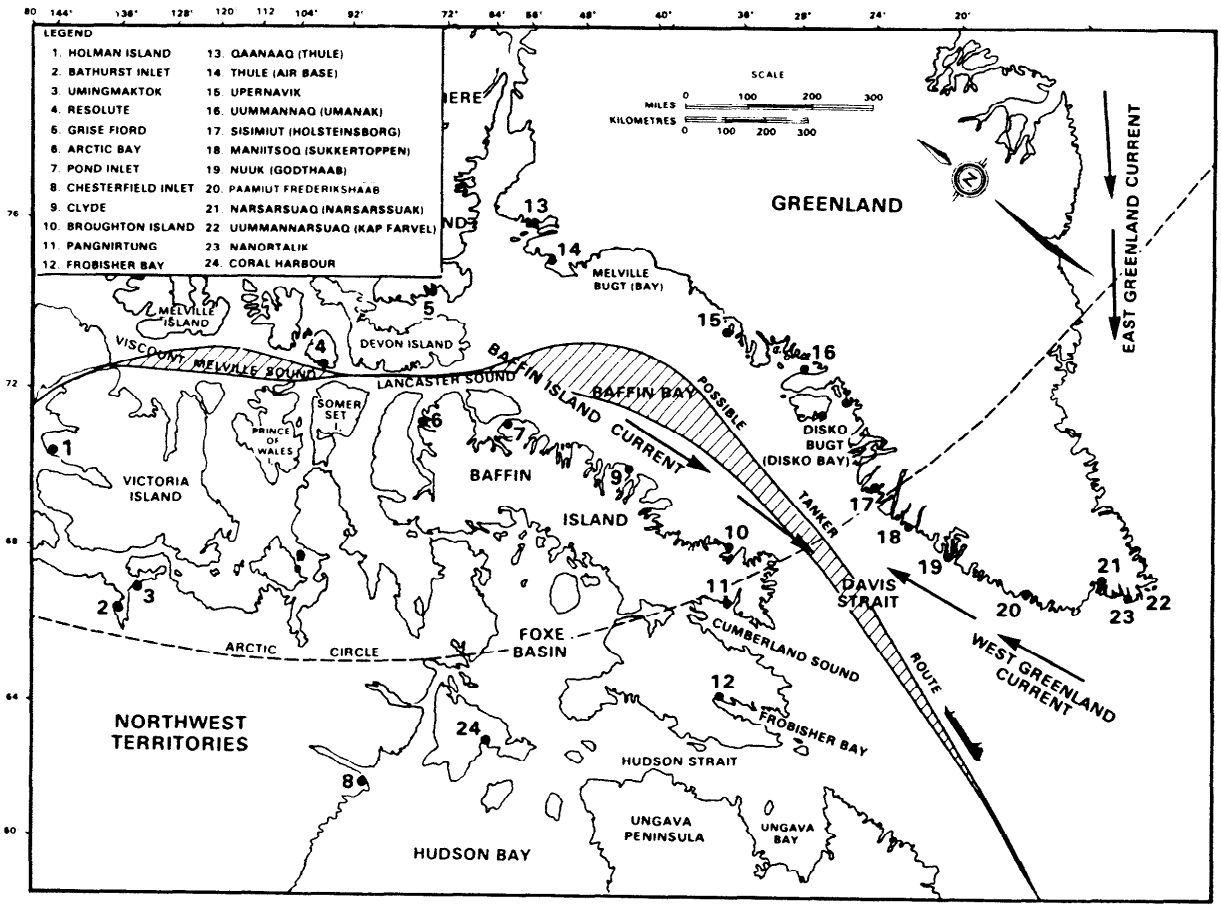


FIGURE 13.1-1 *Regional Setting: Baffin Bay-Davis Strait Communities.*

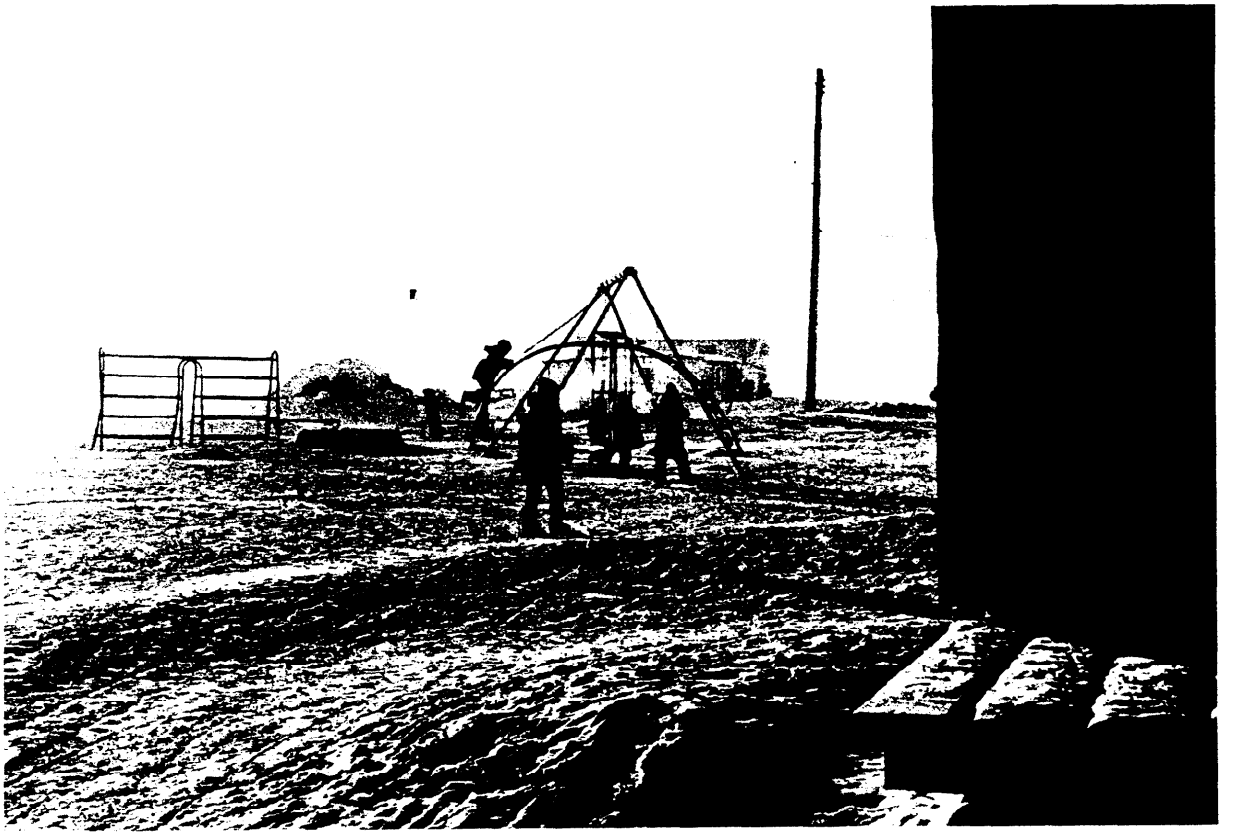


PLATE 13.1-1 *Playground — Broughton Island. As is the case in other areas, the population of the eastern Arctic is growing rapidly, but economic development is slow. The future is therefore uncertain.*

tant. Recent annual harvest statistics are presented in Table 13.1.1. The 'Other Seals' category represents primarily bearded seal, although it may include occasional hooded and harbour seals.

TABLE 13.1-1

AVERAGE ANNUAL HARVESTS OF MARINE MAMMALS BY COMMUNITIES ON THE EAST COAST OF BAFFIN ISLAND

	Clyde	Broughton Island	Pangnirtung	Frobisher Bay
Beluga[1]	0	0	95	5
Narwhal[1]	14	9	3	0
Walrus[1]	2	20	38	33
Harp Seal[2]	2	112	1296	129
Ringed Seal[2]	2840	6014	7633	2085
Other Seals[3]	1	27	86	58

Note: Based on data from Fisheries and Marine Service, DFO, Yellowknife
[1]Average of 5 years from 1974 to 1978.
[2]Average of 4 years from 1974 to 1977.
[3]Average of 3 years from 1975 to 1977.

Other important species taken in the marine zone include polar bear and Arctic fox which are harvested on coastal fast ice. Anadromous Arctic char are taken, but usually from rivers during the time that the char are migrating to and from the sea. Little effort is made to catch char while they are at sea. Small numbers of sea-associated birds are also taken. These are usually coastal species such as eiders, oldsquaws and geese."

The APP Integrated Route Analysis further points out that, during most of the year, hunting for marine mammals is carried out on the ice in Cumberland Sound and Frobisher Bay, and along the coastal fast ice of east Baffin Island, and that there is also some floe-edge hunting in some communities. It notes that, during the open water season, small boats and outboard-equipped canoes are used for marine mammal hunting, which is conducted entirely in coastal waters and in bays and fiords. As a general conclusion, it states that there is no possibility that the offshore routes used by Arctic Pilot Project vessels would directly interfere with the hunting activities of residents of the east coast of Baffin Island.

The Industry is confident that the year-round passage of oil tankers will have virtually no effect on the communities of eastern and southern Baffin Island (See also Vol. 4). The ships will be approximately 160 km offshore and could not interfere with Inuit hunting. Furthermore, it is believed that the passage of the ships will not affect the migrations of marine mammals although this will be the subject of future

research by both the Arctic Pilot Project and the proponents of Beaufort Sea development.

The Industry is investigating ways in which residents of southern Baffin Island can benefit from oil and gas development. The possibility of having people from the area work in exploration and production in the Beaufort Sea region is currently under study. There is also the potential for employment on ships or in environmental monitoring activities (see Volume 7).

13.2 GREENLAND

13.2.1 BACKGROUND

Greenland is the world's largest island and is territorially part of Denmark. About 80% of its area is covered by the Greenland Ice Cap, and much of the remaining 20% is unsuitable for settlement. More than 85% of its population of 50,000 is confined to a narrow band along the southwestern coastline, and lives mostly in large communities such as Paamiut (Frederikshaab), Nuuk (Godthaab), Maniitsoq (Sukkertoppen), and Sisimiut (Holsteinsborg). Most of these communities lie within the territory's open water region (Figure 13.1-1).

Greenland has an Arctic climate with mean July temperatures no greater than 10°C. The major ocean currents affecting Greenland are the East Greenland and West Greenland currents (see Volume 3B). The former is cold, the latter is relatively warm. The flow intensity of the cold portion of the West Greenland current can interfere with warming processes on submarine banks off the West Greenland coast, a factor which has had serious implications for fish species important to the Greenland economy.

Thule Eskimo people, the ancestors of the present day Greenlandic population, first arrived in Greenland toward the end of the first millenium A.D., although earlier habitation of some areas goes back to approximately 4000 B.P. At about the same time as the Thule population spread southward, Norse people from Iceland founded two settlements along the southwest coast which lasted some four to five centuries. The settlements had died out by about the mid-fifteenth century, and for the subsequent 250 years there was little European awareness of the island.

Modern colonization began in 1721, the primary motivation being missionary activity. For the next

PLATE 13.2-1 *Fishing boat near Disko Bay, Greenland. The Greenlandic people are concerned that the passage of tankers will interfere with both subsistence hunting and commercial fishing.*

200 years, until the mid to late 20th century, Denmark virtually closed the island to all influences but its own. The principal instrument through which commercial interaction with Europe took place was the government monopoly trading company, Den Kongelige Gronlandske Handel (KGH).

During the 1950's and 1960's, the Danish government embarked on a program of rapid modernization. A central aspect of this program was the development of an industrial base which could provide the growing Greenlandic population with income and employment. The key industry in this process was the fishery. The fishery was to be fully modern, complete with large processing plants at several centres and vessels capable of operating well offshore. To provide the labour force for the fishery and for other industrial purposes, the Danish government embarked on a large, rapid centralization program which required the abandonment of numerous small communities and the buildup of several major urban centres (Schuurman, 1977).

Urbanization led to important demographic changes. In 1960, the larger towns contained only about 57% of the population, whereas 43% resided in smaller outports. By 1971, the larger centres contained almost three-quarters of the population. The change was even more marked in the fishing districts along the southwest coast between Disko Bugt (Bay) and Uummannarsuaq (Kap Farvel).

The Greenland fishery was supposed to have been based primarily on cod, but a cooling of the waters of Davis Strait resulted in a reduced stock of this species. Prawns have therefore come to play a dominant role. In economic terms, the fishery has not been able to fully meet its costs and the Greenlandic economy has continued to require significant levels of support from the Danish government. Without the fishery, however, the level of subsidization needed to maintain the Greenlandic population would undoubtedly be much greater, and could pose an intolerable burden on Denmark. Moreover, the issues of attaining a greater measure of political independence and greater economic self sufficiency are related. Greenland attained limited home rule in 1979, but economic and fiscal independence would seem to require the development of a larger and more diversified industrial base.

Not all of Greenland's population has been drawn into the modern economy. In the more northerly parts of the territory, there is still considerable dependence on the subsistence harvesting of marine mammals, birds and fish. The community of Qaanaak (Thule), with a population of some 750, is located near the Thule airbase, and is strongly dependent on the renewable resource base (Berger, 1977).

In considering the passage of tankers through water adjacent to Greenland, three questions would appear to be of special importance:

- Would the tankers pose threats to marine mammal and fish harvest in more northerly areas?

- Would the passage pose a threat to the commercial fishery, and therefore to the Greenland economy in this important sector?

- Are there ways in which Greenland could benefit from the passage of tankers?

Answers to these questions are by no means certain and will undoubtedly be the subject of considerable debate. The following section attempts to shed some light on them.

13.2.2 GENERAL GREENLAND HARVESTING ACTIVITIES

The Integrated Route Analysis prepared for the Arctic Pilot Project contains an extensive review of the literature on both domestic and commercial renewable resource harvesting off the coast of Greenland. This review is quoted verbatim here with minor modifications (APP, 1981):

"Kapel and Petersen (1979) have presented a thorough review of subsistence hunting in Greenland. The following paragraphs on use of marine resources are adapted from this review. Of the five regions discussed (Figure 13.2-1), the three southernmost are primarily hunting areas.

(a) South Greenland (Nanortalik to Narsarssuak Districts)

The dominant occupation in this region, south of 61°N, is fishing. This occurs primarily in the mouths of fiords in spring and early summer, and is supplemented by a substantial catch of hooded seals and harp seals. Bird hunting is of local importance; small numbers of polar bears are also regularly taken. Small numbers of minke whales (average 18 yr, 1973-77; Kapel, 1980) and harbour porpoises (average 13/yr, 1971-74; Kapel, 1977) are regularly taken. White whales have not been taken in this region since 1961. Single narwhals are taken every four or five years (Kapel, 1977).

(b) South West Greenland (Frederikshaab to Holsteinsborg Districts, 60°N to 67°30'N)

The most important occupation in this region is fish-

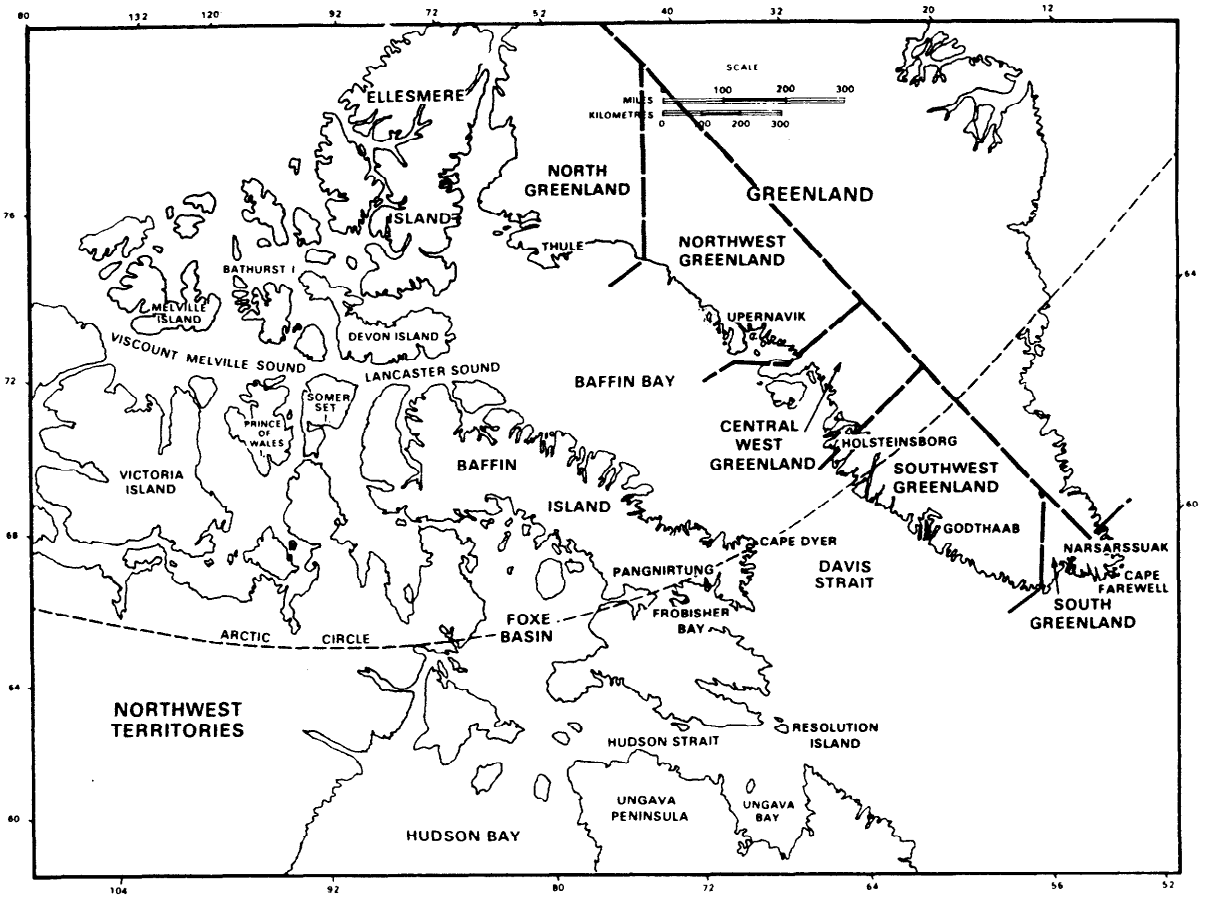


FIGURE 13-2-1 *Marine resource harvesting regions, Greenland. Source: APP Integrated Route Analysis*

ing. Atlantic cod and deepwater prawn (shrimp) are the principal species fished, although several other species are also taken. The effort consists of a coastal fishery conducted from small boats and an offshore trawler fishery on the Davis Strait banks. Catches of whales in this region provide an important nutritional supplement. Species taken include minke whale (average 85/yr, 1973-77; Kapel, 1980); harbour porpoise, white whale and narwhal (averages of 793, 145 and 15 per year, respectively, 1970-74; Kapel, 1977); and humpback and fin whale (averages of 7 and 3 per year, respectively, 1972-76; Kapel, 1979). The catch of seals in the region is relatively small, totalling about 2,000 to 3,000 animals annually. The principal species are ringed seal (70%), harp seal (21%), hooded seal (4%) and harbour seal (3%) (Kapel, 1975). Bird hunting contributes locally to nutrition, especially in autumn.

(c) Central West Greenland (Disko Bay and adjacent areas, 67° 'N to 70° 45'N)

Fishing, especially for shrimp and Greenland halibut, is the most important occupation of the population in this region. Hunting is an important supplement, of basic importance in the smaller settlements, especially in winter (Kapel and Petersen, 1979). Approximately 22,000 seals are taken annually in this region, with ringed seal (75%) and harp seal (25%) the important species. Insignificant numbers of hooded seals, bearded seals and walruses are also taken (Kapel, 1975). Catches of white whale and narwhal (averages of 582/yr and 117/yr, respectively, 1970-74; Kapel, 1977) are of great importance in winter and spring. Catches of minke whales (average 82/yr, 1973-77; Kapel, 1980) and harbour porpoises (average 216/yr, 1970-74; Kapel, 1977) are important in summer. Bird hunting is also important during the open water season.

(d) Northwest Greenland (Umanak and Upernavik Districts, 70° 45'N to 75° N)

Hunting is the dominant occupation in this region, although there is a growing fishery for Greenland halibut, wolffish and Greenland shark. About 35,000 seals are taken annually in this region, with the ringed seal accounting for well over 90% of the catch. The harp seal accounts for about 7% of the harvest, and is particularly important in the summer (Kapel, 1975;

Kapel and Petersen, 1979). Small numbers of hooded seals and bearded seals are also taken. Catches of white whales and narwhals (averages of 281/yr and 57/yr, respectively, 1970-74; Kapel, 1977) play a significant role in autumn but less so in spring. Minke whales (average of 42/yr; Kapel, 1980) provide an important source of meat during the summer, especially in the Unmanak district. Bird hunting, primarily of thick-billed murres and eiders, is also important during the open water season.

(e) North Greenland (Thule District, north of 75°N)

Hunting is the sole basis of the subsistence economy in the Thule District. The ringed seal is the most important species harvested, accounting for 90% of the estimated 4,000 to 5,000 seals taken in the region (Kapel, 1975). Bearded seals and walruses are also important, but only small numbers of harp and hooded seals are caught. The harvest of narwhals, and to a lesser extent, white whales, is extremely important in the summer months. Accurate harvest figures are not available, but Kapel (1977) estimated that 125 to 250 narwhals are taken annually in the Thule District. Polar bear hunting is more important in this region than elsewhere in Greenland. Catches of seabirds, particularly dovekies, are also important in the Thule District.

13.2.2.1 Marine Mammals

In the northern districts of Umanak, Upernavik and Thule, virtually all marine mammal hunting is conducted in coastal and inshore waters (Vibe, 1950; Haller, 1978; Kapel and Petersen, 1979). The detailed studies by Haller (1978) in the Upernavik district indicate that hunters rarely venture more than a few kilometres outside the coastal islands. The exception to this pattern is the polar bear hunt in Melville Bay, in which hunters use dog teams to cross the heavy pack ice. It should be noted that the announced routes of the LNG carriers [APP] do not approach within 200 km of these polar bear hunting areas.

In the more southerly fishing districts, most marine mammal hunting also occurs in coastal and inshore waters. However, in these areas, about 50 of the small coastal fishing boats are equipped with harpoon guns (Kapel, 1979). It is these vessels that are responsible for the annual take of about 250 minke whales and the small numbers of humpback and fin whales (Kapel and Petersen, 1979). It is probable that a substantial proportion of the harvest of harbour porpoises is also taken in inshore waters by these coastal fishing vessels. No information is available on the specific areas fished and hunted by these smaller inshore vessels, although Kapel (1980) states that catches of minke whales occur in "nearshore and inshore areas."

A small number of larger vessels operate in offshore waters. It should be noted that a small commercial whale fishery is still conducted on the offshore fishing banks by a Norwegian vessel. The Norwegian catch is set at 75 minke whales per year (Kapel and Petersen, 1979).

13.2.2.2 Birds

Birds are relatively much more important to the resource harvest economics of the Greenland communities than they are in the Canadian Arctic. The Greenland harvest of birds has been reviewed by Salomonsen (1970, 1979) and Kapel and Petersen (1979). A large number of species are taken but the thick-billed murre, common eider and dovekie are the most important.

Salomonsen (1970) estimated that about 750,000 thick-billed murres (equal to 825 tons of meat) are shot annually. Kapel and Petersen (1979) give an annual figure of 200,000 to 750,000 birds taken. In addition, about 10,000 eggs are taken annually, primarily in the Upernavik District. The harvest of murres occurs in summering areas of central west and northwest Greenland, on migration routes, and on wintering grounds along the coasts of southwest Greenland. The kill on the wintering grounds of southwest Greenland consists of murres from the Lancaster Sound area as well as from western and eastern Greenland colonies (Salomonsen, 1970; Gaston, 1980).

The passage of new game laws in Greenland (effective January 1, 1978) may result in a decrease in the harvest of murres and other species of birds (Salomonsen, 1979). In addition to the large numbers of murres taken by Greenlanders, several hundred thousand were also killed in the offshore salmon drift-net fishery that flourished briefly off west Greenland in the late 1960's and early 1970's (Tull *et al.*, 1972; Christensen and Lear, 1977). This fishery has since been disbanded (Salomonsen, 1979).

The common eider is a bottom-feeding coastal marine duck that is heavily hunted. Greenland populations declined drastically in the 1800's and have probably declined further in this century. The most recent estimate of the annual harvest is about 144,000 birds in 1948-51 (Salomonsen, 1970). Collection of eggs is now prohibited, except in the Thule District where about 10,000 are taken annually (Salomonsen, 1970). The fact that this species and the related king eider are diving ducks that feed on the bottom restricts their range to relatively shallow coastal waters; there is therefore no possibility the LNG carriers will interfere with the harvesting of these species.

The third important bird species harvested by Greenlanders is the dovekie which nests in enormous numbers in the Thule district. Large numbers of these small birds are caught by the Polar Eskimos using dip-nets at colonies on coastal scree slopes. The dovekie is also shot in wintering areas in coastal waters along southwest Greenland. Most of these birds apparently migrate from colonies at Spitsbergen rather than from the colonies of the Thule District (Salomonsen, 1970).

Other species taken in coastal waters include the red-throated loon, northern fulmar, greater shearwater, great cormorant, mallard, oldsquaw, harlequin duck, red-breasted merganser, brant, purple sandpiper, parasitic jaeger, black-legged kittiwake, Arctic tern, black guillemot, common puffin and razorbill (Salomonsen, 1970).

13.2.2.3 Fish Species

Commercial fishing has become an important component in the export economy of Greenland in recent years (Mattox, 1971). The rapid growth of the commercial fishery began in the 1920's. In recent years, the most important species have been Atlantic cod *(Gadus morhual)*, deepwater prawn *(Pandalus borealis)*, Atlantic salmon *(Salmo salar)* and Greenland halibut *(Reinhardtius hippoglossoides)*. The fishery for these species is briefly reviewed below.

(a) Atlantic Cod

The cod is a boreal species that is present off west Greenland during climatic periods of warmer water. The most recent incursion of cod began in the 1920's and apparently peaked in the 1950's and early 1960's. Cod populations have been declining off west Greenland, probably due to over-exploitation and falling sea temperatures (Kapel and Petersen, 1979).

The Greenlanders began fishing for cod around 1920, but catches remained low until the 1940's and 1950's. The peak catch occurred in 1962, when 44,000 tons were landed by Greenlanders. In addition, an international fishery involving several nations was conducted in Davis Strait. Catches in this fishery reached 400,000 tons per year in the 1960's. The cod fishing collapsed in the late 1960's, and a quota system was imposed in the 1970's. The total catch (including Greenland) was 33,000 tons in 1976 and 30,000 tons in 1977. The 1978 quota of 25,000 tons was reserved for Greenland vessels (Kapel and Petersen, 1979).

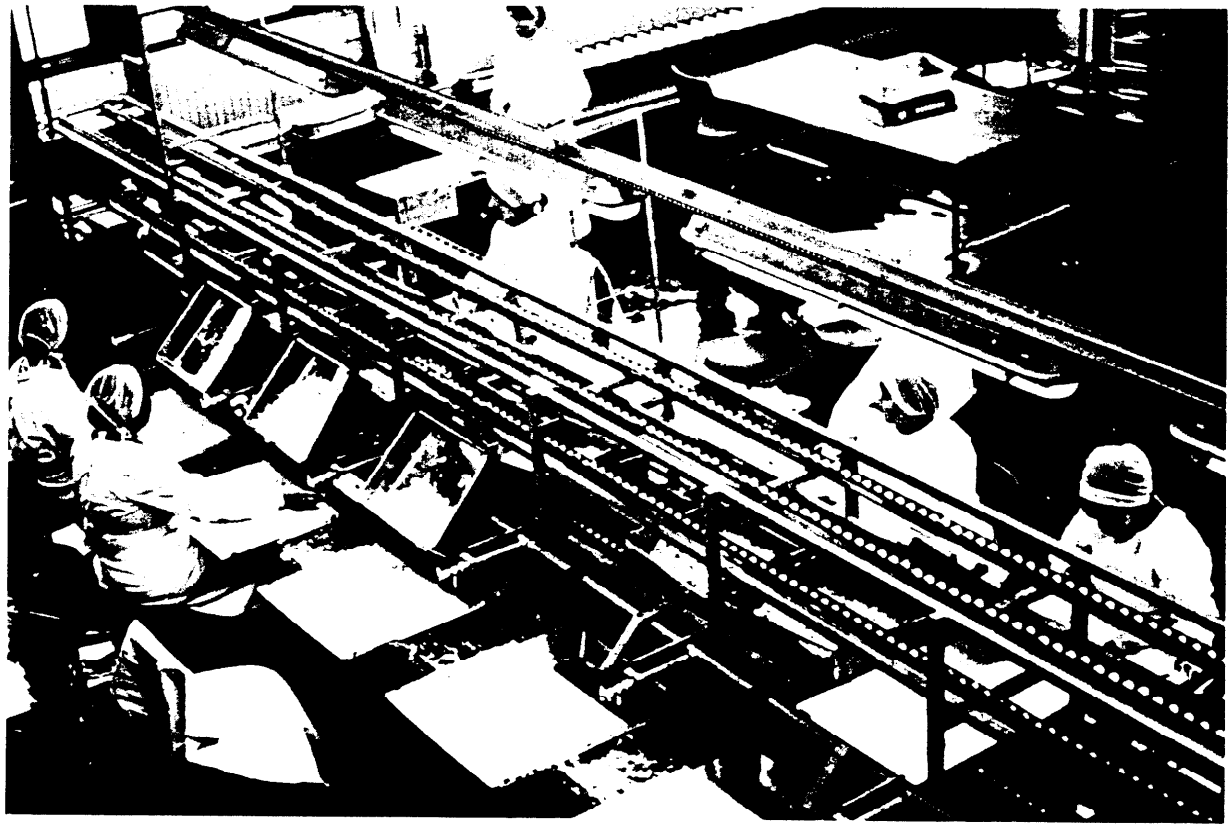


PLATE 13-2-2 *Processing shrimp — Greenland. The Greenlandic fishery has required considerable subsidization. However, the fishery is important in providing a substantial urban labour force with employment.*

The cod fishery is presently conducted mainly in February and March.

(b) Deepwater Prawn

Deepwater prawns are distributed along most of the coast of west Greenland. They are found at depths of 100 m to 600 m in fiords and offshore waters (Kapel and Petersen, 1979). The most important inshore prawn grounds are situated in Disko Bay; the major offshore grounds are found between 60°N and 71°N.

The fishery for deepwater prawns has developed recently, and is now very important to the Greenland economy. The inshore fishery in Greenland increased rapidly in the 1960's. The catch was nearly 9,000 tons in 1971. The inshore catch ranged from 7,000 to 10,000 tonnes annually over the next five years (Kapel and Petersen, 1979). An international offshore prawn fishery developed in Davis Strait in the 1970's. Ships from the Faroe Islands, Norway, Denmark and Greenland took about 40,000 tons in 1976. A quota for the offshore prawn fishery was set at 36,000 tons in 1977. In 1978, 27,000 tons were taken offshore, including 6,000 tons by Greenland vessels; an additional 9,000 tons were taken by Greenlanders in the inshore fishery (Kapel and Petersen, 1979).

The Greenland portion of the offshore fishery is conducted by eight trawlers, of about 700 tons each, owned by the state company (the Royal Greenland Trade Department). In addition, about 20 private Greenlandic trawlers (size 80-500 tons) took part in the fishery in 1980. These private trawlers took 62% of the total Greenlandic catch (P. Johansen, in litt., February 20, 1981).

(c) Atlantic Salmon

This is another species that is influenced by climatic changes, and appears in Davis Strait waters during warmer periods (Dunbar and Thomson, 1979). Small numbers were taken by Greenlanders prior to 1960, but the catch increased and averaged 1,100 tons per year in the 1964-68 period. This fishery was carried out in nearshore waters with set gill-nets (Kapel and Petersen, 1979).

In the last half of the 1960's an offshore drift-net fishery was begun in Davis Strait by fishermen from Norway, the Faroe Islands and Denmark. This fishery expanded, and annual catches of 1,000 to 1,500 tons were taken in the early 1970's (Kapel and Petersen, 1979). The salmon taken in west Greenland and Davis Strait originated from rivers in Europe and eastern North America. The increased harvest of salmon from these areas in which salmon populations were declining raised international concern. In addition, the use of offshore drift-nets caused high by-catches and mortality to thick-billed murres and harbour porpoises (Lear and Christensen, 1975). Because of the above concerns, the offshore salmon fishery by foreign vessels in Davis Strait was terminated in 1976. The inshore catch by Greenlanders continues, however, and averages about 1,200 tons per year. Consideration is being given to extending this fishery further offshore.

(d) Other Species

Other less important species fished in Greenland waters include wolffish, redfish, Greenland cod and capelin (Kapel and Petersen, 1979).

13.2.2.4 Offshore Fisheries

This section discusses the distribution of the offshore fishing effort by vessels from Greenland and the timing and offshore location of trawling activities by Greenland boats in Davis Strait.

The analysis is based on data supplied by the Greenland Fisheries Department of the Ministry for Greenland in Copenhagen. The data set consists of a large computer printout that lists the number of hours trawled and the number of separate trawls occurring in each block of 15' longitude by 7.5' latitude for each week of the year. The data covers the period from January 1, 1975 to the end of March, 1980. To make the data more manageable and trends discernible, years have been combined and the results presented by a four week period for each block of one half-degree of longitude by one half-degree of latitude (Figures 13.2-2 to 13.2.14). Only the data on number of hours trawled are presented. The above analyses are based on the trawlers of the Royal Greenland Trade Department. It is not known whether data from these boats are representative of the privately owned trawlers.

In general, fishing effort by Greenland vessels is low, with an average of fewer than 50 hours of trawling per four week period per year. This average is less than 2 hours per day per half degree block. The maximum effort in a single block was 1,290 hours in February, 1976. This amounts to an average of 46 hours per day, and clearly represents the efforts of several vessels.

The fishery is concentrated in two zones namely, 61°N to 65°N and 66°N to 68°30'N. Fishing occasionally occurs as far north as 73°N in summer. From 61° to 65°N the fishery occurs primarily within 80 to 100 km of the coast. North from 66°N the fishery occurs further offshore, and between 67°N and 68°N it is concentrated between 100 and 200 km offshore. Although this pattern is generally consistent over the years shown, there can be considerable variation in

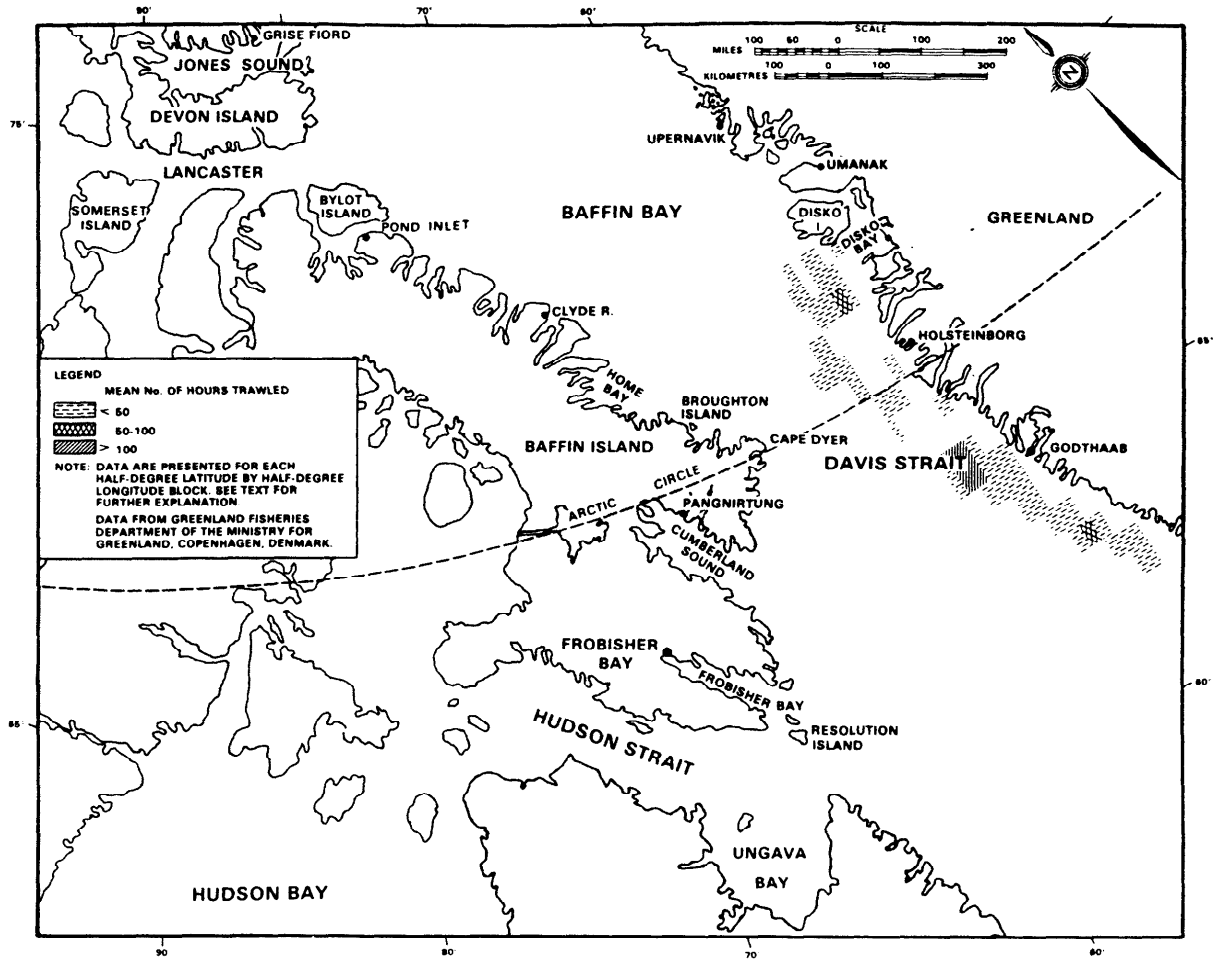


FIGURE 13.2-2 *Number of hours trawled, January, Davis Strait. Source: APP Integrated Route Analysis*

the use of particular half-degree blocks. For example, the largest difference noted occurred in the 64°-64°30'N, 53°30'-54°W region, where in February, 1975 and from 1977 to 1980, between 52 and 470 hours were trawled. Variability of 200 to 400 hours per half-degree block was not unusual in most heavily fished areas. In lightly fished areas variability was rarely more than 200 hours and usually less than 100 hours per four week period. Seasonal differences between years also occur. For example, from 1975 to 1978, the area between 68°N and 69°N was very rarely fished in winter (January to March), but in 1979 and 1980 this area was fished quite heavily (maximum of 8,224 hours in one half-degree block in February, 1980).

Despite this variability, three areas with moderate to high use in at least two years, and quite frequently four of five years, were noted. The area bounded by 61°30'N and 62°30'N, 50°30'W and 51°30'W, and the areas from 63°30'N to 65°N and from 52°30'W to 54°30'W generally contained at least one half-degree block showing moderate to heavy use all year. The area from 67°N to 68°N and 56°W to 58°W received moderate to heavy use consistently from late May through December."

The APP Integrated Route Analysis draws several conclusions with respect to the foregoing. These are based on the Arctic Pilot Project LNG carriers, but it is believed that they would also, in general, apply to the operation of oil tankers. The conclusions are as follows:

- It appears that offshore ship routes will not directly interfere with harvesting of marine mammals by Greenlanders.

- The harvesting of birds along the Baffin Bay and Davis Strait coasts of Greenland occurs entirely in coastal and inshore waters, and offshore ship routes should not directly affect such harvesting.

- Offshore ship routes will not interfere with the inshore fishery which occurs within 22 km of the outer coast.

- Principal interactions with ship routes will occur in offshore Davis Strait where locally intensive periods of trawling by many vessels occasionally occur within the proposed shipping corridors. It will not be possible for the carriers to pass among concentrations of trawlers and site-specific route modifications will be necessary. Insufficient data are presently available to determine how often such modifications are likely to be needed and to determine the required geographic extent of the course alteration that would be necessary to protect the trawlers and their gear.

13.2.3 POSTSCRIPT

Having become a modern and largely urban land, Greenland is nevertheless vulnerable because of its dependence on the fishery. While the fishery is subject to international control under the Atlantic Fisheries Organization, it is not the most stable industry on which to base economic growth. Fish stocks and the competition for those stocks can fluctuate over the years. An individual country, particularly a small country, would not be in a position to exercise much control over an international fishery. Greenland is also vulnerable because of its continued economic dependence on the Danish economy. The population of Greenland is predominantly young, and could grow rapidly in the near future. It will live in a world in which expectations will continue to rise, and in which much will be demanded of governments. It is therefore reasonable to conclude that, to meet its economic and political objectives, Greenland must grow and diversify economically. While the Greenlandic and Danish governments should continue to develop industries in which Greenland may now have a comparative advantage, such as the fishery, they should also seek out other activities which could prove productive in future, and which could absorb increasing proportions of a growing Greenlandic labour force.

The Industry has no specific measures to propose with regard to Greenland at present, but when the time is opportune, it is willing to meet with the Governments of Greenland and Denmark to explore economic opportunities that could derive from the passage of tankers through waters along the Greenland coast.

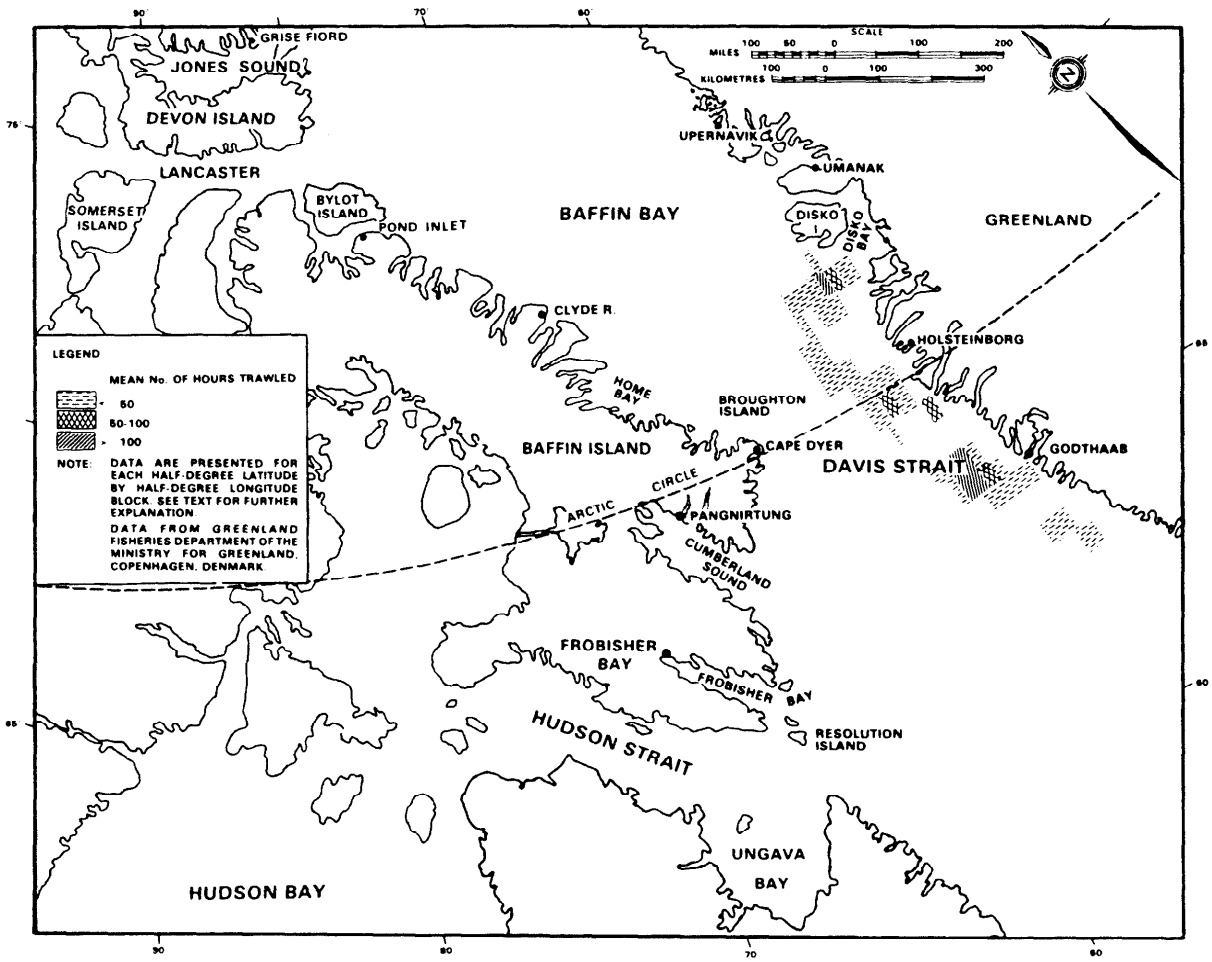


FIGURE 13.2-3 *Number of hours trawled, February, Davis Strait. Source: APP Integrated Route Analysis*

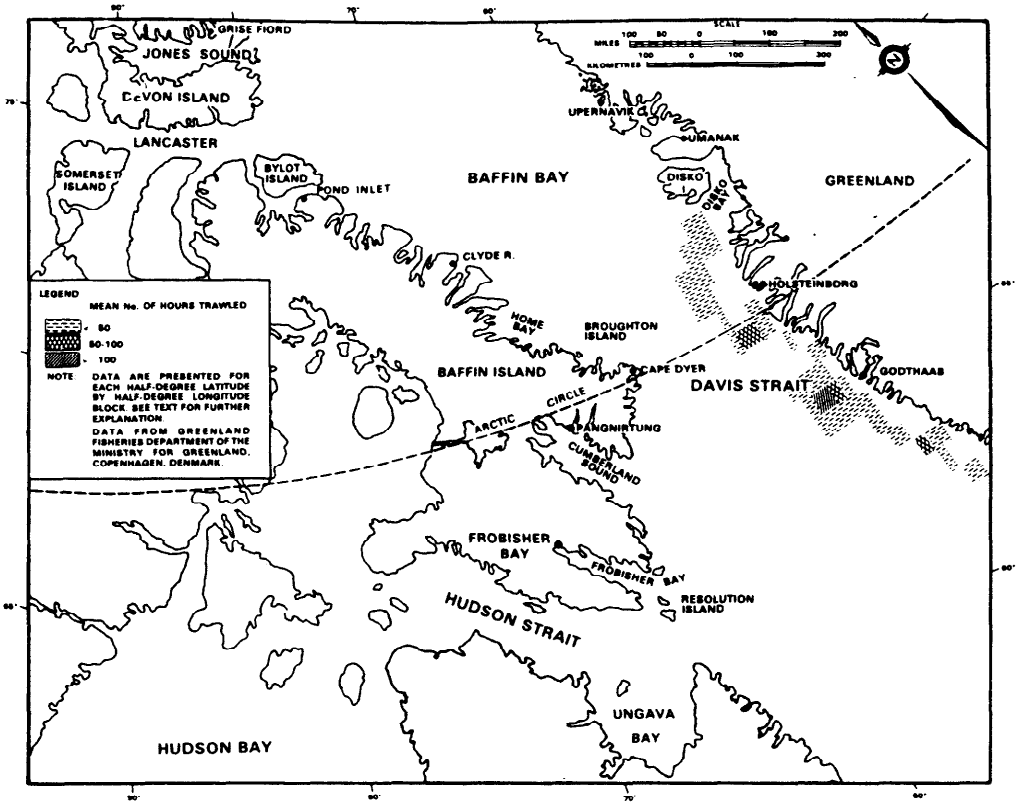


FIGURE 13.2-4 *Number of hours trawled, March, Davis Strait. Source: APP Integrated Route Analysis*

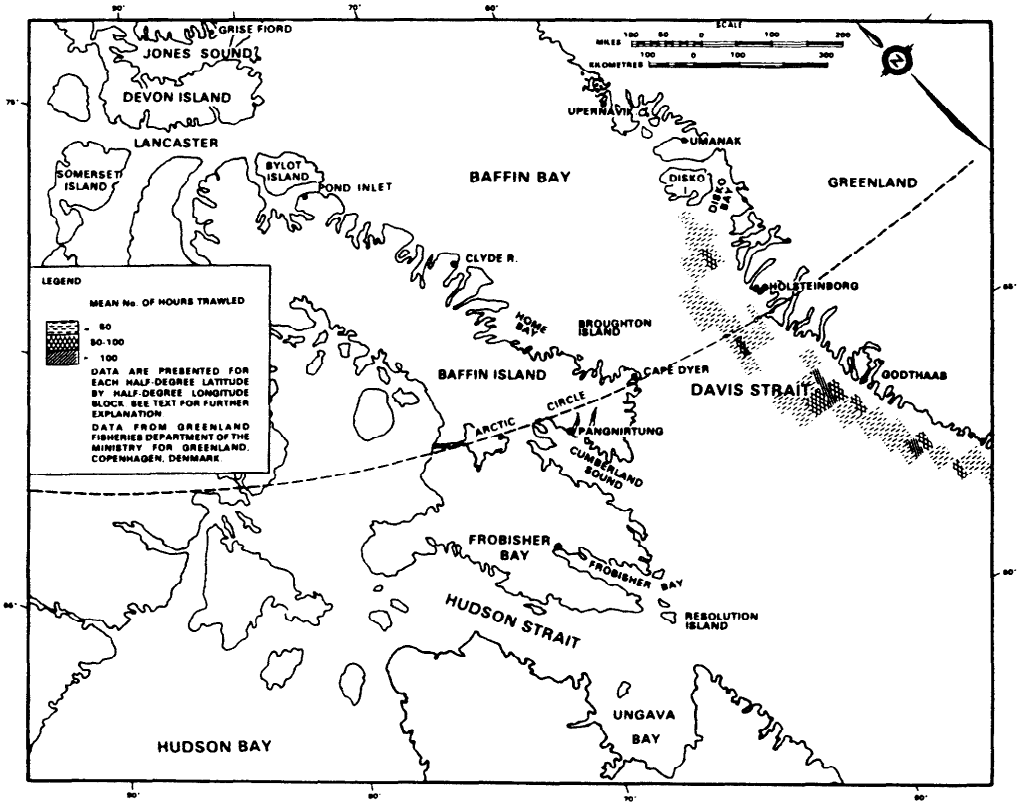


FIGURE 13.2-5 *Number of hours trawled, March-April, Davis Strait. Source: APP Integrated Route Analysis*

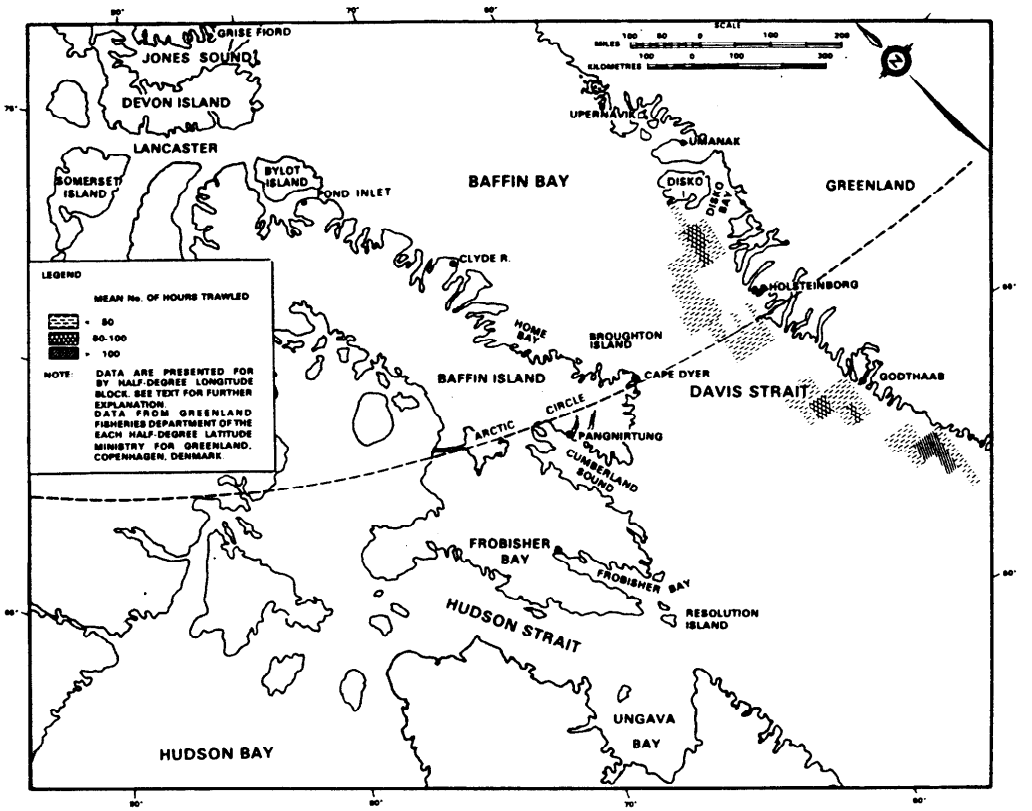


FIGURE 13.2-6 *Number of hours trawled, April-May, Davis Strait. Source: APP Integrated Route Analysis*

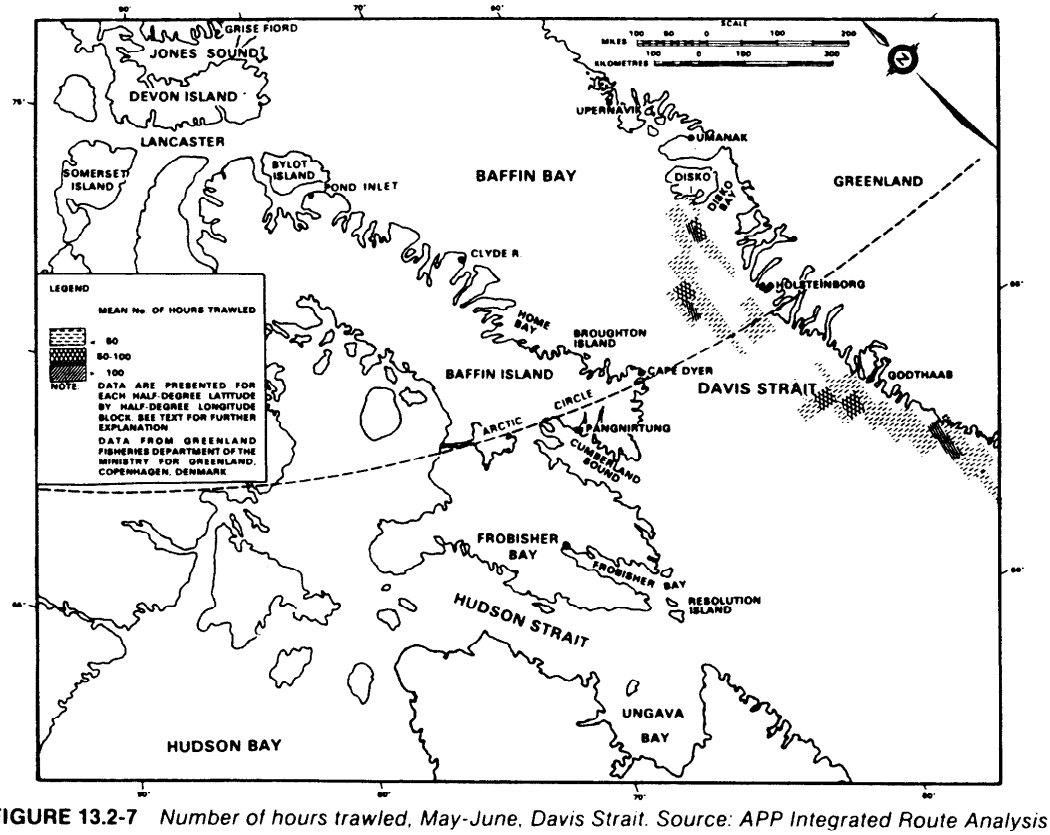


FIGURE 13.2-7 *Number of hours trawled, May-June, Davis Strait. Source: APP Integrated Route Analysis*

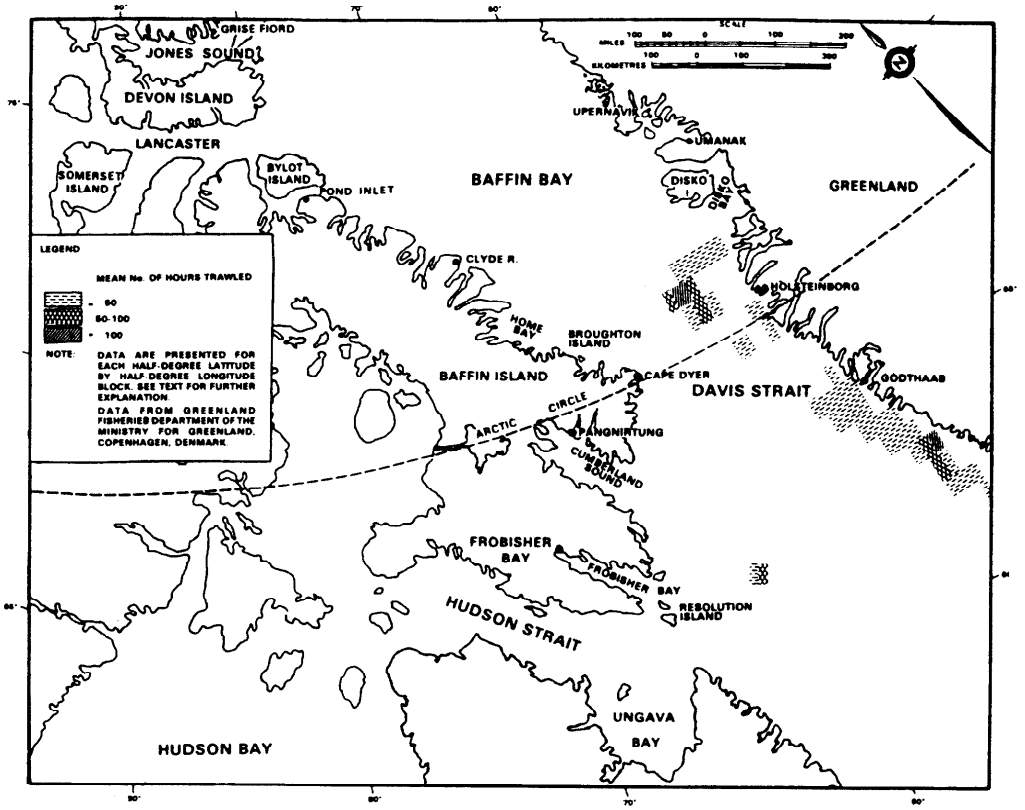


FIGURE 13.2-8 *Number of hours trawled, June-July, Davis Strait. Source: APP Integrated Route Analysis*

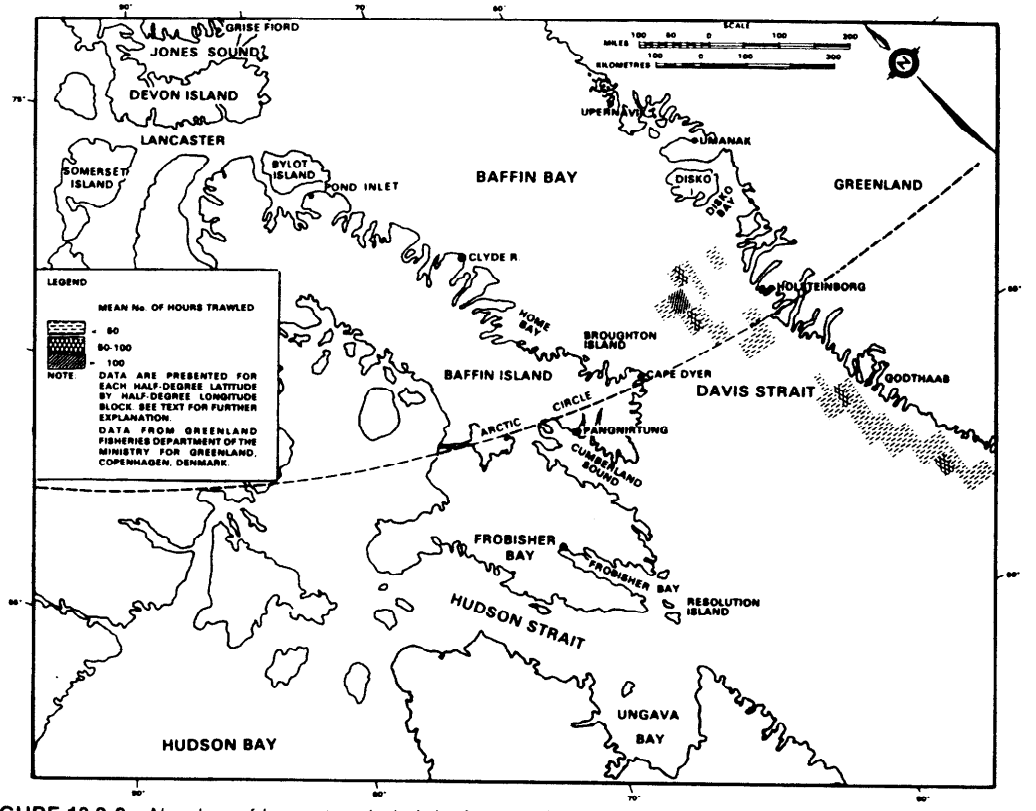


FIGURE 13.2-9 *Number of hours trawled, July-August, Davis Strait. Source: APP Integrated Route Analysis*

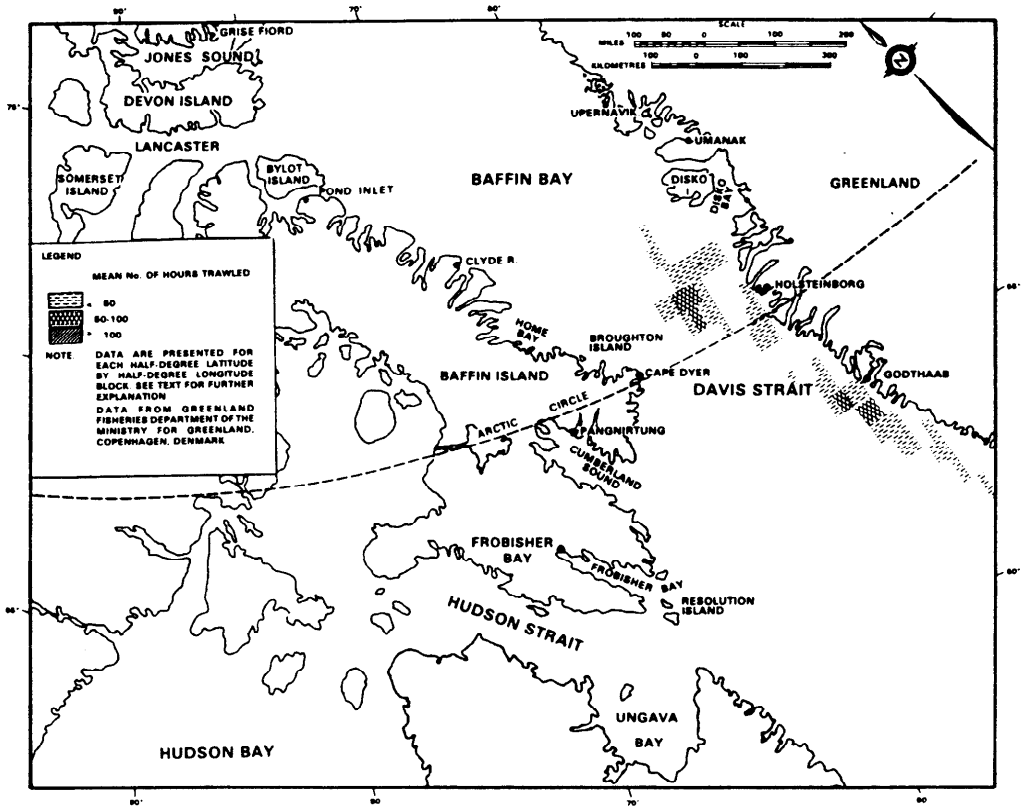


FIGURE 13.2-10 *Number of hours trawled, August-September, Davis Strait. Source: APP Integrated Route Analysis*

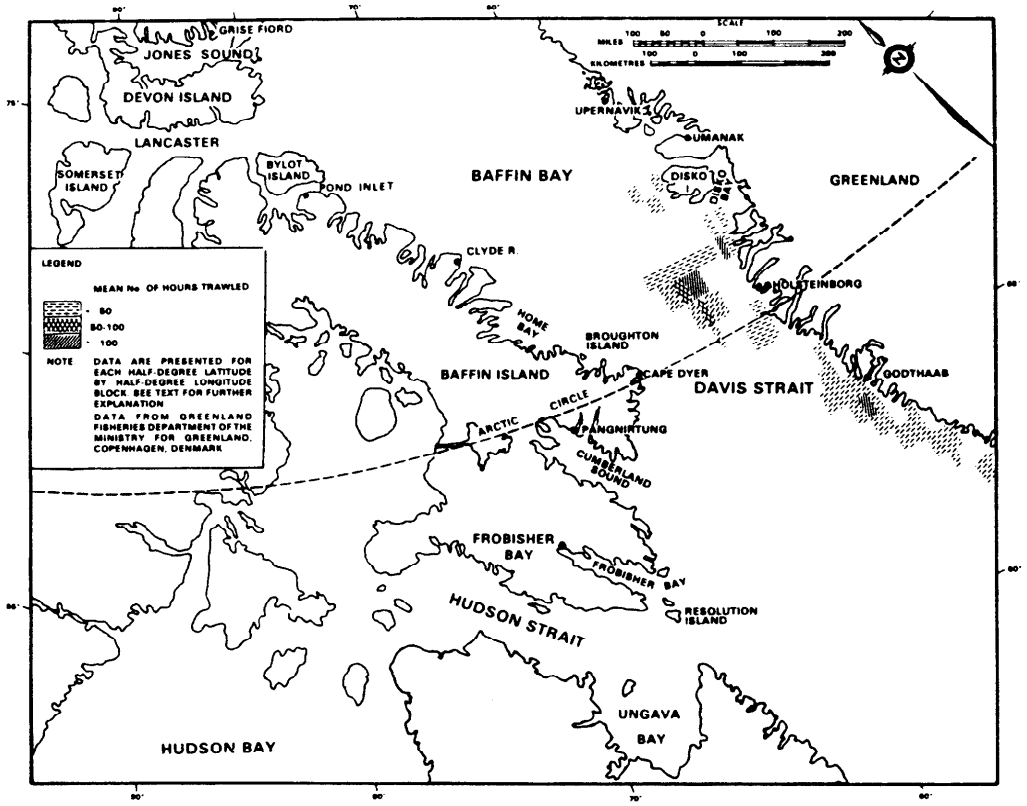


FIGURE 13.2-11 *Number of hours trawled, September-October, Davis Strait. Source: APP Integrated Route Analysis*

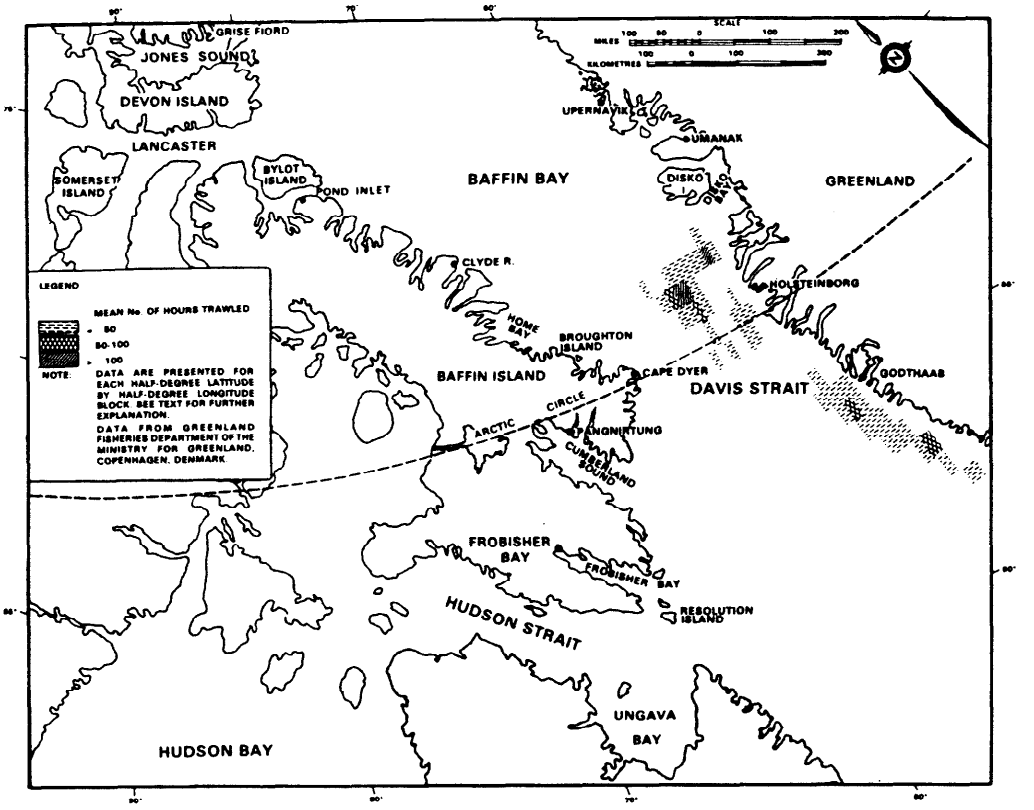


FIGURE 13.2-12 *Number of hours trawled, October-November, Davis Strait. Source: APP Integrated Route Analysis*

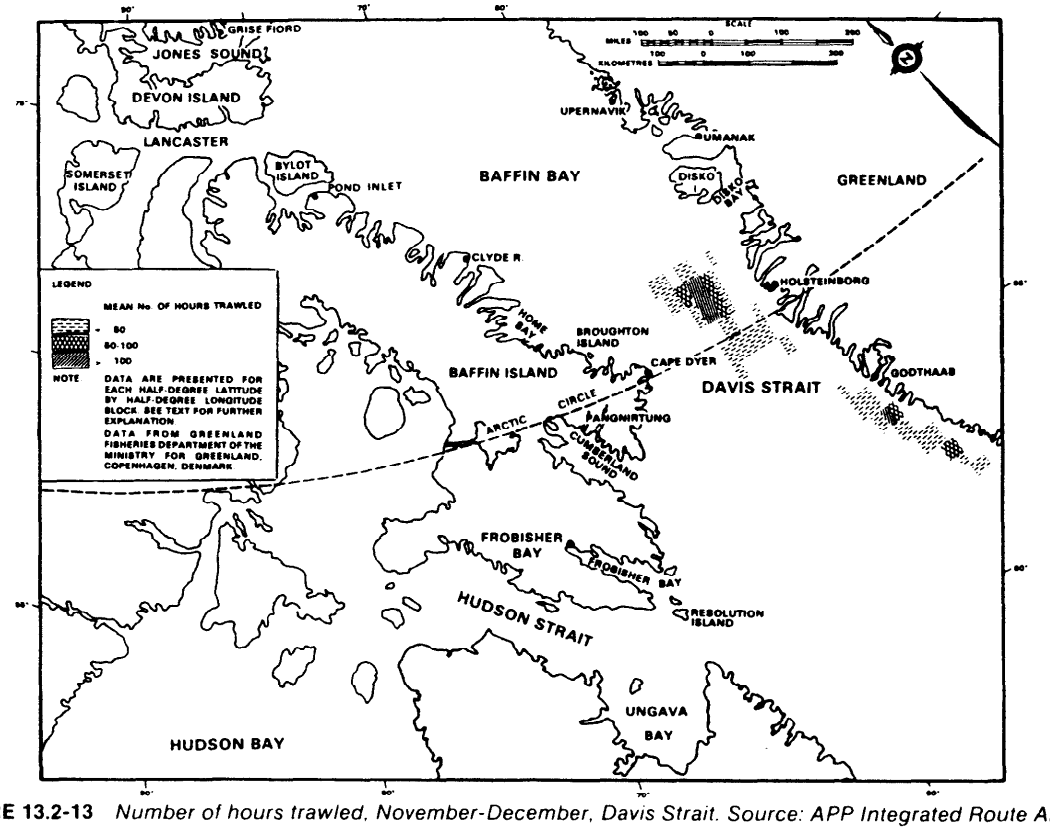


FIGURE 13.2-13 *Number of hours trawled, November-December, Davis Strait. Source: APP Integrated Route Analysis*

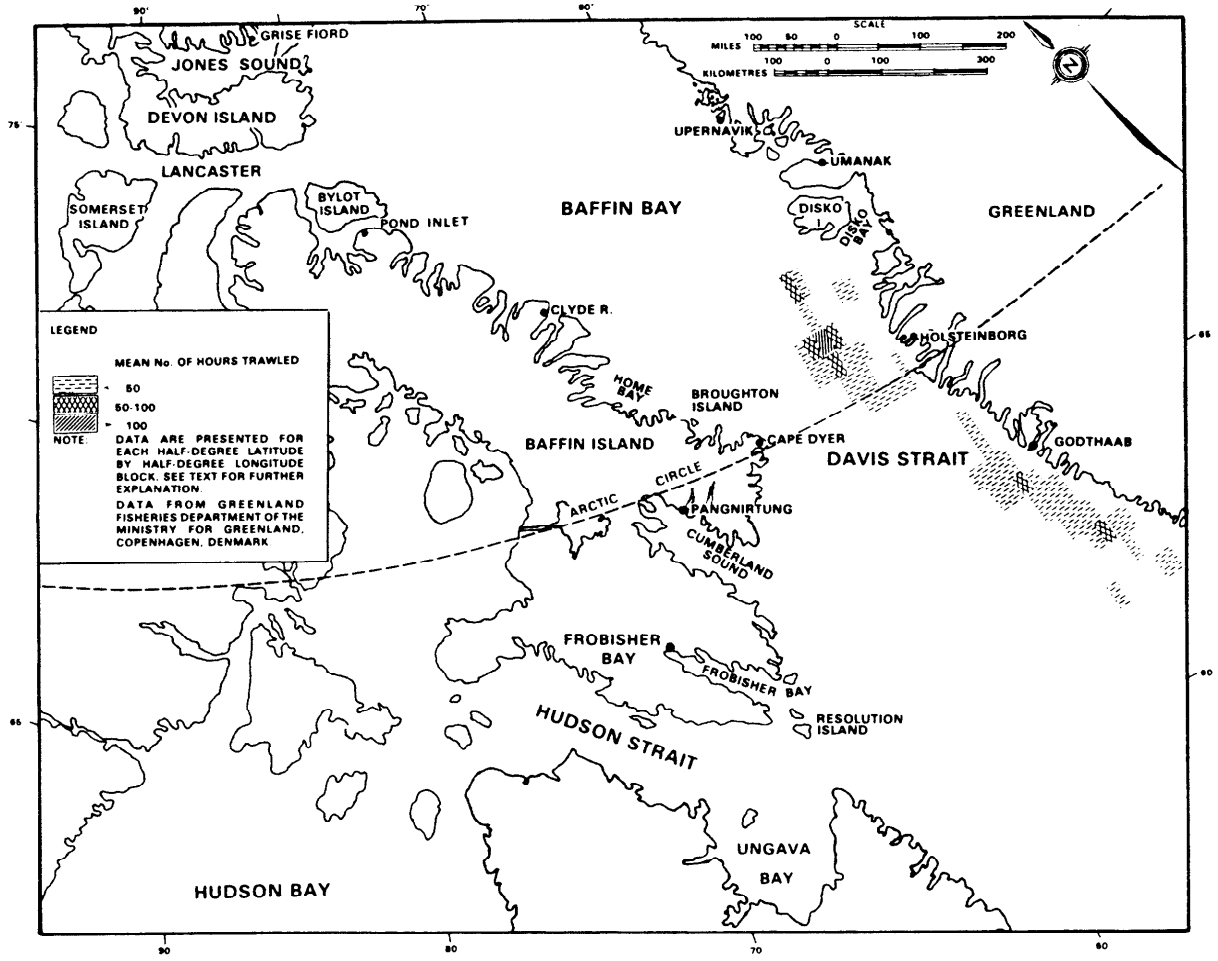


FIGURE 13.2-14 *Number of hours trawled, December, Davis Strait. Source: APP Integrated Route Analysis*

CHAPTER 14

ALASKA

There is a possibility that hydrocarbons from the Beaufort Sea could eventually move to market via a western route which would proceed via the Beaufort Sea coast of Alaska, the Chukchi Sea, Bering Strait and the Bering Sea (Figure 14.1-1). Such a route could be perceived to affect subsistence hunting of marine mammals and commercial fishing, both of which are highly important to the economy of coastal Alaska. However, shipping already uses Alaskan offshore waters for the transportation of supplies to support north coast operations, and the movement of tankers would not be without precedent.

Alaskans engaged in commercial and subsistence fishing and marine mammal hunting have expressed concern about oil and gas development. The continental shelf of Alaska is believed to contain large reserves of oil and gas, and the United states Government has embarked on a staged lease sales program that would tap these resources. This program, knwon as the Outer Continental Shelf Program, or OCS, has raised some controversy. Lease sales have been delayed by requirements for special studies and by court actions. The North Slope Borough, a municipality whose population is largely Inupiat (Inuit) has obtained an injunction against lease sales in promising offshore areas along the North Slope near the Prudhoe Bay oil field. The direction that the OCS program takes could have a bearing on the view taken toward the possible movement of Canadian icebreaking tankers in Alaskan waters.

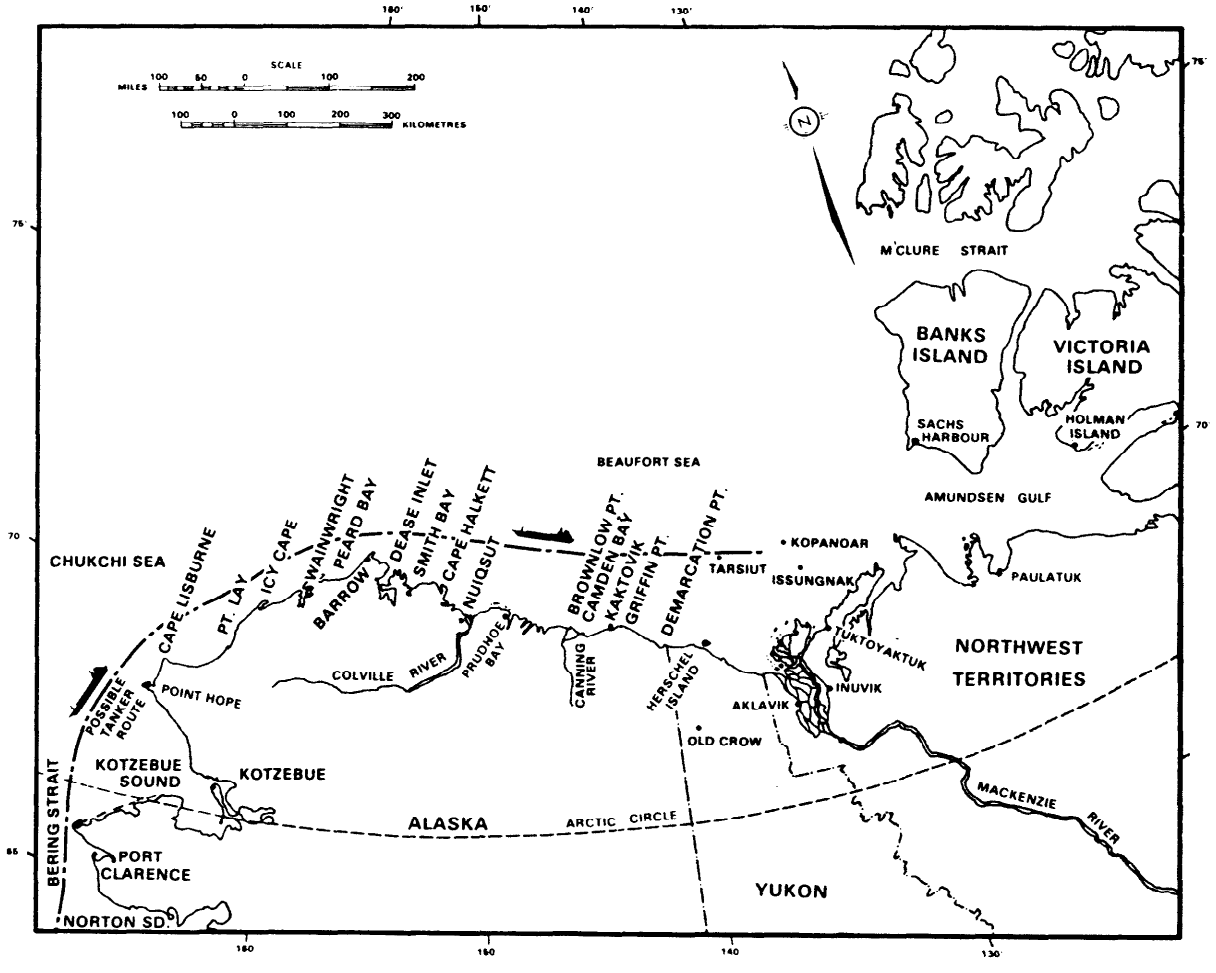


FIGURE 14.1-1 *Regional setting: Alaskan Coastal Communities.*

Such political issues aside, there are two major concerns respecting the passage of tankers through Alaskan waters. Firstly, how might it affect resource harvesting directly by interfering with harvesting activity? Secondly, how might it indirectly affect harvesting activities by interfering with the resource itself? The present discussion deals mainly with the first of these possible effects. For a discussion of the second, the reader should refer to Volumes 3 and 4.

Until specific proposals for tanker routes have been developed, only a general and cursory analysis of effects is possible. The discussion will first deal with the Beaufort and Chukchi Seas and then with the Bering Sea.

With the exception of areas like the Bering Strait, icebreaking tankers could, and probably would operate well offshore. The tankers would generally follow the 30 metre contour westwards around Alaska. Once through the Bering Strait, they would steer a course due southward. It is, on the whole, unlikely that the tankers would have any effect on coastal activities occuring close to shore.

14.1 BEAUFORT AND CHUKCHI SEAS

The principal communities along the Beaufort and Chukchi coasts are Kaktovik, Nuiqsut, Barrow, Wainwright, Point Lay, Point Hope and Kotzebue. All of these are traditional Inupiat (Inuit) communities which have been subjected to strong modern influences. Barrow, with a population of just under 3,000, is the capital and principal institutional and economic centre of the North Slope Borough (population about 9,000), the municipality which contains the Prudhoe Bay oil field, but which is strongly opposed to the development of offshore hydrocarbon resources.

A recent United States Government report says the following about the population of the North Slope Borough (OCS, 1979):

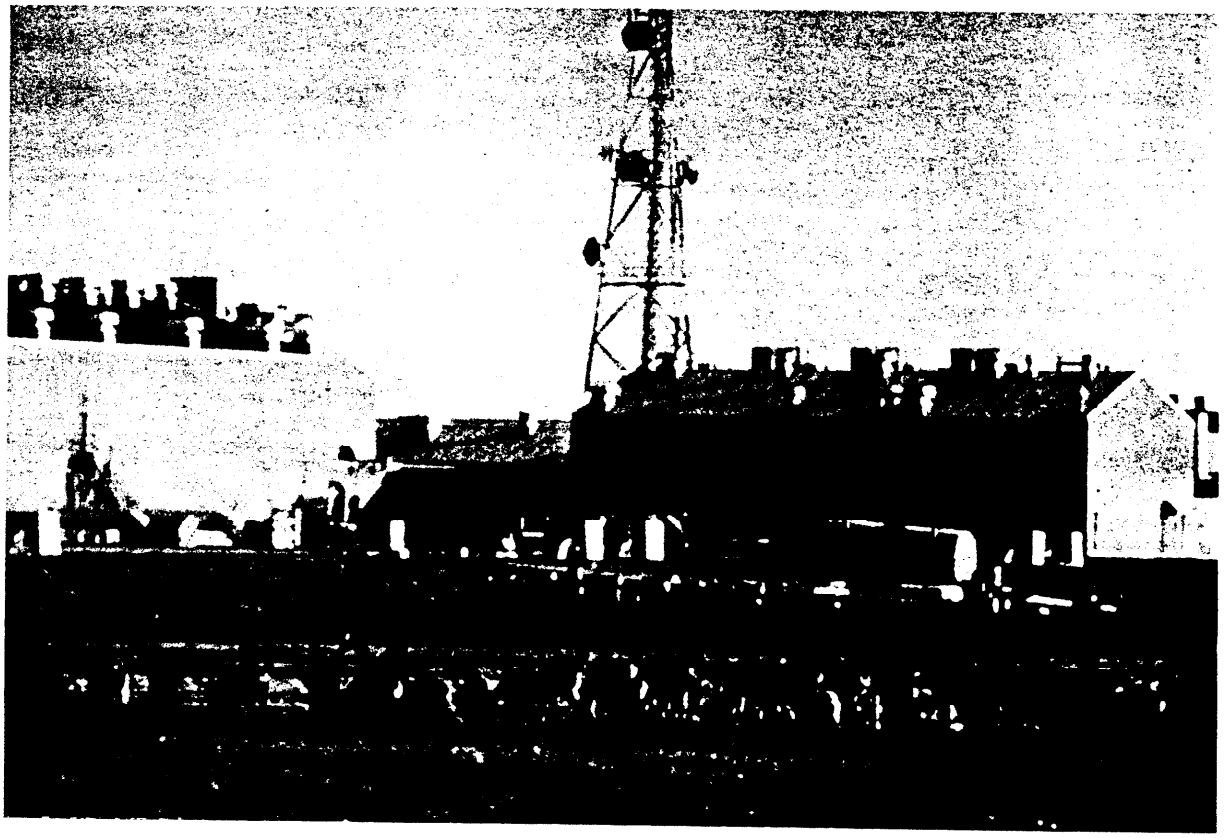


PLATE 14.1-1 *North Slope compressor station with caribou herd in foreground. The production of oil on the Alaskan North Slope has had a major effect on the Alaskan economy and on issues such as the settlement of native claims.*

"The population of the North Slope's traditional communities is still overwhelmingly Inupiat, although there are significantly more non-Inupiat residents in these towns now than there were in 1970. The professional employment opportunities opened up by the North Slope Borough and the Arctic Slope Regional Corporation have attracted many non-Inupiat to the borough since 1970, most of them to Barrow. Most non-Inupiat in the smaller communities are schoolteachers. Since the borough has upgraded education services region-wide, the increased presence of non-Inupiat is probably repeated in most small towns."

With respect to economic conditions of the North Slope communities, the same source says the following:

"In summary, income levels in traditional communities in the North Slope region have improved significantly since 1970, but they remain, on the average, well below State levels. When such factors as high living costs and large family sizes ... are taken into consideration, it is apparent that a significant portion of the population is still living in conditions of extreme poverty and that subsistence hunting and fishing are an economic necessity."

Subsistence hunting and fishing varies from community to community, and patterns may be complex. In Barrow, whales are the primary source of subsistence income while terrestrial animals such as caribou are a secondary source. In other communities caribou may be the primary source, with sheep or fish in secondary positions. Resource harvesting has encountered some problems during recent years because of government limitations on the numbers of whales and caribou that hunters can take.

Communities along the Chukchi Sea, such as Point Hope and Kotzebue, are not part of the North Slope Borough. At the time of writing, little information was available on these communities but attempts will be made to develop such information if necessary.

LGL and ESL (1982) have reviewed the literature pertaining to the resources and harvesting of Alaskan Beaufort communities. The following material is excerpted from their report with minor modifications.

14.1.1 POINT LAY

"Point Lay, on the northwest coast of Alaska, had a population of about 54 in 1977. This community depends about equally on terrestrial and marine resources (NPR-A Task Force, 1978a). Of the latter, white whales and fish are the most important.

White whales are taken from mid-May, when they begin to migrate north past the village, until the end of southward migration in September (Figure 14.1-2). However, most are taken in July in Kasegaluk Lagoon (NPR-A Task Force, 1978a). About 15 white whales are taken each year (J. Burns, pers. comm.).

Fish are taken inland along rivers as well as within about 40 to 50 km of Point Lay along the coast. No estimates are available of the amount taken.

Walruses (Figure 14.1-3) are frequently hunted in the vicinity of Icy Cape (NPR-A Task Force, 1978b) and about 20 are taken each year (J. Burns, pers. comm.).

Spotted and bearded seals are hunted on the sea ice, primarily in spring, and polar bears are occasionally taken on the sea ice in winter. About 50 seals (all species) and usually less than 4 polar bears are taken each year (J. Burns, pers. comm.).

Furbearers are trapped along the coast but the area does not support large numbers of Arctic foxes and few are taken (H. Melchier, pers. comm.).

14.1.2 WAINWRIGHT

Wainwright, located near the mouth of the Kuk River had a population of 398 in 1977 (NPR-A Task Force, 1978a). The main marine hunting area of the town lies between Peard Bay and Icy Cape and the bowhead whale is the marine species of greatest importance to hunters.

Bowheads are hunted only in spring at Wainwright and the main area used lies between the town and Peard Bay (NPR-A Task Force, 1978b). An average of 1.4 bowheads per year (range 0-4) was taken from 1973 through 1979 (Marquette, 1977; Braham *et al.*, 1979b; W. Marquette, pers. comm.). White whales are hunted later than bowheads and the number taken is variable. About ten per year were taken from 1973 to 1977, two were taken in 1978 and 37 were taken in 1979 (J. Burns, pers. comm.).

Walruses are taken between Wainwright and Peard Bay, primarily in July (NPR-A Task Force, 1978b). An average of 96.8 per year (range 31-253) were taken in 1973 through 1977 (J. Burns, pers. comm.).

Spotted and bearded seals are the seal species most frequently taken and both are hunted primarily southwest of Wainwright (NPR-A Task Force, 1978b). About 250 seals of all species are taken yearly (J. Burns, pers. comm.).

Arctic foxes are trapped along the coast. H. Melchier (pers. comm.) estimated that about 100 were taken in the winter of 1978-79.

Ducks and geese are hunted along the coast in spring

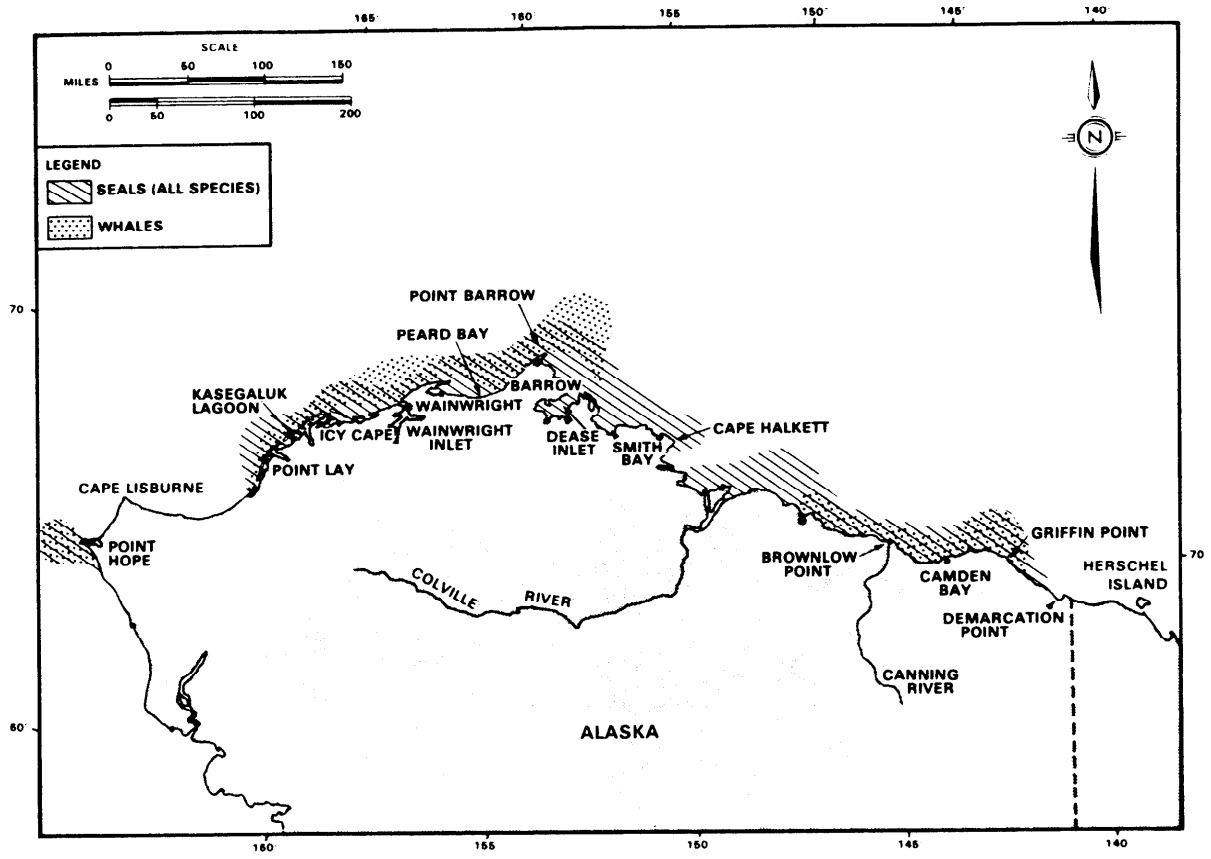


FIGURE 14.1-2 *Extended area used by Alaskan Inuit for hunting seal and whale.*

and ducks are also hunted in fall. Salmon, trout and whitefish are netted near Wainwright in late summer and ice fishing for smelt occurs in Wainwright Inlet.

14.1.3 BARROW

Barrow is the largest of the north Alaska communities and had a population of about 2,220 in 1977 (NPR-A Task Force, 1978a). The subsistence economy is based on bowhead whaling. Both failure of this hunt (an unusual occurrence) and restrictions on bowhead harvest result in greater harvest of other sea mammals and caribou.

Bowheads are hunted as they pass Point Barrow in both spring and fall. The areas where hunting occurs depend on the location of leads in spring but the general area used in both seasons is shown on Figure 14.1-2. The number of bowheads taken at Barrow is variable. The high since 1973 occurred in 1976 when 23 were recovered and an additional eight were known to have been killed but were not recovered (Marquette, 1977). In 1978, only four bowheads were taken at Barrow (Braham *et al.*, 1979a,b); as of mid-October, only three bowheads had been killed and recovered at Barrow in 1979 (W. Marquette, pers. comm.). White whales and gray whales are hunted incidentally to bowheads. Two to four white whales were taken each year from 1976 to 1979 (Marquette, 1977; J. Burns, pers. comm.). One to a few (less than five) gray whales are taken at Barrow in most years (M. Fraker, pers. comm.).

Seals are hunted year-round, but most actively in June and July. Hunting occurs from Wainwright east to about Cape Halkett (NPR-A Task Force, 1978b; Pedersen, 1979). About 1,500 seals were taken in 1973, but from 1974 to 1977 the harvest was only about 1,000 per year (J. Burns, pers. comm.). Polar bears are hunted in about the same area as seals in late fall. From four to ten polar bears were taken annually from 1973 through 1977 (J. Burns, pers. comm.).

Walruses are hunted as far east as the west side of Smith Bay. Numbers taken are quite variable, averaging 53.6 per year from 1973 to 1977, with a low of 15 in 1975 and a high of 136 in 1976 (J. Burns, pers. comm.).

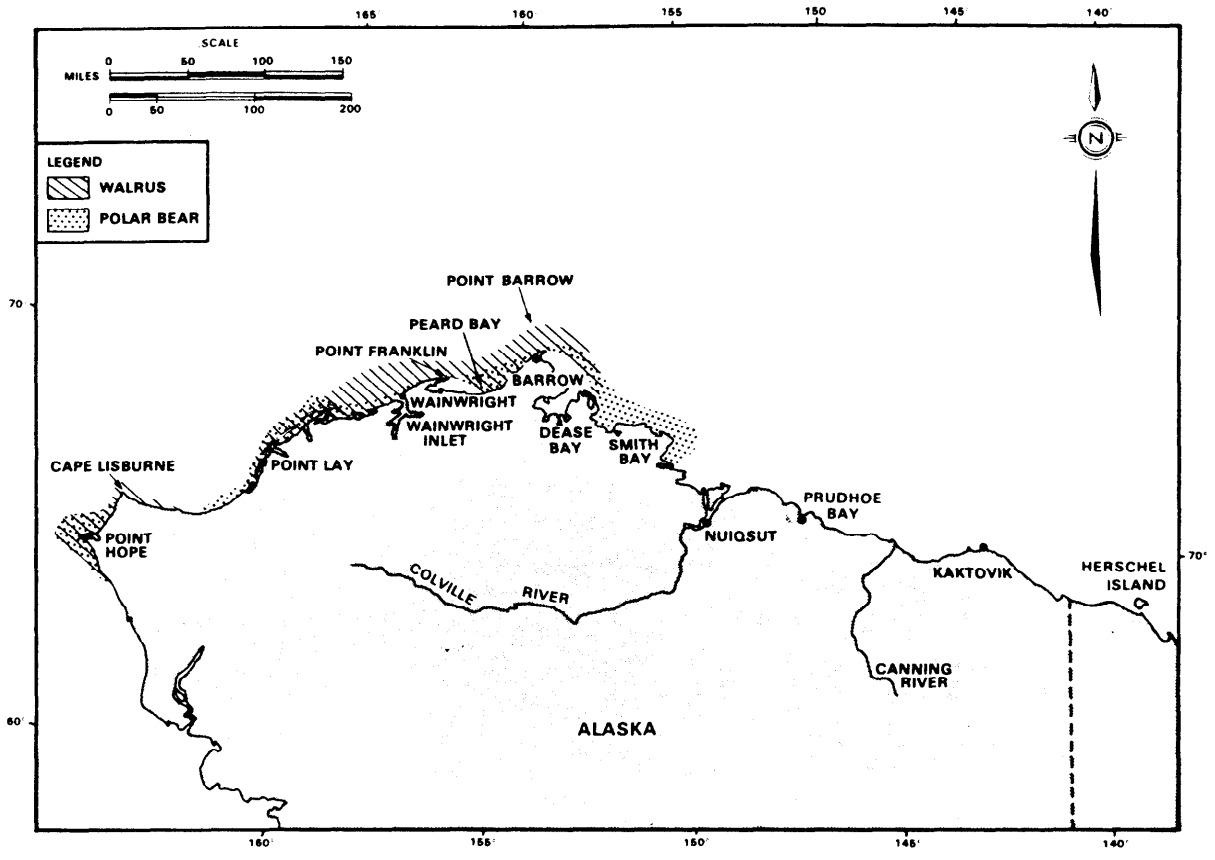


FIGURE 14.1-3 *Extended area used by Alaskan Inuit for hunting polar bear and walrus.*

Trapping occurs along the coast and some hunters trap on the sea ice between the barrier islands and the mainland and in Dease Inlet (NPR-A Task Force, 1978b; Pedersen, 1979). The Barrow area is one of the best in north Alaska for Arctic fox trapping because the peninsula tends to funnel foxes returning from the sea ice into a relatively small area. H. Melchier (pers. comm.) estimated that about 350 Arctic foxes and possibly more were taken at Barrow in the winter of 1978-79.

Duck hunting occurs mainly during spring and summer within a few kilometres of Barrow. Most (over 85%) of the ducks killed are king eiders (Thompson and Person, 1963; Johnson, 1971; Timson, 1976). Thompson and Person (1963) and Johnson (1971) present data suggesting a harvest of 4,000 to 8,000 ducks yearly. Timson (1976) estimated a harvest of 1,143 ducks during a three week period in 1975.

Some fishing also occurs along the coast but most takes place inland.

14.1.4 NUIQSUT

Nuiqsut is located 40 km inland along the Colville River and its people depend primarily on terrestrial resources (NPR-A Task Force, 1978b). Marine mammals are also hunted and fish are taken from the marine system, but in sufficiently small numbers that the Alaska Fish and Game Department does not keep records except for bowhead whales.

Whales (mainly white whales), are the main marine mammals hunted. In spring some people from Nuiqsut may hunt bowheads at Barrow (NPR-A Task Force, 1978b) but in fall whales are hunted from east of the Colville River to the mouth of the Canning River (see Figure 14.1-2) (NPR-A Task Force, 1978b). Only one bowhead was recorded as taken at Nuiqsut from 1973 to 1979 (Marquette, 1977; Braham *et al.*, 1979a,b; W. Marquette, pers. comm.). Ringed and bearded seals, king eiders and occasionally, polar bears are also hunted during fall whaling expeditions (NPR-A Task Force, 1978b). Seals are also hunted on the sea ice at other times of year. Spotted seals are hunted in late summer when they ascend the Colville River (NPR-A Task Force, 1978b).

Fishing occurs primarily at inland locations but the delta of the Colville River is also used (Pedersen, 1979). A commercial fishery (non-native) in the Col-

ville River delta takes an average of about 54,000 cisco (two species) and 3,500 whitefish (two species) per year (Alaska Dept. Fish and Game, 1977; cited by Craig and Griffiths, 1978). Craig and Griffiths (1978) suggested that the harvest by Nuiqsut villagers might be one to two times the commercial harvest although they had no supporting data.

Waterfowl are hunted along the coast but numbers taken are not large (NPR-A Task Force, 1978b). Arctic foxes are trapped along the coast but traplines do not extend onto the sea ice. No accurate figures are available but numbers taken are usually small (H. Melchier, pers. comm.).

14.1.5 KAKTOVIK

Kaktovik is located on Barter Island near the Canadian Border and had a population of 134 in 1977 (NPR-A Task Force, 1978a). Marine resources are of less importance in the hunting economy than are caribou and other terrestrial mammals. Nevertheless, seals, whales, waterfowl and, occasionally, polar bears are hunted (NPR-A Task Force, 1978b).

Bowheads are hunted only in the fall and, although hunters may travel as far as 80 km out to sea early in the migration season, most hunting occurs close to Kaktovik (U.S. Bureau of Land Management, 1979). A total of seven bowheads were taken from 1973 to 1976 and five were taken in 1979 (W. Marquette, 1977; pers. comm.).

Ringed and bearded seals are hunted along the coast from Brownlow Point to Demarcation Point. However, the primary hunting areas are Camden Bay in spring and the vicinity of Griffin Point in summer (NPR-A Task Force, 1978b). About 60 seals were taken per year from 1973 to 1977 (J. Burns, pers. comm.).

The sealing camp at Camden Bay is also used as a base for waterfowl hunting in spring and fox trapping in winter. Foxes are trapped along the coast and on the sea ice within the barrier islands (Pedersen, 1979). About 100 foxes were taken in the 1978-79 season (H. Melchier, pers. comm.).

Most fishing takes place inland but Arctic char and whitefish are netted near Griffin Point in summer (NPR-A Task Force, 1978b). Polar bears are hunted infrequently and mainly in the vicinity of Kaktovik (NPR-A Task Force, 1978b). Four were taken in 1977 but none were taken during the previous four years (J. Burns, pers. comm.).

14.1.6 OTHER COMMUNITIES

People from Point Hope hunt walruses along the coast north and east from Point Hope to about 30 km east of Cape Lisburne (Pedersen, 1979)."

14.2 BERING SEA

Very extensive use, including international use, is made of the Bering Sea fishery, which is one of the world's major fisheries. The fishery falls into two classes - the offshore fishery conducted by non-United States registered vessels, and the inshore crab and salmon fishery conducted by United States vessels. Bodies of water which are part of the Bering Sea, notably Norton Sound, where the Bureau of Land Management has scheduled oil and gas lease sales for 1982, have been the subject of considerable controversy as some environmentalists, fishermen and native people are strongly opposed to the sales. The outcome of this controversy could have a bearing on the shipping of hydrocarbons through the affected waters.

Martec Limited, a Halifax consultant, prepared a report (1981) on the Bering Sea fishery, and the following material is excerpted from this report with minor modifications.

14.2.1 OFFSHORE FISHERIES

"The foreign vessels fishing in the eastern Bering Sea (Figure 14.2-1) are licensed under the United States Fishery Conservation and Management Act. The offshore fisheries are conducted by vessels from Japan, the U.S.S.R., Taiwan, South Korea, Mexico, and Poland (Bakkala *et al.*, 1979). In 1979, the offshore fleets reported landings of 1.31 million tonnes (Anon, 1980a).

As shown in Figure 14.2-1, the offshore groundfishing effort in the Bering Sea is concentrated around the Aleutian Islands and along the 200 m contour running in a northwesterly direction from the Alaskan Peninsula toward the Pribilof Islands and St. Matthew Island. In addition, a concentrated high seas fishery for salmon is conducted in the southwestern sector of the Bering Sea, and for crab off Bristol Bay and Norton Sound on the west coast of Alaska (Forrester *et al.*, 1978).

In the Bering Sea, 51% of the total offshore groundfish fishing effort is conducted in Area 2 (Figure 14.2-2), while 28% is conducted in Area 1. Area 4 supports the bulk of the remainder. Only a small fraction of the total fishery is conducted in Area 3. As seen in Figure 14.2-2, the bulk of fishing is conducted by vessels in the 300 to 500 gross registered ton (GRT) range. Vessels in this size range comprise greater than 50% of the fishing fleet in all areas. The fleets are dominated by Japanese and Russian vessels. In 1979, Japan had 512 vessels involved in the

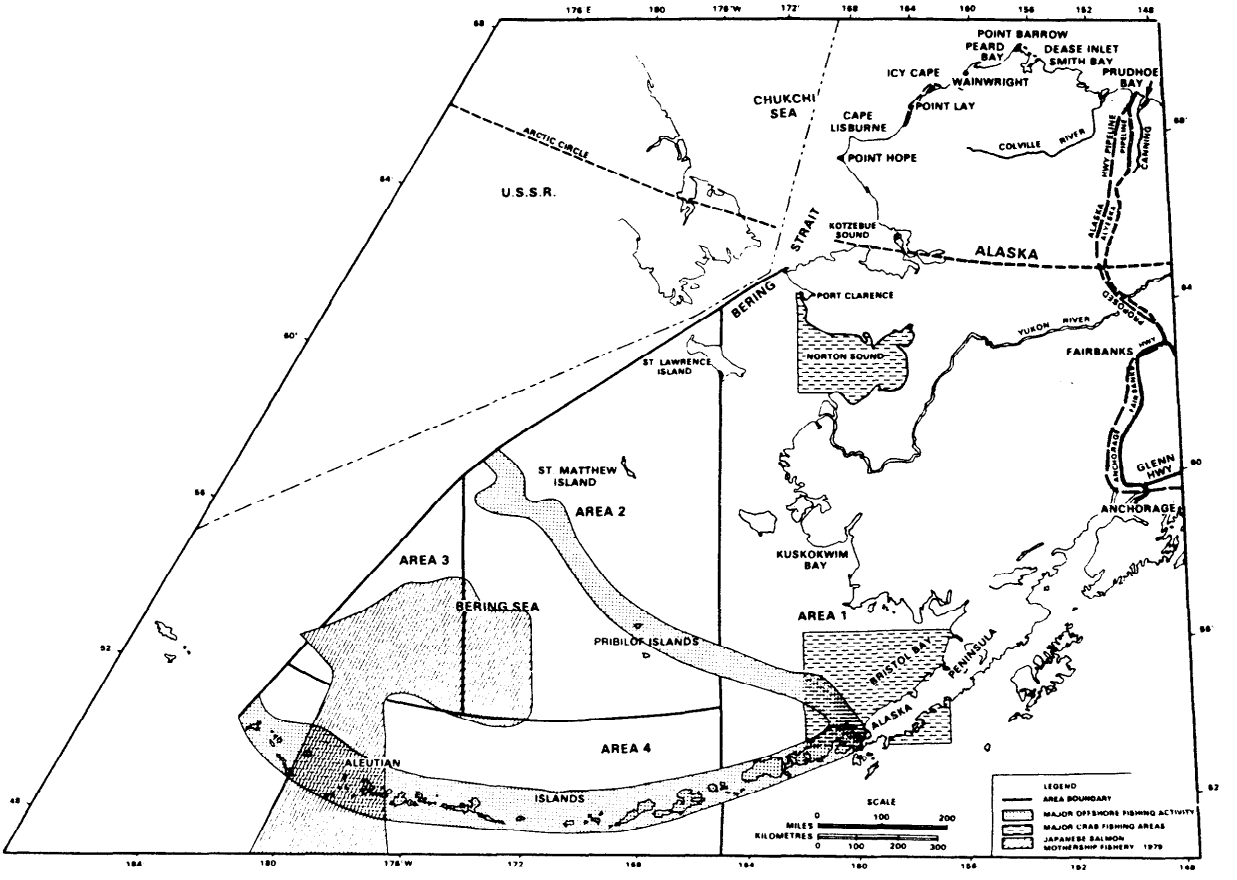


FIGURE 14.2-1 *Areas of concentrated fishing activity in the Bering Sea.*

Bering Sea fisheries, while the Russians had 126 vessels.

The seasonal distribution of fishing effort for offshore species is shown in Figure 14.2-3. The data show that fisheries for groundfish and crab are conducted year-round although seasonal peaks occur in the Area 2 fisheries between January and April, and in the Area 4 effort between June and October. The most intensive fishery, however, is the Japanese Salmon Mothership Fishery, conducted in the area shown in Figure 14.2-1. This fishery is very intensive and occurs over a two month period in June and July.

The proposed allowable catch by species (Bakkala, 1979) presented in Table 14.2-1 indicates the distribution of fishing effort devoted to the various species exploited. The fishery is composed of eight major species. The dominant species is the walleye pollock, followed by yellowfin sole, and Greenland turbot and arrowhead flounder. The pollock and yellowfin sole fisheries are conducted year-round but maximum effort in Area 1 occurs in October, in February

TABLE 14.3-1

PROPOSED ALLOWABLE CATCHES IN 1979 FOR SPECIES OF GROUNDFISH AND SQUID IN THE EASTERN BERING SEA AND ALEUTIAN ISLANDS REGIONS*

Species	Allowable Catch (metric tons)
Walleye Pollock	1,000,000
Pacific Cod	58,700
Pacific Ocean Perch and other Rockfish	21,500
Sablefish	5,000
Atka Mackerel	24,800
Yellowfin Sole	117,000
Greenland Turbot and Arrowhead Flounder	90,000
Pacific Halibut	225
Other Flounders	61,000
Squid	10,000
Other Species	55,000
Total Allowable Catch	1,443,725

*Proposed by the North Pacific Fishery Management Council.
Source: Bakkala (1979).

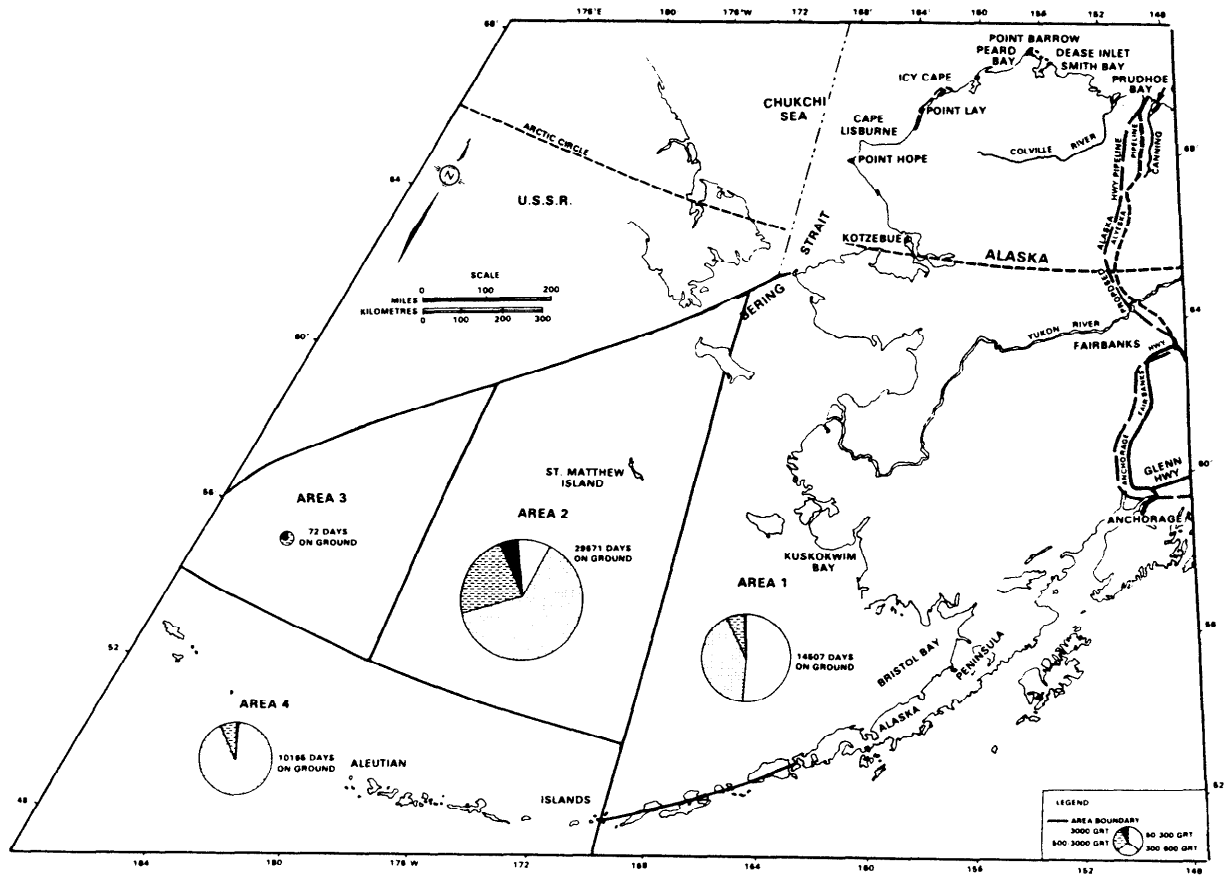


FIGURE 14.2-2 *Distribution of groundfish fishing activity in the Bering Sea. Source: Martec Ltd.*

to March in Area 2, and April in Area 4. The data presented in Figure 14.2-3 indicate that the most intensive activity in the region occurs in Area 2 between January and April. A smaller secondary peak occurs in Area 4 during September and October.

Offshore fishing for Pacific Herring in the Bering Sea was eliminated in 1980.

Vessels involved in this fishery use a variety of gear. Groundfish are taken using single and pair trawls, longlines, and Danish Seines, while salmon are taken in drift monofilament gill-nets which may range from 12 km to 15 km in length. Crabs and snails are collected in pots marked with surface floats.

14.2.2 INSHORE FISHERIES

The inshore fishing effort is directed mainly toward shellfish, (mostly crab), and Pacific salmon. Shellfish species captured on a commercial basis include the red and blue king crab and the tanner crab. The major red king crab fishery occurs in the Bristol Bay area indicated on Figure 14.2-1 between September and December while a minor red king crab fishery occurs near Norton Sound from mid July to early September (Anon, 1979). Tanner crab are also caught in the Bristol Bay area from January to June or July.

Blue king crab are captured from September to December by vessels fishing around the perimeter of the Pribilof Islands.

Halibut catches are regulated in the Bering Sea by the International Halibut Commission established by a convention between Canada and the United States. The effort is limited to American vessels and commercial fishing effort for halibut in this area is virtually non-existant (S. Hoagg, pers. comm.).

Commercial fisheries for Pacific salmon (chum, sockeye, chinook, coho, and pink) exist at several locations. Fishing activity generally occurs within 3

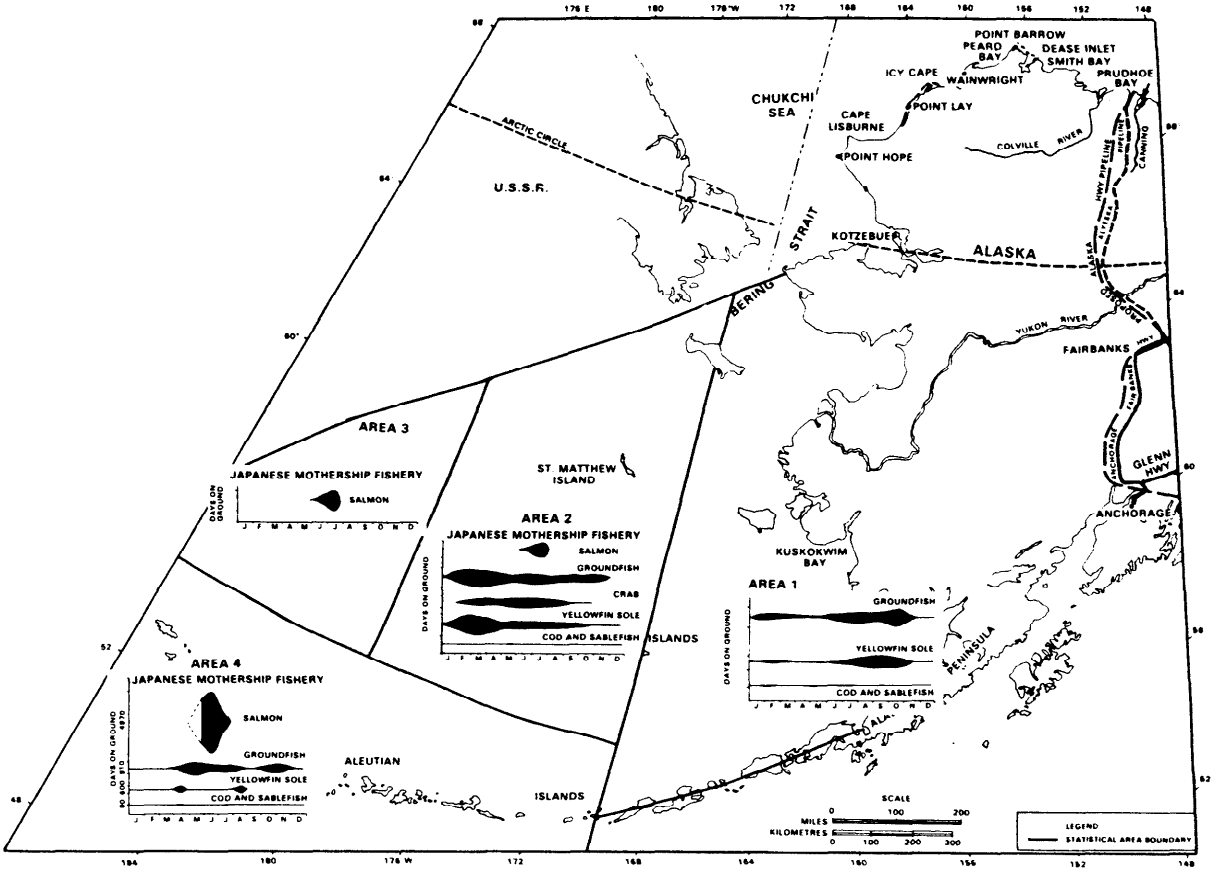


FIGURE 14.2-3 *Proposed allowable catches in 1979 for species of groundfish and squid in the eastern Bering Sea and Aleutian Islands regions.*

miles of the coastline, mostly adjacent to river mouths. In the northern areas, "terminal" fisheries occur in waters stretching from Point Hope south to Kuskokwin Bay (Figure 14.2-1). Activity is centred in Kotzebue Sound, Point Clarence and Norton Sound. In the southern area, a large commercial fishery is centred in Bristol Bay and around the Aleutian Islands (Anon, 1979b).

Drift gill-nets set from skiffs are used almost exclusively in these fisheries. Occasionally, purse seines and set gill-nets are used. The salmon fishery in the Bering Sea occurs from mid May through September. Chinook salmon are generally taken in May and June, sockeye and pinks in late June and July, chum from mid June to early August, and cohoes in August and September (Anon, 1979). The timing of the fisheries for each species can vary by several weeks from location to location. Generally, the fisheries occur later in the season in the more northerly areas.

An inshore fishery for Pacific herring occurs in Bristol Bay and to a lesser extent in Norton Sound. The fishery is conducted in late April and early May using purse seines and set gill-nets."

14.3 CONCLUSION

Ships currently ply the waters off the north coast of Alaska in open water season taking supplies, including diesel fuel, to government and industry operations. Disregarding any consideration of icebreaking tankers, this traffic is likely to increase. The industry is not contemplating the movement of hydrocarbons to the west in the immediate future but believes that, if they should go through the area in 5 to 10 years time, they should not have undesirable effects on the people of Alaska or on the marine and terrestrial animals on which many of these people still depend. Normal operations associated with icebreaking tankers should not cause any insurmountable problems. Furthermore, tankers would use a route well offshore.

Fears and concerns related to the possibility of a major oil spill are understandable. Every reasonable measure will be taken by Industry in order to minimize the chances of a problem (spill) occurring. Preventative measures include the development of innovative engineering designs and monitoring systems, and special training of personnel to minimize human error (See Volume 6). Industry's oil spill countermeasures program will continue to ensure state-of-the-art cleanup capability.

APPENDIX TO 6.0

COMMERCIAL RESOURCE HARVESTING

The Mackenzie Delta-Beaufort Sea region has been the scene of various attempts to develop commercial enterprises based on the north's renewable resources. Some of these efforts have already been noted. The commercial whaling activity in the region around the turn of the century, for example, was an unrestrained and disastrous use of one element of the region's renewable resource base for commercial gain. Commercial whaling ceased in the region when the market for baleen collapsed in the south, but it could not have continued much longer in any event because it had placed a heavy strain on the small populations of large whales, almost exterminating the bowhead.

The fur trapping activity introduced into the region by the Hudson's Bay Company and promoted by its representatives and those of other commercial enterprises in the 19th century has already been noted. It continues today and, as should be apparent from the description of "traditional" resource harvesting activity presented in Chapter 5, is considered by native residents to be part of their traditional lifestyle and not simply a business activity.

With few exceptions, more recent efforts to develop commercial resource harvesting enterprises in the region have not been notably successful. In the 1950's and 1960's government attempted to develop a number of commercial fishing and local, small-scale sawmilling enterprises in various communities. Few of these lasted long. Uncertainty about the resource base, limited and irregular local markets, poor quality control, the distance to larger markets in the south, turnover in management personnel and, in some areas, limited local interest in ventures initiated by well-meaning outsiders, combined to make most enterprises uneconomical. The sawmill that still operates intermittently at Fort McPherson and the commercial fishing that occurs in the eastern portion of the Beaufort Sea region in support of the Cambridge Bay Co-operative are all that remains of these efforts to develop local, commercial enterprises based on the region's renewable resource base.

More recently the Inuvialuit Development Corporation has undertaken several projects: it has initiated a commercial fishery in the Delta area and has begun to operate a country foods store in Inuvik. It has promoted intersettlement trade in country foods and commercial muskox sports hunting in Sachs Harbour and Paulatuk. None of these ventures will succeed without much hard work and innovation on the part of local residents.

The only commercial resource harvesting operation in the region that has demonstrated some success over the long-term is the reindeer herd on the Tuktoyaktuk Peninsula. This herd is currently managed and owned by Canadian Reindeer (1978) Ltd., and represents the culmination of some 45 years of initiative, experiment, and hard work on the part of both government and private owners. The herding operation has only recently become profitable, although its long-term commercial success is by no means yet assured. The biological aspects of the reindeer herd are discussed in Volume 3A, and the area set aside by government as the Mackenzie Reindeer Grazing Reserve is depicted in the same volume.

Canadian Reindeer (1978) Ltd.'s origins lie in the Federal Government's efforts to improve the meat supply and local employment situation in the western Arctic following the depletion of local caribou herds during the commercial whaling era. In 1922 a Federal Royal Commission reported that the prospects for establishing a reindeer industry in the Mackenzie Delta area looked favourable. The commission suggested that a reindeer herding industry would provide employment, a more reliable source of meat and hides for the native population and, among other things, a source of meat for southerners coming north to explore the area's mineral potential.

After field studies in the 1920's suggested that the Mackenzie Delta-Tuktoyaktuk Peninsula area could have the capacity to support up to 300,000 reindeer, the Federal Government took steps to initiate a herding operation. In 1929 arrangements were made to purchase a small herd of some 3,400 reindeer in Alaska and for experienced reindeer herders from Lapland to go to Alaska to direct Alaskan Eskimos in moving the herd to the Delta area. The trip took until 1935 and the herd's number decreased significantly in the course of the move.

After the herd reached the Delta, government initiated various efforts to expand its numbers and, over time, to sell off a portion of the annual calf production to local residents interested in owning a herd. For a variety of reasons these efforts were not successful. The main herd grew slowly and its operation required continuing subsidies. The privately owned herd flourished for a while until the mid 1960's. An account of this period of experiment and frustration is provided in Scotter (1972), and Treude (1975).

In 1974 after much study, government decided to get out of the reindeer industry. It sold the entire herd to the chief herder. A private company, Canadian Reindeer Ltd., was established and efforts were made to put the company on a profitable basis. Attempts were made to improve the immediate cash flow situation by promoting additional meat sales in the Delta

region but the market remained small. Sales of reindeer antlers for export to the Asian aphrodesiac market provided some cash flow but this market remained uncertain. Efforts were also made to improve the slaughtering operation to a level where the meat could be certified for export from the Northwest Territories. These initiatives were expanded and intensified after the company was sold to another Tuktoyaktuk resident in 1977 and its name modified to the current Canadian Reindeer (1978) Ltd.

The cash flow provided by the antler sales, modernization of the herding and roundup operations through the use of light aircraft and helicopters, development of appropriate slaughtering facilities and meat handling procedures, the lower cost truck access provided to southern markets by the opening of the Dempster Highway in 1979, and arrangements made with southern meat packing and meat sales outlets, taken together, greatly changed the prospect for a continuing reindeer industry. The industry began to operate as a business and became profitable.

Canadian Reindeer (1978) Ltd.'s herding and meat slaughtering operation provides some employment and the opportunity for a different lifestyle for Tuktoyaktuk residents. The business employs the owner, his wife (as book keeper), six full time herders who work on overlapping rotations (four herders on duty at any one time), some 40 to 50 residents for roundup and marking during a two to three week period each summer and a smaller number, usually 20-22 residents, each February for winter slaughtering. The business also contracts within the region for helicopter and light aircraft support during the summer round-up and management advisory services (Nasogaluak and Billingsley, 1981).

As of 1981, the herd had increased to 12,000 animals and the company was becoming concerned about the ability of the grazing reserve to support larger numbers of reindeer. (Nasogaluak and Billingsley, 1981). A study was initiated to determine the carrying capacity of the area and some thought was being given to the possible establishment of additional herds in other areas of the north. The company was also concerned about the possible impact of future oil and gas development on the herd. However, as the company president and his principal advisor noted in a paper on the herd delivered in May, 1981: " Canadian Reindeer believes that these possible difficulties can be minimized and controlled given a continuation of the cooperative attitude shown by the oil companies in the past," (Nasogaluak and Billingsley, 1981).

APPENDIX to 7.3

METHODOLOGY FOR CALCULATING TOTAL POPULATION EFFECT OF BEAUFORT EMPLOYMENT

Direct employment has been translated into total population impact on the Beaufort region by using the following procedure:

Equation A

Directly Employed Regional Residents
X 2.071 (0.88 x 3.74/1.65 + 0.12) =
Population due to Regional Resident Labour Force

PLUS

Equation B

Directly employed North South Rotational Labour Population due to Force
X 0.05 (2.071 (0.88 x 3.74/1.65 + 0.12) =
North/South Rota-tional Labour Force

The first equation estimates the population multiplier for resident workers (4.3795) while the second estimates the population multiplier for rotational workers, which is 5% of the former. (0.219).

The components of these factors are explained following.

2.071 = Employment Multiplier based on a study of the total employment impact of export based activity in northern Alberta. This multiplier was considered a reasonable proxy for the situations expected in the Beaufort Sea area over the next 20 years, although it is appreciated that northern Alberta is not fully comparable to the Beaufort.

It cannot therefore be argued that the multiplier used herein is the most appropriate one, but it can be argued that it is reasonable. If, however, readers consider it an inaccurate estimate of the spin-off effect of direct resident employment, more preferred multipliers need only to be applied to the population factors below to produce new forecasts of total population impact.

0.88* = Married proportion of the Labour Force.

3.74* = Average number of persons in families.

1.65* = Average number of persons working per family.

0.12* = Unmarried portion of the Labour Force

* Based on experience in Fort McMurray, 1976

Equation C & D, below, derive population multipliers using a slightly different but comparable approach based on figures for Inuvik from the 1976 Census. The latter method uses data more particular to the area but as can be seen from the factors which are derived, there seems to be little difference whether NWT or Alberta data is used. In other words, the Inuvik data would appear to support the general validity of the population multipliers in this Volume.

Total Population Effect of Direct Resident Employment

Equation C:

2.071 ((0.659 X 2555) / 995 + (0.341 X 560) /515) = 4.2725

Total Population Effect of Direct Rotational Employment

Equation D:

0.05 X 2.071 ((0.659 x 2555) / 995 + (0.342 X 560) / 515) = 0.2.136

Where:

2.071 = Employment Multiplier for resident jobs

0.659 = Proportion of the labour force is families**

2555 = Number of persons in families**

995 = Family members in the labour force**

0.341 = Proportion of the labour force not in families**

560 = Number of persons not in families**

515 = Non-Family members in the labour force**

0.05 = Employment Multiplier for non-resident jobs

Both procedures assume two things: first, that the 1976 distribution of labour force and population will apply to the future, and second, that full employment will be present throughout the development period. It is not being suggested that the future will find labour force and population situations completely similar to those found in 1976, but only that the past should serve as a reasonable guide to the future. With respect to employment levels, it is reasonable to expect that they will be very high so that unemployment, if present, will not be a significant factor. It should be noted that, in Section 8.2, only a proportion of the future regional native labour force is assumed to be active in oil and gas employment. Those not employed by the oil and gas industry would either be working in an indirect or induced employment role or active in the traditional native economy. They would not be unemployed.

The factor 0.05, the multiplier effect of a rotational job, recognizes that the impact of a project employee residing in the Beaufort area will be much greater than that of a person that flies into the area to work only return to home outside the area at the end of a rotational period. However, there may be a question of whether the multiplier is an accurate estimation of the difference in impact. A low multiplier was used for the rotational labour force because few rotational workers would spend actual time in any of the communities of the Beaufort region. Many would work at offshore facilities and along pipeline spreads far removed from those communities. Rotation could take place via airstrips at - e.g. King Point and McKinley Bay. Even so, the rotational work force would have some population effect, and the 0.05 factor does not seem inappropriate.

** Refer to Inuvik as per Census data supplied by the Statistics Division, Governement of the Northwest Territories, April 1982.

APPENDIX TO SECTION 8.7

Source of Information

Numerous studies have documented native resource usage in Northern Canada through maps with text. Some of these, such as Nelson's and the Boreal Institute's (1975) Renewable Resource Mapping Project for the Inuit Tapirisat of Canada and Freeman's (1976) Inuit Land Use and Occupancy Project for the Department of Indian and Northern Affairs span the Canadian Arctic. Other studies encompass smaller areas such as Usher's (1976) community specific,

detailed mapping of hunting and trapping areas in the western Arctic, the James Bay and Northern Quebec Native Harvesting Research Committee's (1979) compilation of Harvest of the Inuit of Northern Quebec, and Interdisciplinary Systems Limited's (1977), study of past and potential land use in a proposed land freeze area round Tuktoyaktuk.

Thematic maps such as the set accompanying the Canadian Arctic Gas Pipeline Applications (CAGPL) prepared by Industry; the set entitled "Mackenzie Valley and Northern Yukon Pipelines; Regional Analysis" published by the Environmental-Social Committee, Northern Pipelines, Task Force on Northern Oil Development; the Canadian Wildlife Service's (CWS) Atlas of Wildlife Habitat Inventory Maps; the Arctic Ecology Map Series (AEMS); and the Northern Land Use Information Series (NLUIS) have been and are continuing to be prepared to assist in resource management and planning matters. The Environmental-Social Committee's maps, although restricted to the Mackenzie Valley and Delta regions, include maps sheets depicting wildlife zones and hunting and trapping areas by community.

The Arctic Ecology Map Series compiled for the Canadian Wildlife Service by Renewable Resources Consulting Services Ltd. delineates "specific habitat areas as a prerequisite to safeguarding important wildlife resources" (CWS, Arctic Ecology Map Series Critical Wildlife Areas Descriptive Reports, 1972), p. 2). The main purpose for this map series was "to identify and map important and critical wildlife areas of the Canadian Arctic where human activities can have an adverse or destructive impact on wildlife populations". The objectives were to, firstly, bringing together as much data as possible on habitats utilized by a wide range of species in order to document "key area of particular importance" and, secondly, to provide a planning tool "for wildlife areas." On a species specific basis, the "Atlas of Wildlife Inventory Maps" differentiate habitat according to relative importance.

Wildlife data from the Arctic Ecology Map Series are supplemented with data on fish resources; native hunting, trapping, and fishing activities; ecological makeup of the natural environment; and socio-economic and cultural information and are presented in the Northern Land Use Information Map Series. This spatial assimilation of key material in environmental and socio-economic affairs gleaned from scientific documents, government publications, interest groups and private industry provides a perspective on man-environment interaction and the location of potential land use conflict. Environment Canada and Indian and Northern Affairs Canada now advertise that "Since 1971, the Land Use Information series of maps had developed into the major systematic environmental-social research and information program for Northern Canada... The wide variety of topics covered by the Land Use Information series make it a unique tool for managing natural resources in the Canadian North" (NLUIS Map Index, Ottawa, Undated).

The point is that considerable effort has been expended to prepare and bring together environmental and socio-economic information for assistance in planning industrial development in the north. Given the oil and gas development scenarios prepared by Dome Petroleum Limited, Esso Resources Canada Limited, and Gulf Canada Resources Inc. (Hydrocarbon Development in the Beaufort Sea-Mackenzie Delta Region," June, 1981), that put into a 1981-2000 time frame a view of production levels, and transportation and social infrastructure requirements, it is possible to begin to assess the impacts of oil and gas activities on current land use patterns and activities.

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PERSONAL COMMUNICATIONS CONCERNING FUR, GAME AND FISH HARVESTING

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