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Interdisciplinary Systems Ltd.

Environmental Consultants Winnipeg/Edmonton

A COMPREHENSIVE STUDY OF PAST AND POTENTIAL LAND USE IN AREA "A", PROPOSED TUKTOYAKTUK LAND FREEZE



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Prepared for:

Department of Indian Affairs and Northern Development Ottawa, Ontario

Prepared by:

Interdisciplinary Systems Ltd. Winnipeg, Manitoba



This study comprises three volumes: a main study report, an appendix volume and a map supplement. The main study report presents our conclusions and recommendations for resolving traditional and industrial land use conflicts in Area "A", Proposed Tuktoyaktuk Land Freeze. The appendix volume contains much of the background information on biological characteristics and traditional land use used in developing the main study report. The maps described in the appendix volume are presented in the map supplement.

August 1, 1977

CONTRIBUTORS:

R.E. England, Project Leader D.H. Boyd, Traditional Land Use M. Fedak, Cartographics W. Hayden, Fisheries L.E. Hurwitz, Exploration and Development K.M. Johnston, Land Use Regulations G.R.P. Mutch, Mammals R.K. Schmidt, Birds

SUMMARY

This report identifies eight areas regarded as critical in maintaining present use of Area "A" fish and wildlife resources, and an additional seven areas regarded as critical in maintaining potential resource harvest opportunities in Area "A".

Many potentials for adverse impact from oil and gas exploration and development activities within these areas are identified. For the most part, these impacts are regarded as mitigable through existing land-use regulations if appropriate operating conditions are applied to land-use permits and if enforcement of operating conditions is adequate.

We have identified operating conditions which should be applied to land use permits for activities in critical areas. These are mainly concerned with the timing of activities, methods used, and specific locations of activities. Certain exploration and development activities are regarded as incompatible, however, since no means for mitigating their impact is known. Generally, these include such things as water-based drilling programs and the configuration and site specific location of certain infrastructure components such as permanent roads, compressor stations, etc.

Two critical areas are highlighted as areas of particular concern, namely the upper and middle Eskimo Lakes and Cape Bathurst. The former is a favoured recreation area

(i)

for Tuktoyaktuk residents and we have recommended that no water-based exploration and development activities be permitted in these waters.

With respect to Cape Bathurst, we do not regard exploratory activities to be a particular concern in this area so long as appropriate operating conditions are applied to land use permits. We do, however, forsee the potential for adverse impacts on caribou should a producing field be discovered on Cape Bathurst and the necessary infrastructure (above-ground pipelines, permanent roads, etc.) be developed. The nature and extent of this impact would depend upon the precise location and configuration of the infrastructure, however, and this cannot be predicted at this time.

As a consequence, we conclude that exploration activity could only proceed in Cape Bathurst area at the peril of not being able to bring a proven field into production. That is, there would be a calculated risk for proponents of exploration activity in this area.

Even though we consider exploratory activity not to be damaging on Cape Bathurst, we do recognize that this area is held in special regard by some Tuktoyaktuk residents and consequently proposals to carry out any program there are likely to be regarded negatively as they have been in the past.

Much of Area "A" has not, on the basis of existing information, been classified as critical for present or potential use of Area "A" fish and widlife resources. We

(ii)

forsee limited potential for adverse impacts on traditionally harvested fish and wildlife resources as a result of exploration and development activities in these areas. This of course presupposes that such activity is conducted in a manner consistent with sound land use practices as normally stipulated in operating conditions applied to land use permits.

We concluded that it was not necessary to identify operating conditions which should be applied to land use permits covering exploration and development activities in areas not regarded as critical. We also did not forsee the need to prohibit any of the types of exploration and development activities which might be anticipated within these areas.

Although attention in this study was focussed on potential adverse impacts of exploration and development activities on current harvest levels, we briefly aluded to the implications of local population growth on traditional resource harvesting activities. On the basis of the limited information available we concluded that local population growth, due both to natural population increase and inmigration, will probably give rise to increased harvest of renewable resources and could result in excessive pressure on local fish and wildlife populations within Area "A".

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ACKNOWLEDGEMENTS

Many people from government, industry, and Tuktoyaktuk have been helpful in providing information and advice during the preparation of this report. We express appreciation and thanks to them all. Particularly we would like to acknowledge the biological and harvest information offered by Drs. J.G. Hunter and D.E. Sergeant of the Arctic Biological Station; R. Barnes (Inuvik) and D. Dowler (Yellowknife) of Fisheries and Marine Service; G. Williams (Inuvik) and V.D. Hawley (Edmonton) of the Canadian Wildlife Service; K. Davidge (Aklavik), Dr. G. Calef, B. Wong, R.B. Hall and R.B. Tinling (Yellowknife) all with the Northwest Territories Government; K.P. Whitten of the Alaska Department of Fish and Game; M. Fraker of F.F. Slaney and Co. Ltd; Gillian Earl (Calgary) of Gulf Oil Canada Limited; and Dr. R. Riewe of the University of Manitoba. Information on the present system of land use regulation was given by C.J. Cuddy, G.T. Glazier, and D. Longlitz (Yellowknife) and B. VendHoen (Inuvik), all with the Land Use Section of Indian Affairs and Northern Development; and J. Howell of Canadian Arctic Resources Committee. M. Ratuski of Gulf Oil Canada Limited in Calgary, and I. Bishko of Northern Geophysical Ltd. in Calgary were particularly helpful in providing insight to technical aspects of petroleum exploration and development. F. Schwartz, formerly with the Inuit Land Use and Occupancy Project, assisted in finding project

(v)

data at the Public Archives in Ottawa. Finally, and most importantly, we thank Jonah Carpenter, Bobby Chicksi, Charlie Gruben, and Alphonse Voudrack for their participation in an intensive review of our mapped information of animal distributions and traditional land use patterns. We would also like to thank all the residents of Tuktoyaktuk who took the time to review the background materials and discuss the study with us.

Interpretations of data and conclusions of this report are the sole responsibility of the authors.

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CHAPTER 1

STUDY OBJECTIVES AND PROBLEM REVIEW

Study Objectives

The purpose of this study is to develop guidelines for controlling land use in Area "A", Proposed Tuktoyaktuk Land Freeze (Figure 1). Of particular concern is ensuring that existing and potential opportunities to practice traditional pursuits (hunting, trapping, fishing) are not impaired by oil and gas exploration and development activities.

Specific study objectives are:

- 1. to identify the extent to which portions of Area "A" are currently used for hunting, fishing and trapping (last 5 to 10 years); the extent of existing utilization (cash income, food supply) including consideration of the habitat needed to maintain the fish and wildlife resources used by man.
- 2. to identify the past, present and potential exploration and development activity in Area "A", and to identify potential conflicts between such activity and current hunting, trapping and fishing by local residents.
- 3. to identify areas within Area "A" where exploration and development could occur without detriment to traditional pursuits as currently practised. Acceptability must be determined by considering cumulative as well as immediate impact.
- 4. to identify specific conditions that might be used in permits regulating exploration and development activities in areas where a potential for conflict has been identified.

to identify areas in which no clear priority can be given to any single use and in which normal regulating procedures should be followed.

5.

It is important to note at the outset that since several factors are not taken into account in this study, the findings presented here do not provide a complete basis for land use regulation in Area "A". First, this study restricts consideration to the living resources of Area "A". Although certain land use controls are required and can be instituted in Area "A" to ensure the integrity of fish and wildlife populations while they occupy the area, some species use lands outside the study area during critical life history phases. For example, most of the caribou which migrate through and calve in Area "A" winter outside the study area. Similarly certain goose populations which stage.

Second, only those species traditionally utilized by Inuit hunters, trappers and fishermen as a source of food and income are addressed in this study. Consequently the potential for impact on species not traditionally harvested, including rare and endangered species, was not considered.

Third, sites of historical and cultural significance, such as archaeological sites, burial grounds, and traditional camp sites, have not been considered.

Fourth, the reindeer herd was not considered since this herding enterprise does not fall under the definition of traditional use. For purposes of this study traditional



use is defined as including hunting, trapping, and fishing activities that have been engaged in by local residents at least since the beginning of the fur trade era. For the most part, the objective of these traditional activities is to acquire food or cash income from the harvest of living resources. At times, however, these resources are used more for recreational purposes. Recreational use, where and when it occurs, is regarded as "traditional use" in this study.

Problem Review

Conflict in Area "A" came to the fore in April, 1972 when Elf Oil Exploration and Production Canada Ltd. applied for a land use permit to conduct a summer seismic program on Cape Bathurst. Concern was expressed by various member agencies of the Land Use Advisory Committee (LUAC), the Committee for Original People's Entitlement (COPE), and the Tuktoyaktuk Hamlet Council, that unacceptable damage to the environment could result from the proposed activity. It was felt that if this environmental damage occurred it could hinder or perhaps eliminate the livelihood of some Tuktoyaktuk residents. On these grounds the application was refused.

Elf Oil subsequently reapplied for permission to conduct a winter seismic program on Cape Bathurst from October to December, 1972; this application was approved by the Canadian Wildlife Service (CWS) and other member agencies of the LUAC. Some native people, however, still

perceived Elf's proposed winter program as a potential hazard. Fears expressed by the Inuit Tapirisat of Canada (ITC), COPE, and the Tuktoyaktuk Hamlet Council, persuaded the Minister of Indian Affairs and Northern Development (DIAND) to delay for one year a decision regarding this application and the permittee's obligations under their existing oil and gas permit for the area were postponed by an Order-in-Council.

At the same time, the Minister requested that a study be carried out to: examine the environmental concerns expressed by the Tuktoyaktuk residents and native organizations, apprise him of the state of knowledge on area wildlife resources, and recommend specific controls and guidelines which might be applied to regulate exploration and development activity in the Cape Bathurst area.

A "revised" report on the findings of that study, carried out by the Canadian Wildlife Service, was published in July 1975. In the interim, oil and gas permit obligations were postponed by annual Orders-in-Council. In essence, therefore, a moratorium on exploration and development activity has applied on Cape Bathurst since 1972.

During this period, native organizations had become increasingly active in pressing for a land claims settlement and had received a favourable judgement on an application to file a cayeat on lands they were claiming. However, the judgement called for the filing of such a cayeat only after all possible appeals from the judgement

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had been completed or the time for launching them had expired. Government proceeded with an appeal and, as a result of this action, the native organizations asked the Minister what might be done to ensure that a measure of - 11 day - 1 THE BEAM REPORTED AND A DESCRIPTION OF AN A DESCRIPTION OF A DESCRIPTION OF A DESCRIPTION OF A DESCRIPTION OF A protection was provided for the lands identified in the various claims until such time as negotiations on land claims could be carried out. The Minister indicated that a total freeze on all lands being claimed was not acceptable but did suggest that there might well be some places of ಮ್ ಕ್ರಿಸ್ಟೆ ಸ್ವಾರಿಸಿದ ಮಾಡಿಕಾಗಿ ಸ್ವಾರ್ ಕ್ರಿಸ್ಟ್ ಸಿದ್ದಿಗೆ ಸ್ವಾಗಿಸಿದ್ದರೆ. ಇದು ಸಿದ್ದ ಸಂಸ್ಥೆ ಕ್ರಿಸಿಗಳು special significance to native people which should be given ලදාවූ කියුවු . මේයදුරුවක් වී වේ. හිරි දීරේ පිළිහිණය කොම්ලා වේ. මෙහෙමයි. මේයා හම්ලා මේයා මේයි individual consideration. More specifically, the Minister conveyed the following message to the president of ITC, 28 November 1974. "I am referring to locations which may have particular cultural, historic, or local value for which special protection could be arranged so that disturbance 化铁合物型蛋白铁 动物性 经制造工具工具工具工具 化化力 would not occur without full prior consultation. I think nog (special states) 이 옷로가 이 공사로 같은 것을 수요? 이 가지 않는 것을 that this approach, if you agree, could afford reasonable protection of individual parcels of land pending the outcome of any settlement."

In May 1975, in response to this initiative, COPE proposed three areas for individual attention and special protection. The largest of these was Area "A" - Proposed Tuktoyaktuk Land Freeze, an area of about 11,000 square miles in the Eskimo Lakes-Liverpool Bay and Cape Bathurst region. This proposal was endorsed by the Tuktoyaktuk Hamlet Council.

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COPE asserted that the proposed land freeze area avoided all known high potential lands for oil and gas discovery, a view not shared by industry. The basic position

adopted was that all exploration and development activity be excluded from Area "A", and that it be preserved as a traditional hunting and trapping area. This position was in opposition to DIAND's policy of multiple land use and DIAND contended that environmental concerns could be adequately dealt with by the Territorial Land Use Regulations. Departmental officials further indicated that the intent of the Sec. 1 Minister had not been to entertain proposals to freeze large to rectify more and they work where and the start being the start being the start blocks of land. Rather, it had been to consider small discrete parcels of land, such as burial grounds, for special protection. Both COPE and the ITC expressed their opposition to this position contending that Area "A", in its entirety, was valuable to the traditional pursuits of local people. DIAND's willingness to provide guarantees respecting such things as burial grounds were seen as marginal considerations compared to the value of the total area to 化化学学校 化化学学学校 化化学学 化化学学 化化学 native people. They further contended that the Land Use Regulations were inadequate as a tool for preserving this terite and the second term

environment.

While the Minister did not accept the land freeze proposal, he did agree to extend the moratorium on Cape Bathurst to May 31, 1976, at which time he outlined proposals for the future. Generally, these proposals took the form of multiple land use in Area "A", with preference given to traditional use over industrial pursuits.

On October 1976, Atlantic Richfield applied for a land use permit in Area "A", followed by an application by Gulf Oil to conduct seismic work in the Eskimo Lakes area. Tuktoyaktuk Hamlet Council and the Inuvik Town Council voiced no objection to the Gulf application. However, opposition to it was registered by COPE and the Tuktoyaktuk Hunters and Trappers Association, also via COPE. In response to this opposition, the Minister, in February 1977, endorsed a six-month land freeze in area "A", until such time as further studies could be done.

At present, a lack of unanimity of oppinion appears mento exist with regard to: (1) the adequacy of existing Land -TUse Regulations in controlling exploration and development,

(2) the imputed value of Area "A" for traditional versus industrial pursuits; and (3) the designation of a responsible authority to represent local interests.

A first with respect to the adequacy of existing land use is regulations, DIAND has steadfastly maintained that they are adequate for ensuring that exploration and development activity does not result in irreparable damage to the environments: Generally, local residents seem to agree that is and use practices have improved greatly since land use regulations were first implemented. Nonetheless, earlier abuses and reckless land, use practices are vivid memories for area residents. The land use regulations are not without their critics, however, but much of the criticism seems to focus not so much on the intent or adequacy of the regulations themselves as it does on the adequacy of their enforcement interves as it does on the adequacy of their

常说,这就要要的服务者的,是我的身体,可以这些**要要的实际**的问题的,让我们就没有了,我没有的人,我没有的人,你不能在这些人,就是

With respect to differences in opinion about the imputed value of Area "A" for traditional versus industrial pursuits, COPE, as stated earlier, contends that the lands "Within Area""Asido not possess high potential for gas and off discovery. Industry does not share this view; and government geologists regard much of the area covered by the land freeze proposates having moderate potential formail "and gas discovery. The share to share the share the share the share of the area covered by the land freeze proposates having moderate potential formail

Essi wilfelsewhen the boundaries of Area A. were defined, many Tareas used by Tuktoyaktuk residents were not included of The Core marten trapping area around Crossley Lakes, for exordisample; wascercluded from Area "A" ... The boundaries of Area "A" were clearly selected in an attempt to protect the se watershed of Eskimo Lakes and the lands of Cape Bathurst. "Over much of this area it is recognized and admitted locally that there is very little utilization of living resources. - is all or Much of the controversy over the imputed walue of traditional use seems to have centred on Eskimo Lakes. In part this may stem from confusion surrounding the nature and "extent of the use in this area." There appears to be little question that the upper and middle Eskimo Lakes, and particularly the latter, are an important fishing area for a " Tuktoyaktuk residents. Fishing there is not so much for "food as it'is for recreation, however, a contract of Light of With fespect to the problem of who represents local interests there is no clear answer. The retected Hamlet Council is obviously regarded as the representative authority within hamlet boundaries but their authority or

right to speak on behalf of Tuktoyaktuk residents concerning land use matters in the hinterland of the settlement has been challenged by the Hunters and Trappers Association. A concerning review of miscellaneous pronouncements and transcripts of news media interviews with residents of Tuktoyaktuk also

organizations opinion varies and changes from time to time. us rigend see i subre dade not retuit i the trou with An understanding of "who represents whose interests" is abar index naise a fear and a subject from the state of a structure of the state of further confounded by the periodic involvement and proy (* 1916), 19. – velove verse (* 1917), stady Bernardsev (* 2011), Lungel er 11 maar (* 1867), 1867 nouncements of COPE and ITC, the regional and national Inuit rivers (8) gradogudina) aserus a isdrow, r giller Maxim 2, se organizations respectively. Both organizations at times the state of the second ್ರವಿಲ್೨ಿಅಂ⊈ ಸೇ ಸೇವಿಯೊಂಗಿ ್ಟಿ ಎಂದೇ ಎ purport to speak on behalf of local residents. Periodi-"我们都是我的意思,是要要认为,是我们的吗? 1.**1**1 - 1.1. 1868 - 18 Qu cally, however, their right to do so or the accuracy of their pronouncements has been challenged locally.

With the recent establishment of an outpost camp 1.22 化生产的 网络家庭 at North Star Harbour, another group has to be reckoned with. We believe that most Tuktoyaktuk residents regard 计波动联盟公司公共中心 . North Star Harbour residents as the legitimate or primary 음악 영국 전 승규는 영상 등 것 spokesmen regarding land use on Cape Bathurst. da an an an tha 🔭 🚓 a' In devising our study approach, we attempted to take account of these diverse views and interest groups. 医白喉性病 化化合成素素酶加强的 化分子光谱 法公司承担贷款 化合物分子 energy of the part of the fight when the state of the state

CHAPTER 2

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harvested fish and wildlife populations were delineated next and the potential short- and long-term impacts of moderate or high severity identified within the aforementioned matrix were addressed for each critical area. Finally, we identified exploration and development activities requiring special attention (controls) or which should be prohibited in each area critical to present use. This same procedure was repeated for areas considered biologically critical in maintaining fish and wildlife resources of potential value for use. In the case of potential use areas, concern was

confined to consideration of potential long-term impacts of moderate or high severity.

HER RELEASE The above aspects of our approach and the under--Adadying rationale areadiscussed more fully below to transpo -Stel of Takadel Bolesa off and dramawod autropics Takat

Determination of Traditional Use

A detailed contrantary on the history and status of

-modes , Jest The Innits Land User and Occupancy Projects informa-

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tiondwasbusedstoodevelopgan initial understanding bfstradi-

and, the Taktoyaktuk areaswas compiled by 60PE on behalfs of ITCas and,

like all of the Inuit Land Use and Occupancy Project information, is deposited in the Public Archives, Ottawase Only estimation relating to more recent patterns of tradi-

tional use by Tuktoyaktuk residents (1955-1974) was used. Wisholdsbard tol assis instricted viscorciols The only source materials of use compiled by the Project not Statestil eidelieve most foritioned are maps for individual available for review were land use maps for individual available for review available for for the second of the second of

The terms of reference for this study require that Viladoitibet: the covery variable and set the the last traditional use of Area "A" resources for the last 5 to 10 refer to reference for the last 5 to 10 years be considered. Since the most recent information on years be considered. Since the most recent information on with of labitic end and and a set of the last two traditional use compiled for the Inuit Land Use and Occu-

pancy Project in the Tuktoyaktuk area is aggregated for a 20-year period, it was necessary to ascertain the change which may have occurred in use patterns during the last 10 years. This was accomplished via intensive review of our current land use maps with a small group of active hunters and trappers, and more general discussions with a cross section of Tuktoyaktuk residents.

In addition to the above, harvest information was compiled from the available records maintained by the Northwest Territories Government for the period 1966-67 to 1975-76. eri isrolt lot la mudan musief

A detailed commentary on the history and status of "Sutraditional land use patterns and resource harvest, accom-- Denied By supporting data in mapportaloguessands tabular and the second of the second of the straditional land uses and resource harvestodata sections of the appendix volume to this report.

like all of the Invit Land Ose and Osevpanzy Systems informa-

Documentation of Biological Characteristics of al ,30 /3 Traditionally Harvested Species

"This information relating to new record patherne of the

tional use by Tuktoyakyuk residontu (1953-1974) was usud. Biologically important areas for traditionally the only source materials of use compiled by the Freiters not harvested species were identified from available literature, svailable for review were last use mires for Individual by personal communication with government resource workers, as a low chansence we transformer and the second second and the second seco ***** and through discussions with those who use the resources. rondents, are to remain apprichmental for fine yes, c Particular attention was focused on areas considered criti-The cerms of referrance for this status of the th

cal during various life history phases of traditionally cel during various the cerois "A" cerois tor the last 3 10 10 harvested species, e.g. colonial nesting areas for wateryears be considered, Since the most recent it formation an fowl, caribou calving grounds, and areas critical to fish seeditional use compiled for the indit Land Can and Occur life histories.

是一次2月,是当时和东西在区域的,要求,这些变形,在这些地区的内部地区,在自己的主义,是是一个人的人。 Details on the biological characteristics of the ·马马尔,这时,这次说,他们就在这些你的说,这么,这些世界是希望的话,这些你们的,你们,我都是没**会说**,这些那些不少了 study area for the species supporting traditional use are Study area for the spectra sepretary for the barrabes read that doubt presented in maps and supporting catalogue entries in the ំចុះ ំណ្ដាមដំហូងដែលនៅដែលនៅការ ភូមិមិន នោះក្រៀននោះស្រុះសូល ខ្លាក់ សំរាប់ (អង្គមនុស្ស appendix volume of this report.

Verification of Current Traditional Use and Biological Characteristics Information

Having reviewed and mapped all available informaareas possess one or more of the following characteristice tion on the biological characteristics of the study area and the exea is important for our particular life history phase patterns of traditional use, we verified this information coors to mainees reluce ray a for amenged leaf . sainade a lo with residents of both Tuktoyaktuk and North Star Harbour. of species use the area during a particular like history The maps were given intensive scrutiny during a two-day phase, or species using the area are particularly vulnerably review session with four area residents who are or have been during the time they occupy the area. These areas are above active hunters and trappers. As a result of this review we on a may (Ffyure 3) presented in Chapter 4 of this report. were able to identify land use pattern changes during the Detail on the critical areas is presented in catalogue last 10 years and to verify certain areas biologically stries acrompanying the aroremantioned map.

important for harvested species. Maps incorporating modifications made as a result violantio for variable betaevrat vienoritiest to such of the above consultation were then placed on display in the betalooses bus seers seed. Detaenies is a size beta Tuktoyaktuk community hall for three afternoons and two stated of institudis berebience word are anoits (ado evenings. All interested residents were invited to visit (& erupit) game are swore are seens is is if to see a the hall to have the study explained to them, and examine is is is is individed and are and a set are and the beta and comment on the maps. A particular effort was made to evenings active hunters and trappers to view the maps, but

the general public was also urged to come and discuss our moltanologya he moltaineed bus not a filtereft findings. About 25 to 30 residents viewed the maps and a

informally discussed the study.

NE ME BERE CE SUCTOR LES RESOLTERED WITH SERVICE ST

- JDelineation of Criticals Areas who have a set of the algest of

state - the four means and an end of the state of the state

be probably a types of areas regarded as critical for main-

taining traditional use were delineated -- areas critical

for present use and areas critical for potential use

Areas regarded as critical in maintaining the

populations and distribution patterns of currently harvested

fish and wildlife populations were first delineated. These Havit; reviewed and mapped all available informaareas possess one or more of the following characteristics: tion on the bidlogical characteristics of the study area and the area is important for some particular life history phase ณออังพระบาที่ เป็นปี 16011 เดิด คุณ (อาที โลยเป็นไปลาง ออ คุณจะบังอนู้ of a species, large numbers of a particular species or group suodist sett lett bis an X greit and se affected the state the of species use the area during a particular life history The mapy were given infansive scruting daring a two-day phase, or species using the area are particularly vulnerable review seedon with four area residence who are or have hear during the time they occupy the area. These areas are shown active hunters and trappets. As a result of dias revies we on a map (Figure 3) presented in Chapter 4 of this report. were able to fentify land use pattern chelfes didd ig the Detail on the critical areas is presented in catalogue dast 10 years and to verify certain aleas biologically entries accompanying the aforementioned map. important for harvestel species. Areas regarded as critical for maintaining popula-Mags Encorportiting modifications were as a result tions of traditionally harvested species, not currently of the above consultation were then place for display it the used, were next delineated. These areas and associated Waxte yaktuk community hadil for three afternoon and the populations are those considered significant for potential evenings. All itteristed residents wore arvited to wind These critical areas are shown on a map (Figure 4) use. the hall to have shedy and lained to them, and evening presented in Chapter 5 of this report. Additional detail is ad abam eas on the relation of Particular Entropy and the second the presented in accompanying catalogue entries. encourage source aureais and trappare to wiew that we wante

ine emports for anon of Septement Ender faterage of Identification and Description of Exploration and Development Activities 200 00 ct 25 Junca - apprints

informally discussed the soudy.

The types of activities associated with each phase

of exploration and development (seismic, exploratory dnilling, production, transmission) were identified. This

exploration and development as well as information provided

to us by industry ind response to our queries. demonstry our

Villevez Since the potential of Area "A" for gas and oil discovery remains largely unproven, the ultimate nature, extent, and specific location of exploration and development activity is presently unknown. Consequently, we took the view that exploration and development activity could proceed from a preliminary seismic investigation through an exploration drilling program to the development of a producing field, with all its associated infrastructure, almost anywhere within the study area.

activity to adversely affect species supporting traditional activity to adversely affect species supporting traditional use was then addressed within a matrix. Exploration and development activities comprised the vertical axis of the matrix while the horizontal axis was comprised of sensitive life history phases of the species supporting traditional use. Within the matrix, only potential impacts of moderate and high severity are noted. Impacts are further differentiated as short- or long-term in duration. The matrix is also presented in the appendix volume of this report. We considered an impact to be of moderate severity if it could result in a perceptible change in a population or distribution pattern. If a population is not being "I harvested heavily, however, an impact of moderate severity might not be reflected in total harvest, but greater effort might be required to attain a pre-impact level of harvest. On the other hand, if a resource is being harvested at or near capacity, an impact of moderate severity could result in decreased harvest.

We considered an impact to be of high severity if it could result in a readily noticeable change in a popusetting of the setting of the setting of the setting of the lation or distribution pattern. This level of impact is nemcolevel the notificity of boltabol of the the the setting likely to be reflected in total harvest. That is, not only but would more effort have to be expended in an attempt to new of the total the setting of the total were maintain a pre-impact level of harvest, but, even having expended the extra effort, there may well be a shortfall in harvest. harvest.

The differentiation made between a potential impact of moderate and high severity is a subjective one. The biological and use information available provides little or no basis for ascertaining whether or not any particular population is being harvested at or near capacity. For to this fact and be information (fish and wildlife example, reliable census information (fish and wildlife numbers), populations dynamics studies, and harvest records (quantities harvested and time series) are not available. With respect to impact duration, we regard a short-term impact as one where populations or distribution

patterns will revert, in less than 3 years, to a pre-impact

condition. A long-term impact we therefore regarded as one whose effect persists for more than 3 years.

Both short- and long-term impacts of moderate and high severity were considered for populations currently utilized but possessing good potential for expanded famian use, only longtermbimpacts of moderate and high severity were considered. et notate , we but is notifiered and high severity were considered. by vivious pridels has pointed and and use out to barrow to be vivious pridels has pointed and and and the second bemasones at Maline , see build bet the second out to be second bemasones at Maline , see build bet to be second termbind and the second out to be second bemasones at Maline , see build be build be second out to be second to vivious pridels has been build being and and and and and and second at the second out to be second out to be second to be set to be a basis of the second out to be second to be an an and the second out to be second out to be second to be a set to be a basis of the second out to be second out to a second out to be set to be a second out to be second out to a second out to be set to be a second out to be second out to a second out to be set to be a second out to be second out to be set to be a set to be a set to be a second out to be set to be a second out to be set to be a second out to be set to be a set to be

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CHAPTER 3

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PAST, PRESENT, AND POTENTIAL LAND USE IN AREAS AF doug and harding (Dreshod con raiselears work not should be not yith This chapter provides a brief-discussion of spast, present and spotential land-use in Area "A". This deliver cussed under two headings, traditional land use, which is concerned with the trapping, hunting and fishing activity of native peoples, and industrial land use, which is concerned with the exploration and development activities of industry, primarily the petroleum industry.

Traditional Land Use

Trapping, hunting, and fishing by Tuktoyaktuk and North Star Harbour residents occurs over much of Area "A". Arctic and coloured (red) fox are the major furbearers in Area "A" and are trapped over much of the area. Other major furbearers are polar bear, taken mainly in the Baillie Island-northern Cape Bathurst area; marten, taken south of the treeline in the Kugaluk and Anderson River areas; and muskrats, taken in the areas surrounding Eskimo Lakes. Wolves are taken throughout the area whenever encountered but they are relatively few in number.

Caribou are the major game species and are hunted over a large portion of the area from the Kugaluk River to northern Cape Bathurst. Moose are hunted in the Kugaluk,

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Moose, Anderson, and Horton River valleys and around Sitigi Lake although very few are currently harvested. Seals are taken in Harrowby Bay but again harvests are relatively low. Geese and ducks are major game species and are hunted around Eskimo Lakes, in the Rugaluk, Moose, Smoke, and Mason River deltas and around Harrowby Bay.

commercial fishing occurs in Eskimo Lakes. Some domestic fishing occurs in the Kugaluk, Anderson, and Horton Rivers, in Wood Bay, and in several small inland lakes.

are provided on the current land use maps in the supplement to the appendix you're of this report. Catalogue sheets accompanying these maps describe seasonality, intensity, and other aspects of land use.

though a much larger area is used by local residents. The total area of land currently used by local hunters and trappers is not significantly different from the area used by hunters and trappers living in the region before 1955. It extends east of Area "A" into Amundsen Gulf, south of Area "A" to the Crossley Lakes area, and west of Area "A" along the west coast of Mackenzie Bay. Usher (1976a) observes that, since the introduction of the snowmobile, Tuktoyaktuk people are now apparently covering traditional hunting areas as effectively from one settlement as they did many years ago from various camps.

We collected harvest data to determine the importance of hunting, trapping, and fishing to area residents

and to determine the relative distribution of harvest among the most active hunters and trappers. Harvest levels over the current 10-year period for many species (arctic and .wol coloured (red) fox, polar bear, transfor, decks, and whales, are generally higher than, or as high as, harvest " Ievels over the previous two 10-year periods, whereas harvest levels for marten, muskrats, moose, and seals have declined considerably. Individual harvest records indicate "that a relatively small group of hunters trappers account for a high percentage of mode, polar bear, caribou, marten, and muskrat harvest, whereas goose and duck hunting is a widespread activity which is practiced by a majority of are provided on the current land use manual additions are Every native resident must obtain a ceneral Hunting License each year in order to be allowed to hunt or trap. Based on records, the number of General Hunting Licenses issued increased by 67% from 1966 to 1976 and 32% from 1971 to 1976. The corresponding increases in population during this period were 46% and 12% respectively, indicating that an increasing percentage of residents are obtaining licenses and thus are hunting or trapping. With increases in the population of Tuktoyaktuk in the future, we anticipate there will be corresponding increases in hunting and trapping and hence increased demand for fish and wildlife resources. The degree to which increased harvest will be for satisfying basic food and income requirements, providing supplementary food and income, or deriving recreational to seemine and and maintain but there are rained to be we

severitees there as but with the confidence rate that the start

satisfaction cannot be predicted, however. Ultimately this

will depend upon the nature and extent of alternative

income opportunities available to local residents and their

redisposition to a wage economy versus a traditional and said save contast, set bard marks fill a solution resource harvesting lifestyle.

BULE sloties a virber for bra elements out, but the We have estimated total cash and in-kind income opic actions of a basis of be beatver as another teblo for Tuktoyaktuk and North Star Harbour residents from fur sadigme elderebiance and actobility presided of 20 or beatv and game harvest in 1976 as \$275,900. However, this estisue beings asy stivitos classes glassing of 20 or detailed.

mate is based on fur and game harvest records which have suppowed visiting as busges aw .1781 or to "A" and all many significant sources of error. It also omits many of yourg as a ad al visitios classes that visitidized all sources of income including in-kind income from domestic

15 .170. spara suc fairner need and doinw tair sbeecks // fish harvest, in-kind income from game and fish used for dog food, in-kind income from animal products used for clothing, babiyong northanities of publication sonates of blan ers and cash income from local sales of handicrafts made from

sparsD bleithpir bitsipi isobuloct eacht CRFIG o er animal products. If these factors are considered, the total doubloo of (370] reacted) diming a rol netrapiliges a'.bot cash and in-kind income could be \$100,000 or more greater (sars saval omixed subbin bas required to increase greater than our estimate. Details of harvest data and income from this, a sub various religention a'besimil shared ind income from this, a sub various religention a'besimil shared ind income from this, a sub various religention a'besimil shared ind income from this, a sub various religention a'besimil shared ind the fur and game harvest are presented in the appendix volume to religing a'besimily a beside beside to do a subconduct "A" setA to do and your religing managing the beside.

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despond almales a dup yrres (5,6) 12 (4,6) nordeolfyde Industrial Land Use

north of Hans Bay, and Elf Oil Exploration and Frequerran

Between 1971 and the present, the main exploration

and development activities in Area "A" have been seismic and development activities in Area "A" have been seismic and solution avoid and the been seismic and

exploratory drilling operations. Our calculations show that

during this period about 9.88 square miles or 6323 acres of tailed the second s

represents about 0.089 percent of the total study area which

encompasses an estimated 11,117 square miles or 7,114,880

acres. The location and relative intensity of activity since 1971 is shown in Fig. 2. Then has constant for the state of the Records of exploration and development activity erredisorestator to a variation for the second of a contract a scalar to see prior to 1971, when Land Use Regulations were first in-COLVERSION HARVOR INTERS INCLOSED. stituted, are incomplete and not readily available. Some older applications we reviewed and other information profor Taxtoyakter and North Star Harbour flor the Starte Los vided to us by industry indicate that considerable exploraand dame harvest in 1976 as 1275, July 1600 harvest this entry tion activity, primarily seismic activity, was carried out mate is basid on the and guna harmas meneral antuh have in Area "A" prior to 1971. We regard as unlikely, however, and a line were of a thoras to secure this there is your the possibility that seismic activity in the area prior to sources of income including in-kind floc-e from domestic 1971 exceeds that which has been carried out since 1971. At fiel harvest, there is a from the sub-1403 C. the present time, several land use applications for Area "A" food, in-kind income from rainal products ase for distance. are held in abeyance. According to information provided to and cash income from love' asiss of hind drafte nade tong us by DIAND, these include: Atlantic Richfield Canada Listes will beautrance was subscribed as a strubord tailing Ltd.'s application for a permit (October 1976) to conduct a terms are to the to the state of block and brut the state of t seismic program in the upper and middle Eskimo Lakes area, with conversional bus safe described of fishers and the and their struct Gulf Oil Canada Limited's application to carry out a landmilov setterige este di besetresse ste testant emes bue sub ¢. 🙄 based seismic program within that portion of Area "A" lying veraoder eind south of the uppermost Eskimo Lake, Gulf Oil Canada Ltd's. application (April 1976) to carry out a seismic program NET ANKA ISLATEDDAD north of Hans Bay, and Elf Oil Exploration and Production Canada Ltd.'s longstanding application (September 1972) salayan taya kuka shakara takakara taya malu ekerilare to carry out a seismic program on Cape Bathurst. dir siss nort avel (A) baas of relitivities shamedieves and 1. 22 The above applications are the best indication cada werda ano sea shilika ku Whitelets telliby goods this available of the general areas industry regards as having to serve file the tester and fit is such a fighting along the the potential for oil and gas discovery. The only other VELYERSE CLEARER A PROVERSE PROPERTY BRAN "E" SETA . . . ('. mathe bere states (buds the solutions) and mode atmatediates

area of potential interest which might be added to the above is the area lying to the west of Anderson River and south of Liverpool Bay.

Generally, the oil and gas division of DIAND has rated the hydrocarbon potential of the study area as moderate except for that portion lying in the vicinity of the eastern Eskimo Lakes, including the fingers area, the Kugaluk River drainage, and the area south of upper Eskimo Lakes. These general areas are rated low potential hydrocarbon areas.

Given the very general nature of the available information on hydrocarbon potential, it is impossible to predict, with any confidence, the potential location and magnitude of future exploration and development activity in Area "A". As a consequence we have had to anticipate that exploration and development activity might proceed to the production phase almost anywhere within Area "A".

It is our understanding that no exploration or development activity of consequence, other than that associated with the petroleum industry, is anticipated within the study area. At the same time, we recognize that plans exist for construction of an all-weather road connecting Inuvik and Tuktoyaktuk. If the alignment of this road provides access to Eskimo Lakes, use of these waters by anglers from Inuvik is likely to increase, as is summer use by residents of Tuktoyaktuk.

Although it is impossible to accurately predict how much renewable resource use would increase as a result of enhanced access we would nonetheless suggest that, given

the generally low productivity of northern waters, and the alleged decline in trout catches which has already occurred at Eskimo Lakes, it is probable that the increased use, which would follow from improved access, would further deplete trout stocks.

We also recognize the presence of low grade coal resources in the study trea. We are, however, not aware of any information which would suggest that development of these resources is likely in the foreseeable future.

If subsequent oil and gas exploration activity in the vicinity of Area "A" does reveal development potential, and if this potential is tapped, there will be a migration of personnel to the area to operate and maintain production facilities. For example, preliminary estimates for the Gulf Oil development at Parsons Lake suggest that a permanent work force of 65 to 130 persons might be anticipated there.

With increases in population due to the in-migration of personnel to operate oil and gas developments, there is likely to be an interest in harvesting local fish and game resources and this could result in excessive pressures on local fish and wildlife populations.

It is impossible to predict the potential implications of local population growth at this time, however, for the following reasons:

1. any prediction of the magnitude of local population growth which might be anticipated as a result of in-migration would be premature given the relatively poor understanding of area development potential.
- the potential implications of oil and gas development in the area for resident employment opportunities is unknown,
- 3. the future propensity of local residents to harvest the fish and game resources of the area "a"cannot be predicted, and RARA JADITISD
- 4. the magitude of the renewable resource base available for harvest and the degree to which the existing harvest approximates the maximum sustainable yield is unknown.

In all, we have identified elder arises which we

on set indicated for so taiping current fractional use on The above notwithstanding we suggest that if, at sets to basi statute diotis ers ease to emotion with sets some future date, an increase in demand for and use of fish and wildlife resources of the area by in-migrants is regarded ero bue lafeixe the local native populations, it may be necessary for government to delineate fishing and hunting zones for native use exclusively. The native peoples them--era pristoque ne issistio Serectanos esere edu assuming that land claims are resolved and implemented in such a fashion that control of land use on lands "owned" by native read and tof . Destinged enew wars (contino esect , troget residents rests with them. pure in the casts of bidd lifet formalienterions. In four sting primarily on biological factors, we are suggesting that resource bacyest will be largely uningared if effect tive Land-CAE costiuls can be devised and implemented to ensure that first and which is populations will remain , bedoellase vievide er

Construction of the construction of the above in the first of an Sekimo Laker. This appears to be printerijy a cargeltier is fitabely for forting appears to be printerijy a cargeltier is a sourch spling break we fakely the bakely is the construction of the construction.

CHAPTER 4

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A Discrete contraction of the destroy of the base static stati

In all, we have identified eight areas which we

regard as critical for sustaining current traditional use in Area "A". Some of these are single discrete land or water for 1 to say int for an in the water and or water build units, some are comprised of several discrete land or water the required bit with a securces of the area by in-magement is required. units where the same potential for impact exists; and one of your it and included with and and yourses in the second seco unit is divided into several sub-units on the basis of proceedings bas proved by the provession of the description of the descr -The areas considered critical in supporting presently harvested fish and wildlife resources are shown on a down at becaunaigns be, barrison and any signation bear is a Figure 3. As indicated in the approach section of this evider yd "benwo" show of en en one in the indicated actively report, these critical areas were identified, for the most part, on the basis of biological considerations. In focusing primarily on biological factors, we are suggesting that resource harvest will be largely unimpaired if effective land-use controls can be devised and implemented to ensure that fish and wildlife populations will remain relatively unaffected.

The most noteable exception to the above is the fishery at Eskimo Lakes. This appears to be primarily a recreational fishery for Tuktoyaktuk residents. From all reports, the annual spring trek to Eskimo Lakes, to "jiggle" for trout, is an event looked forward to with much antici-

pation by the people of Tuktoyaktuk. It heralds the coming of spring and is regarded as their holiday. There is therefore a strong and underiable emotional attachment to this area similar to the attitude toward parks and favoured recreating areas that one might expect to find among residents of most southern Canadian communities.

evom bis , soulEor, each area delineated on Figure 3, there follow - catalogue, sheets which summarize, the biological description, ex resource harvest, potential impacts, data gaps, and conclusions to References indicated by reference numbers on the catalogue sheets are listed at the back of this volume. er - bieff the genclusion section for each critical area bie identifies those exploration and development activities regarded as potentially detrimental to fish and wildlife populations. Most of these impacts can be mitigated via existing land we regulations if appropriate operating activities, however, same regarded as totally incompatible identifies, however, same regarded as totally incompatible identifies, however, same regarded as totally incompatible identifies are specified and adequately enforced. Some activities, however, same regarded as totally incompatible identifies and unmitigable, consequently, we recommend that they not be of permitted are are 1 enough no cools event (receipe office).

Summary of Conclusions 561M Ens rage : 1 ser-

etdivious dramqolavet has activatorique and Isionarod badimin increas action and development activity and traditional use, as cdetailed in the accompanying gatalogue sheets, may be briefly summarized as follows: few problems associated with oil and gas exploration and development programs are anticipated. The few exploration and test-drilling activities

regarded as potentially harmful can be controlled, for the most part, by existing regulations if appropriate operating conditions are attached to land use permits. -er bernows: The most serious problems anticipated are those associated with water-based drilling programs, specifically

Area 1: Upper and Middle Tskind Lakes We forsee

limited potential for exploration and development activites affecting the fish resources of these waterbodies assuming appropriate operating conditions are specified on land use permits and enforcement is adequate. The possible exceptions to the above are blowouts at water based drilling sites and ruptures of underwater oil pipeline gathering

systems or oil pipelines at major tributary river crossings. Nonetheless, we recommend no exploration and development activity be <u>permitted in these waterbodies</u> because of their perceived importance to Tuktoyak tuk residents as a recreational resources: However, we do not regard Gulf Oil's proposed development of docking facilities on Hans Bay or the movement of limited barge traffic through Eskimo Takes, assuming no dredging in this category is a sol

poideols <u>Area</u> 2: Rugaluk Estuary. Th this area we forsee potential for several adverse impacts upon traditionally⁵⁰⁰¹ used fisher potential impacts can be controlled if operating ^{51.01} these potential impacts can be controlled if operating ^{51.01} conditions applied to land use permits are appropriately⁵⁰⁰¹ drafted and adequately enforced.

<u>he new Arbas 3:: 198411 981 and: Lakes (Hotek for lake trout</u> and whitefish): vseverequotential sources of finds: are set visaged by: each oregarded as controllable if existing land. use regulations are applied band offectively conforded. To the Certain water based sactivities controllable inforded. To the and explosive veismic soperations; should not be permitted in these lakes above on at sore and at one device for the formation enclosing Area A: Smoke and Mouse River Deltas, Campbell and Thumbels lands of A number of particular concern is the identified for this area: a off particular concern is the timing and specific blocation of activities which could imple specific blocation of activities which could imple and specific blocation of activities which could the set of a for this area: a off particular concern is the identified for this area: a off particular concern is the result in a four disconfice of a concern is the could the set of a for this area and strictles which could the set of a for this area and strictles which could the set of a find of activities which could the set of a find of activities which could the set of a find of a strictle is the set of the set of a find of a strictle is the set of the set of a strictle is the set of a strictle is the set of the set of a strictle is the set of a strictle is the set of the set of a strictle is the set of a strictle is the set of a strictle the set of a strictle is the set of a strictle is the set of a strictle the set of a strictle is the set of a strictle is the set of a strictle the set of a strictle is the set of a strictle is the set of a strictle the set of a strictle is the set of a strictle is the set of a strictle the set of a strictle is the set of a strictle is the set of a strictle the set of a strictle is the set of a strictle is the set of a strictle the set of a strictle is the set of a strictle is the set of a strictle the set of a strictle is the set of a stri frastructure relative to brant nesting colonies and projectrelated activity near these colonies when birds are present. <u>Area 5: Mason River Valley and Delta ecastwithos</u> Area 4 aboves concerns here focusion other degradation of ore critical molting fareas and disturbance wor destruction of ore brant nesting colonies from conclusions for other area care of essentially the same as those for Area Amil in Jaenevon add

Area 6: Old Horston River Channel and South Shore of Harrowby Bay . We are restricted improperly evaluating impacts for this area because of the slatk of data on humbers and seasonal distribution of waterfowl. Nonetheless, the limited information available deads us to continue that seeds restrictions similars to those defined in Area distoute the applied.

<u>Incid excharges 7A:through E:DnEape BathDrstCandimost of</u> <u>Area "A" South of Eskines Lakesn Diverpool Bay and East of Difference in the area for exploration end test in the area from exploration end test in the area from exploration end test in the area for exploration end test in and avoid any local, exeas where caribou have be more associated with development of a producing field Doment of associated with development of a producing field Doment of associated and the area for the area for the associated with development of a producing field Doment of a producing field Doment of a producing field Doment for a producing field Doment field Doment for a producing field Doment for a producing field Doment for a producing field Doment </u>

structure elements, primarily collector lines and permanent roads, across areas used by caribou in migrating between calving and sommering grounds on Capp Bathurst and Winter¹⁵¹ ranges further fouther a detailed appraisal world impact, inter especially in othis area, would have to await detailed fighting formation on Decation and design of Production and transmission infrastructure fm the area is finder cape Bathurst bis a particularly important area for the area for the four and the for an important resource to area residents? If is permaps approar priate to point out that, in our view, some residents of Tuktoyaktuk will remain opposed to any exploration and development activity on Cape Bathurst regardless of any assurances that all precautions will be taken to ensure that no environmental damage occurs.

Area 8, Harrowby Bay. Concern in this area centres on the probability of blowouts at water-based drilling operations. Concerns about other exploration and development activities displacing or killing seals can be mitigated through drafting and enforcing appropriate operating conditions respecting the timing of such activities.

An examination of Figure 3 reveals that no critical areas are identified for some traditionally harvested species. For example, no areas are identified for fox. The reason for this is that the only exploration and development activity considered potentially detrimental to fox is gravel extraction from land features where fox denning is concentrated. However, even this activity would probably have

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a static second will remain our view, some residence of a second out that, in our view, some residence of the second response of the second second response of the second response response of the second response response response response response of th

Area 8, Harrowby Bay. Concern in this area centres on the probability of blowouts at ater-based drilling operations. Concerns about other exploration and development activities displacing or killing seals can be matigated through desiting and enforcing armopriste operating conditions respecting the timing of such activities.

An examination of Engure 3 Levens that no oritical areas are identified for some trivitionally harvefoed species. For example, no areas are identified for for. The reason for this is that the only an identified dow lophent activity considered potentially detrimeness of the gravel extraction from land features were low detailed is contentation from land features were low detailed is a

CATALOGUE SHEETS BUR FIGURE 3

AREA LA & 1B: MIDDLE AND UPPER ESKIMO LAKES

BIOLOGICAL DESCRIPTION

Species	Activity	Abundance	Season
Lake trout	Spawning, feeding, overwintering	Moderate	All year
Whitefish	Spawning, feeding, overwintering	Moderate	All year

Notes:

- the major lake trout populations of the entire study are are in these lakes

- lake trout in Eskimo Lakes are largely confined to west of 132° 30' (the narrows southeast of Tuktoyaktuk).
- spawning areas of lake trout and whitefish are unidentified but are likely along shorelines and reefs.

- fish movements within and between lakes are not well understood.

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- fish abundance is less here than in southern waters, but greater than in small inland lakes of the study area (64).

RESOURCE HARVEST

Type of Harvest:	Domestic, recreational, commercial fishing				
Season:	Domestic, recreational - spring, primarily Mid-April to late May (5,23,43) Commercial - summer or early fall				
Intensity:	Domestic, recreational - very high during the spring "jiggling" season Commercial - very low and occasional				
Notes:	Domestic, recreational - Eskimo Lakes are a very important spring "jiggling" area to almost all Tuktoyaktuk residents. Spring "jiggling", in association with camping and goose hunting, is seen as an important "holiday" by Tuktoyaktuk residents (15,43,93). Based on observed and recorded campite locations (16,35,60,93), area 1A is more important than area 1B. Only the eastern part of 1B is important for spring "jiggling". (See Current Land Use - Fish, Area 1).				

Commercial - One commercial fisherman from Inuvik occasionally fishes the upper lake (3), but catches have been low. Commercial quotae are established for 1976/77 (24).

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POTENTIAL IMPACTS

Project Activity	Major Concerns	Severity	Duration	Controls	
LAND SEISHIC	None anticipated			•	
WATER-BASED SEISMIC		land locations	of gravel at up	- general availability	
Explosives	Fish-kills	Lovaligonigh	ban short term	eolgiargana to stoolis -	
EXPLORATORY DRILLING					
Site preparation is not bewaiv at pristand second Drilling activity (blowouts)	adi+unal AGAATIE estu adi+unth canopagia againa ang a	to Lesselly high	teshort-term, tinthotterterm, einthotterterm, einthotterterm, einthotterterm,	Line Contraction Line Contrac	liate
PRODUCTION OPERATIONS	Savel CEIX53 22 883020	"t read browights".	ty of a permane. Storal stain 3	Lidizoog ens asie este voceive more reare	-
Persent and a set of the set of t	tovelopment would sized of openwater selamic or not upenwater selamic or vav can be table of no and dreading artifica in to deal with white eve in to deal with white on to deal with with the selamic contained of the selam	exploration and spiristion and encide financia on charpai areas contracted a vers contracted a vers	ASTIONAL COMMENSION	Inver Louisia Sinifian (1850) a suplicity selection (1851) a suplicity selection (1851) about the superson (1851) about the s	12 29 29 29 29 29 29 29 29 29 29 29 20 20 20 20 20 20 20 20 20 20 20 20 20
pipelines, (b) owburs and ruptures)	sa 1 to serv ite inno -ba Ne also forsee no prod Ne	rge treitiz in Are ng takes place. V rces are used.		<pre>/ state control inter / state in fac www. / state in fac www. / state in factor / state inter / state / state inter / state / state</pre>	95 95
pennited ant enpoor yaktuk. Directional octactivities w print XMURN s were taken to ensure pripats	ctivités <mark>ting divino,</mark> pe a to residents of Tukto cart ensures that proje if adequata precaution allige dixor	or development a tange of this are and company, and e.	restor division restor division would be accept would be accept common the loss	Method Jax: Wetv Xuo S: Salas Jost Solassi e Salas Stores Solassi Solassi Jost Collign Humber Solassi Collign Humber Solassi Solassi Collign Humber Solassi	T) T) T) T) T) T) T) T) T) T) T) T) T) T
Permanent roads	Siltation	Moderate	Long-term	Location, design	
Dredging	Siltation	Hoderate	Short-term	Location, method	
Dock construction	Siltation	Moderate	Short-term	Location, method	
Trenching	Siltation	Hoderate to	Long-term	Location, design	

Discussion:

Gravel extraction

Siltation

Industrial (petroleum) development could affect fish populations of the middle and upper Eskimo Lakes primarily by inducing siltation to sensitive fish habitat, because of well blowouts and line ruptures that allow toxic spills to water, and by use of explosives in water-based seismic operations.

Short-term

Location, design

Moderate

Fish spawning sites are particularly vulnerable to siltation, and because these sites are now inadequately known, site-specific investigations should be made prior to project activities that could cause siltation. The objective of these investigations should be to identify spawning sites so they could be avoided by project activities.

Where avoidance of spawning sites is not possible, appropriate construction methods and project design will lessen siltation. Specifically this means considering methods other than dredged artifical islands for offshore drilling, and discharging channel and dock area dredging slurry to safe land areas. Permanent roads and trunkline rights-of-way, which can cause long-term siltation, should be located in non-prodible areas away from the lakes, and should be designed to limit and control siltation. Use of shoreline gravel for borrow material is potentially more damaging to fish habitat than the use of upland borrow sites.

Fish eggs, fry, and adult fish are all directly vulnerable to toxic materials in water, and fish are indirectly vulnerable through effects on fish food organisms. Adult fish are least vulnerable since they can swim away from the spill area. Well blowouts and line ruptures in water pose the most difficult problem since contingency procedures presently appear inadequate. This problem worsens with ice cover because access to the wellhead and underwater lines becomes virtually impossible.

Areas with significant potential for toxic spills are at major staging areas that would be used during construction of production facilities and trunk lines. These staging areas should not be located near sensitive fish areas, e.g. spawning or rearing areas. Staging sites should be located in areas without direct drainage to watercourses, and fuel storage should be properly dyked.

Contingency procedures for the containment and cleanup of toxic spills should be tested and in place before moving fuels or other toxic materials into the field (50). Damage to fish from the disposal of process wastewater can be controlled by injecting these wastes below the permafrost level, or by detoxifying the wastes before they enter natural waterbodies. Fish-kills caused by explosive, water-based seismic can apparently be controlled by using air-guns rather than explosive energy (25). Under-ice use of air-guns should be prohibited until it can be shown non-harmful to fish.

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MAJOR DATA GAPS

- lake trout and whitefish spawning and nursery areas
- general availability of gravel at upland locations
- effects of non-syplosive seismics under ice fover

ANTER-BASED SZISMIC

Fish-Xills

Explosives Exploratory Dribling

Discussion:

CONCLUSIONS

"Disc: 1 designated as 1 critical area because of traditional flight restorational flight tanks and a use of the area. Spring "jiggling" in this area, in conjunction with camping and goose hunting, is viewed as an important "hollday" by Tuktoyaktuk residents." (subowoid)

With the possibility of a permanent road providing access to Eskimo Lakes in the future, this area may receive more recreational use in summer.

Schult Song Yanapailano religion of these is topical of northern waters; side of rowth rates are mRM 2813 slower than in southern waters. Oil or gas exploration and development would affect fish in this area via explosive selemic, siltation, and toxic spills. "Effects of openwater stimute can be controlled by autobal side of using non-explosive selemic, siltation, and toxic spills." Effects of openwater stimute can be controlled by suidable of fish. Siltation from permanent road and trenched fights-of-way can be largely controlled by suidable of location and adequate design. Siltation from channel dredging and dredging artifical islands could cause severe local impacts if it occurred at spawning areas. In-lake will blowouts and Thin Fughtures of represent the granter is fish affect conjugation action to deal with this event is presently inadequate.

STSUPD: SAL BIOTSTOD INSERT We can forsee no problems with barge traffic in Area 1 to service inde-band capito. The service development activities, providing no dredging takes place. We also forsee no problem with Openweighteric seismic, providing non-explosive energy sources are used.

In our view, exploration drilling or development activities indulting the period with mpoord the lake due to the high recreational importance of this area to residents of Tuktoyaktuk. Directional drilling from onshore areas would be acceptable if the applicant ensures that project activities with II XHURT and interfere with traditional resource use and camping, and if adequate precautions were taken to ensure that blowouts would not contaminate the lake.

uf caep	Location	Long-tarm	Moderate	Siltation	Pe manent roads
500294	Lostion	5107 t- ter . 1	aterete	Siltation	Dreddtud
borren .	Location	Short-term	#250 550M	Siltation	nelsoursence soot
des 13n	Leva- 10n,	ಸಾಕ್ರೆ-ಲೇಂವಿ ಎಸ	sjereb 3	siltation	Tranching
 desisn.	noisenoi	Short-term	Adjerate	Siltation	Gravel extraction

Industrial (retroleum) development could affect fish populations of the middle and upper Eskimo Lakes primarily by inducing ritici on to simultive fish capitat, because of welt fitworts and the ruptures that allow toxic spills to water, and by use of explosives in farer tised schemic operations.

Fish speaming sites are postivilarly fulneration of silestion, and because these sites are now indiguately from siterepositic thereiges cons should be made prior to project activities that could could could assist on The objecture of these investigations should be to iduntify spawning sites in one could be avoided by project activities.

Where Avoidance of sparsing fitch is not possible, appropriate construction v shore and proprot design will lessum siltation. Specifically this reshere construction methods other than dradged artifical islands dot, offeners drained and inecharging channel and cock area dredging shirp to all the find area. Permanent roads and trunkline rights-of-way, thick for any to see interval to detect in non-sociable areas away from the layed, art should be designed to limit and control siltation. Use of shoreine gravel for borre, material is potentially more demaging to fish analyses and the steel

%ish equa, fry, and adult fish are all directly vulnerable to "nate aterials in water, and fish are indirectly vulnerable thudgen offects in fish deci dramater. Adult fish are least vulnerable since they fan swim racy from the will' wire well blowdets and the represe in water pose are most definit problem and contingency presently appaar fredoments. This problem and the ice pover because agress to the wellboad and industry time because with with ice pover because agress to the wellboad and industry to be address for the ice pover because agress to the wellboad and industry to be because with with incompatible.

Areas with significant potential for train spulls are at major visuing a sas that would be used during construction of provided and are and train itrain staging areas should not be tourretor of provided and the start each of rearing areas should not be tourred rear solution at the second end, spinner of rearing areas, and that storage and it to reas with de-

Consingency procedures is the depositrant and diegrop of vould spills a could be tested and in plade poters dev ne fuels of ather scale toberlass into the flo d 50). Eduade to fish dior the dispose of process wheel. Set on at one of stailed by injucting onese succes of low the genultops sayed, so is a deverting to the anste boolest the toto the docides Fish-kills caused by explosive, water-based seismic can apparently be controlled by using air-guns rather than explosive energy (25). Under-ice use of air-guns should be prohibited until it can be shown non-harmful to fish.

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MAJOR DATA GAPS

- lake trout and whitefish spawning and nursery areas
- general availability of gravel at upland locations
- effects of non-explosive seismic under ice cover

Fish-kills

WATER-BASED SEISMIC Explosives EXPLORATORY DELLDING

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CONCLUSIONS

This is designated as a critical free because of traditional flight intrational flight tenned and a set of the area. Spring "jiggling" in this area, in conjunction with camping and goose hunting, is viewed as an important "holiday" by Tuktbyaktuk residents. (2000) (2000) (2000) (2000)

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Location, densign	are-paol	Modezate	Siltation	Pe manant coads
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- Jack		8918	14 - 1 1 - 1	
WAYARD PHOTORIOC	#292 *750C8	9 <i>74</i> 1950M	SILLASION	Gravel extraction

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Yish eque, fry, and addit fish are all cirectly vulnerable to fakic interlate in water, and fish are indired y vulnerable thudons effects in fish lost orradients. Addit fish are least vulnerable since they dan swim way from the 4111 area well blowques and the represent water pose the most difficult problem since contingency procedures presently appear insolation. This problem works with ice uover because ignore the wellboad and anter water inter because with 419 imposedures because ignore the wellboad and anter anter because with 419 ice uover because ignore the wellboad and anter anter because with 419

Areas with significant potential for taxis epills are at rejus viaging 5 as the would be used furing construction of providely of mility or and trink lines. The staring areas should not be housed rais solution solution areas, dig, spanar, co tearing areas, Staring 51165 should to ice is in such should derive to be watercourses, but the suchase one is to supply dybad

Consingency procedures is the deschisters and sients of verifies and is to estably of verifies and in the second and in glause points over the factor of stores over the factor of stores over the second and in glause to fish factor the subpose of stores and the second over the second ov

AREA 2: KUGALUK ESTUARY

BIOLOGICAL DESCRIPTION

Species	Activity	Abundance	Season
Whitefish	Feeding, overwintering, nursery	High	All year
Lake herring	Feeding, overwintering, nursery	Moderate to high	All year
Sea herring	Possible overwintering	More to north than south	Fall and winter
Northern pike	Spawning, feeding, overwintering	High in south	All year

- northern pike abundant in south end of area Notes:

- whitefish common throughout area, migration likely

- sea herring enter north end of area in September

- estuary situation

RESOURCE HARVEST

Type of Barvest:	Domestic fishing		
Seasons	Primarily fall and early winte	r, some spring fishing (43,23)	
Intensity:	Low in the second se		
Notes:	The Rugeluk is fished by trapp There is probably some spring are at least two campsites in trappers (43).	ers in fall and early winter to fishing associated with spring of this area which are currently us	procure food supplies. poose hunting. There led by hunters and

Project Activity	Major Concerns	Severity	Duration	Controls
LAND SEISMIC	None anticipated			
NATER-BASED SPISNIG GUE HEAL	na e Varka arrikgerande in 4. so	ىيە بىرىنى ئولغۇچۇش ئىلىمىتۇم (+ بۇيۇرغۇچۇش	1. 1	contingency systems for all
Explosives tal for siltation resulting able aspennether branches precessed alternative to	Pish-kills Scause of the high potent a saverity and uncontroll drilling (rom (and to a	and trappers. Locally high ic receptable be the drapped the int for a trapped it for the trapped it	s for hunters Short-term Storters is an in al gauge and in al gauge and in al gauge and	which are important camparts anp-rik In-water drilling from construction of artici
Staging	Toxic spills	Moderate	Short-term	Location, contingency, procedure
Site preparation	Siltation	Locally high	Short-term	Method, location
Drilling activity (blowouts)	Toxicity	High	Short-term	Present controls inadequate
PRODUCTION OPERATIONS				
Staging	Toxic spills	Moderate	Short-term	Location, contingency procedure
Permanent roads	Siltation/fish blockage	Moderate	Long-term	Location, design, method
Dredging	Siltetion	Moderate	Short-term	Location, method
Dock construction	Siltation	Moderate	Short-term	Location, method
Process wastewater	Toxic spills	Moderate	Long-term	Method
Cluster facilities and pipelines (blowouts and ruptures)	Toxicity	High	Short-term	Present contols inadequate
FRUNK LINE		and a second		and a second
Staging	Toxic spills	Moderate	Short-term	Location, contingency procedure
Permanent roads	Siltation/fish blockage	Moderate	Long-term	Location, design, method
Dredging	Siltation	Moderate	Short-term	Location, method
Dock construction	Siltation	Moderate	Short-term	Location, method
Trenching	Siltation	Noderate	Long-term	Location design

Discussions

The main impacts to fish that may be caused by industrial petroleum development in this area are fish-kills resulting from explosive seismic; siltation of spawning areas caused by dredging, roads, and trenching; and toxic effects via process wastewater.discharges, fuel spills from storage areas, well blowouts, and line ruptures.

Seismic caused fish-kills can apparently be controlled by use of non-explosive energy sources (e.g. air guns) for water-based seismic (25). Water-based seismic under ice-cover should be prohibited until it can be shown non-harmful to fish.

Siltation resulting from dredging for artificial islands, channel deepening, dock construction, permanent roads, and trenching could smother fish eggs and degrade spawning habitat. Because of the restricted size of this area, these effects could be severe. In this area, artificial islands should not be built, and dredging for channel deepening and dock area leveling should not be allowed in spawning areas. Location of these spawning areas will require site-specific investigations by development proponents. Permanent roads and buried pipeline rights-of-way should be located away from sensitive areas and should be designed to minimize erosion by locating the alignments in non-erosive areas, and should be designed to limit and control siltation.

Toxic spills can directly affect fish and fish eggs, and can indirectly affect fish by killing fish food organisms. Fuel storage and handling sites are the main potential source of toxic spills. These sites should be operated in accordance with operating conditions of land use permits and they should be located at least 450 m (approx. 500 yds) from waterbodies (37). Damage to fish from disposal of process wastewater can be controlled by injecting these wastes below the permafrost level or by detoxifying the wastes before they enter natural waterbodies. Restriction of water-based drilling would preclude underwater well blowouts and collector line ruptures, but land-based wells should be located so that blowouts could be controlled and contained before reaching the waterbody.

Blockage of fish movement resulting from a permanent road restricting water channels can be controlled by employing bridges for channel crossings, rather than causeways and culverts.

MAJOR DATA GAPS

- timing and extent of fish movements in this area

- location of fish spawning sites

CONCLUSIONS

The Kugaluk estuary is used by various fish species for overwintering, migration, feeding, spawning, and rearing. With controls that can be accommodated within the existing regulatory framework, petroleum exploration and development is acceptable in this area. Specifically, these controls are: prohibition of explosives for water-based seismic; appropriate location and design of road and pipeline rights-of-way and water-crossings to limit erosion and minimize siltation; avoidance of fish spawning areas by dredging; and allowing camps and fuel storage sites only in areas without direct drainage to waterbodies; and developing contingency systems for the cleanup of spills. Exploration and development activities should avoid sites are which are important campsites for hunters and trappers. Envg-IA rise-storic Apin viasod tillistar? envisors

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	distinct, location	「見るをなっているだを	npud vileool	SLITERTOD	Site preparation
eachfiapeur	elorinoi insest?	that term	ALLH	<u>γ:</u> τολλοτ	Defiling Activity (Diowouts)
					RODUCTION OPERATIONS

Staging	affige dixot	NC LOCASE	51283-51042	Location, contingency proces
Permanent roads	Siltation/Lash black	etstobor	mast prov	Locition, design, method
prigos.	soirseile	Mudarate	359753Cd2	housen, noisead
Dock construction	Sittation	Noderate	- ME92-2X0/18	Location, method
Process wastewater	Toxic spills	Moderate	F12 +7 -5/10-2	Hethod
fluster farilities and pipelines (blowouts and	Texicity	detH	ホンタナーナスの内容	stenent contols tracers

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<u>.</u>	eroza Koue	, continge	Location	Short-tera	sist isbolt	Toxic spills	Stading
	finddwr	, design,	Location	Long-tera	Mcderate	Siltation/fish blockage	sbaur Jasaanis"
		borten .	Location	Short-terra	Modezate	SLITACION	Dredging
		bonsen .	12. 111on	Short-there	Poter 1te	Siltation	DOCK CONSCRUCTION
• • •	es e Second	. Ctaten	nulserod	10.03-tezu	ezerebon	siltacion	rench ag

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Setamic caused fish-kills can apparently be controlled by use of non-explosion energy sources (0.0 (0.1) guns)(for water_based enismic (25)), (0.1) techbussi setunts under tex-cover should be (rohubited until) to can be shown non-harmful to fish.

Slitation realizing five dredging for artificial islands, channel disponing, dock construction, permanent reads, and therefoling julid scother flah eggs and legrade spawning indicate. He state, efficie getricked size of the off area, these effects could be severe. In itil area, withing a listed with should not be built, and dredging for channel frequenting and cork area towaing scould not be allowed in spawning areas. Location of the is spawning area towaits with require strengbening investigations by development proponengia. Furtherately strength by development proponenging in non-erosive and should be designed to furtherate locating the alignments in non-erosive areas and should be designed to inmit a control alignments on.

Toxic spills can directly affect fish and fish ages, and can indirectly effect fish by killing fish food organisms. Tuel storage and handling sates are the main potential source of toxic spills. Indee sizes should be operated in accordance with operating conditions of iaid ane pormies and they should be do ated at loss 450 m (approx) 500 yet from waterbodies (27). Domate to 3.5 h free disposal of potenties the controlled by injucting where workes islow the permatect level or by detectiving the waters before they enser natural waveshouses. Securitation of water-based drilling would preclude underwater well observing and controlled to the should be located so that blow should be located so that blowouts could be do free and wells the waterbody.

Blockage of fish movement restining from a required by read reching water distances can be concolled by eveloging to inde incontrain organized rechings without than created at and curverts.

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AREA 3: SMALL INLAND LAKES

BIOLOGICAL DESCRIPTION

Species	Activity	Abundance	Season
Lake trout	Spawning, feeding, overwintering	Moderate to high	All year
Whitefish	Spawning, feeding, overwintering	Moderate to high	All year

- lake trout are predominant in some lakes, whitefish in others Notes

- lakes appear to function as somewhat independent systems
- easily overexploited or disrupted due to size of lakes

RESOURCE HARVEST

Type of Harvest:	Domestic (commercial status applied for on three Cape Bathurst waterbodies)
Season:	Primarily fall and early winter (43,23,19)
Intensity:	Tuktoyaktuk trappers or North Star Harbour residents frequently fish these lakes.
Notes:	See Current Lend Use - Fish, Area 2,5.
TIAL IMPACTS	

POTENTIAL IMPACTS

Project Activity	Major Concerns	Severity	Duration	Controls
LAND SEISMIC	None anticipated		•	
WATER-BASED SEISHIC				
Explosives	Pish-kills	High	Potentially long-term	Air-guns
EXPLORA. JRY DRILLING				
Site preparation	Siltation	Noderate	Potentially long-term	Method, location
Drilling activity (blowouts)	Toxicity	Righ	Potentially long-term	Present controls inadequate
PRODUCTION OPERATIONS				
Permanent roads	Siltation	Noderate	Long-term	Location, design
Camp operations	Effluent discharge	Noderate	Short-term	Location, method
Fuel storage	Toxic spills	Bigh	Short-term	Location, contingency procedures
Cluster facilities and pipelines (blowouts and ruptures)	Toxicity	Rìgh	Potentially long-term	Present controls insdequate
Process wastewater	Toxic spills	Nigh	Long-term	Nethod
TRUNK LINE				
Permanent roads	Siltation	Moderate	Long-term	Location, design
Trenching	Siltation	Noderate	Long-term	Location, design
Camp operations	Effluent discharge	Noderate	Short-term	Location, method
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POTENTIAL IMPACTS

Project Activity	Major Concerns	Severity	Duration	Controls
LAND SEISMIC	None anticipated			
WATER-BASED SEISMIC				
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EXPLORA.ORY DRILLING	and a second second Second second second Second second			
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Permanent roads	Siltation	Noderate	Long-term	Location, design
Treaching	Siltation	Moderate	Long-term	Location, design
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Fuel storage	Toxic spills	Moderate	Short-term	Location, contingency procedure

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POTENTIAL IMPACTS

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LAND SEISMIC	None anticipated			
WATER-BASED SEISHIC				
Explosives	Pish-kills	High	Potentially long-term	Air-guns
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Site preparation	Siltation	Noderate	Potentially long-term	Hethod, location
Drilling activity (blowouts)	Toxicity	Nigh	Potentially long-term	Present controls inadequate
PRODUCTION OPERATIONS			e en el compositor de la c	
Permanent roads	Siltation	Noderate	Long-term	Location, design
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Fuel storage	Toxic spills	Bigh	Short-term	Location, contingency procedure
Cluster facilities and pipelines (blowouts and ruptures)	Toxicity	Bigh	Potentially long-term	Present controls inadequate
Process vastewater	Toxic spills	Righ	Long-term	Nethod
TRUNK LINE				
Permanent roads	Siltation	Noderate	Long-term	Location, design
Trenching	Siltation	Noderate	Long-term	Location, design
Camp operations	Effluent discharge	Noderate	Short-term	Location, method
Fuel storage	Toxic spills	Noderate	Short-term	Location, contingency procedure

Discussion:

The main impacts to fish that may be caused by petroleum exploration and development at small inland lakes are: seismic-caused fish-kills; siltation of spawning habitat caused by construction of artifical islands, permanent roads, and trenching for a trunk line; and toxicity resulting from blowouts, and pipe ruptures in water, camp operations, leakage from fuel storage areas, and discharge of process wastewater.

The severity of many of these impacts will be greater in small inland lakes than in larger waterbodies because fish are confined to a small water volume, thus allowing concentration of pollutants and limiting escapement of fish. Lack of water currents in these lakes also impairs the Trushing and cleansing bility of these waterbodies.

Fish-kills resulting from water-based seismic can apparently be controlled by using air-guns rather than explosives as an energy source (25). None the less, even air-guns should not be used under ice until it can be shown that this method is not harmful to when

(1) USE DIM - YAM OJE distance from these lakes [17] and in areas of nonerodible, stable soils. Design of (1) .BAA 525 - YINT bighthese components should include adequate silt-control methods. Detailed geophysical JANA 16 investigation will be required for location of permanent rout and pipeline right-of-way 20,000 moleing (9,2, #######pila25 May - 15 Aug. (3) BITTE ANT BULL AND THAT

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MAJOR DATA GAPS

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- independance of these lakes from other aquatic systems putanul south bas scope TYPE OF REPARTS STR REPORTERS VAN SIM 38081 82 CONCLUSIONS

. (Le.(L) sets printud instructions of stadiants and impact because of the the solitations and interious of the solitations. With controls that ranks are more within the existing regulatory framework, petroleum exploration and development is acceptable within these lake drainages. "Specifically, these controls are: prohibition of explosives for water-based seismic; appropriate location and design of read and BipBeline rights-of-way to limit erosion and minimize siltation; and allowing camps and fuel storage sites only in areas without direct dr.inage to waterbodies; and developing contingency systems for the cleanup of spills.

In-lake drilling activity is not acceptable because of the high potential for siltation resulting from construction of artificial islands, and because of the severity and uncontrollable aspects of well blowouts and line ruptures in water.

44.

CRITICAL AREAS FOR PRESENT USE - WATERFOWL 4-14-27 C 46 L 14 . POIDOGIOSEN DESAREA 4. SMOKE AND MOOSE RIVER DELTAS AND CAMPBELL AND THUMB ISLANDS Eish-kills resulting from water-cosed set muin int. (parently he controlled by using air-gung rather than explosives at an every relate (3). None the lass even air-dung should not to used under ice until it can be shown that this method Species bace anonantes Continity work of all all all and in the standards at its added and anonantes all season ic apizuć zelsos gilasa sid constanto is interioris in the several thousand (43) sonstalbate May - Mid Aug. (4) Brant Isturgingen bellar Meating and Droeds site astronous of with thousand (43) sonstalbate May - Mid Aug. (4) Yaw-tu-sidyi tallegi Molting the sonstalbate to contable to tellast ad its hubspirzeval 1111.3 20,000 molting (9,2) Ednomapris 25 May - 15 Aug. (4) Whitefront Nesting and molting est ne mort such at stilling (21,86) at slies bored totaller strong of the standard of the sta (42) This is a critical nesting, molting, and brood reafing area for geene from late May Notes: Botes: This is a critical nesting, molting, and brood rearing after for yease from late May s over bluce surjected and september. The Snoke and Moose River deltas plus the east shore of Campbell hore surjected at a specially important to describe a description of the source of the source of the source of a source of the RESOURCE HARVEST SAPS STAL GAPS

- Independance of these lakes from other aquanto systems painted soub bas acood : : tasystems

Season: Mid May to June (43,93)

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In-lake drilling somivicy is not screptable because of the rowerity and intention of antication case that the construction of artificial seconds and because of the soverity and intention of annears of well pleyouts and the ruptures in water.

roject Activit	У	Major Concerns	Severity	Duration	Controls
EISMIC OPERATI	ONS	None anticipated			
XPLORATION DEL	LLING	and among structures and a state of the			a a an
Gravel ast	flocks heites Elocks heites manent degroda	Distant and moleting durks	waterfow: of several spec reant-mata (a) an bandor bander, imadi ha hashinde	rge numbers of acknowledge of starte to installe	Area 4 supports ia range dange arapoiranisQu apinologi faande aangezovranisQu
	o to stard to		local reduction of	geese and duci	C#
TOLEM	areas, (b' no	- ACT SCANTISSEC TO SERVE Materian Janee Station	MOLLING PROVISIONS AND IN	e loui to ellow	Therafore, (0) no
Site dêvel ((b) 10 4	 moltingnamed s. and other ng habitats, (over, colonies 	A Displacement (sinasting) Spanty Mainture (degrad-) i depent etitive to seinold (seat 0005) m 01d neivet	Tons of mests and (r reduced production actr to rest to testin () mot to rest to testin () mot to to to testin () mot	sister and the set	
Camp operat	tions	Displacement of nesting	Same as precedingering s	ishert-tem no	ungange af ar factive ar
aave cons are located	t should not i eismic operati ties should be	ploration and development r inhabit the area. No a	associated with oil/gas ex	F EPILIOUTIE Dat N NG JUSIE DAt	near colonies; schedule s aquivities verminimize redisturbance insoitingie vire
Drilling ad (blowout)	ctivity	Fouling or displace- ment of mesting brant, molting geese and ducks	Potential abandonment of brant colonies and large-scale losses of molting waterfowl	Long-tern .:	100 LOIN JURN JURN of Drivers 200 2001 JURN of Unit Street blowouts will foul critica molting or nesting habitat
Staging (fo hand)	uel ling)	Same as preceding	Same as preceding	Long-term for brant Short-term for	Do not stage fuel where spills will foul critical molting or nesting habitat
		•		other water- fowl	•
ODUCTION, TRU	NK LINES				
Staning/fu	1 handling		and a second		n an
ergang/ . e.		ours as preceding	ceme es bracerrud	ceding	seme as preceding
Constructio Pads, facili camps, plants	on of: cluster ities, , processing , roads	Displacement of nest- ing brant	Potential abandonment of colonies through habitat degradation	Long-tera	Do not build roads or facilities in or near bran colonies
Operation (nd	Displacement of nesting	Potential abandonment	Long-term	Schedule activities to
Maintenance	•	brant and molting ducks and geese	of brant colonies; reduced numbers of molting waterfowl		reduce disturbance
Cluster fac and pipelin outs and re	zilities hes (blow- Aptures)	Fouling or displace- ment of nesting brant and molting geese and	Rotential abandonment or destruction of brant colonies and	Long-term	Do not locate wells or pip- lines where blowouts or ruptures will foul critica
		ducks	large-scale losses of molting water- fowl		molting and nesting habita
Camp operat	ions	Displacement of nest- ing brant	Potential abandonment of brant colonies	Short-term	Do not locate camps in or near brant colonies
Aircraft		Displacement of nest- ing brant and molting	Potential abandonment of brant colonies and	Short-term	Do not fly over nesting brant or molting waterfowl

Disgussion:

Main concerns are long-term disturbance and extensive pollution in sites used by molting brant, Canada, and white-fronted geese and ducks. Staging of fuel along banks of major drainage systems or on shorelines of Campbell Island and offshore or shoreline location of wells could result in large-scale mortality of waterfowi if spills or blowouts occur where ducks, geese, and swans gather during the molt. At such times, populations are concentrated in small areas and being flightless are less capable of avoiding slicks. In addition to causing direct mortality, major spills - primarily those from blowouts could degrade waterfowl food sources for saveral years. Finally, spread of fuel or crude oil into brant colonies could destroy nests and adults cause birds to abandon the area.

Other activities involving intensive human activity, low and frequent passage of aircraft, and construction noise close to occupied molting areas could cause birds to move elsewhere. This could result in loss of birds through stress and depletion of energy reserves needed for successful migration. However, such activities are not likely to significantly reduce populations available for local harvest.

Placement of roads, gravel extraction, camps, cluster facilities, or processing plants within a brant colony will almost certainly cause birds to abandon the area. Activities associated with these developments, including aircraft disturbance, could result in mest abandonment if activities take place close to occupied colonies.

The construction and presence of permanent facilities such as clusters, processing plants, compressor stations, and airstrips at or near important campsites could displace hunters from preferred camping locations or affect the visual quality of the setting.

MAJOR DATA GAPS

- precise locations of key concentration sites of molting or nesting waterfowl in Area 4 ...

- confirmation on numbers of molting white-fronted and Canada geese

CONCLUSIONS

Area 4 supports 1	large numbers of w	aterfowl of several spe	cies, all of which are hu	DATALIAS ADITANO.
Turidy armer otherarder of	particularly impor	tant main place shace 9	ird# maagnegehembasleEge	flocks to Bolt of Lavard
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OI CTITICAL NADILALD.	exhor bra Greet	to satisate at a factor	seash pur	
Therefore, (a) no	wells or fuel st	orace calters should de-1	ocated on coastlines, riv	er banks, or off-
shore areas where spills of	r blowouts will po	llute brant colonies or	waterfowl concentration	areas, (b) no major
construction assivity and	ld take place with	in 3.2 mm = (2 million): and	brant colonies case statis	1 moltingababababababa
during times of waterfowDa	use, (c) construct	ion camps, icompression:s	tations, processing plat	s, and other we hebitate (d)
facilities should not be lo	ocated within 3.2	km (2 miles) of brant c	olonies of criticalneessa # then \$10 m (2000 feet)	aver, colonies or
AIFCIAIT SHOULD NOT BE OPEN	rated within J.4 A	NYAGANYAWAY OL, OL LOW	Editary to transationic	SAC. INTEG OTES
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esimingener seuvivites	and structures as	sociated with oil/gas e	xploration and developmen	t should not have
any significant of lowgele	sting effect on wa	terfowl populations the	t inhabit the area. No s	eismic operations are
expected to create major co	onflicts with wate	rfowl habitats or activ	ities. Permanent facilit	ies should be located
to avoid impossant campart	s. mass-paol	Forencial Apendonation	Fouling or displace	Drifting Jorivity
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CRITICAL AREAS FOR PRESENT USE - WATERFOWL

AREA 5: MASON RIVER VALLEY AND DELTA

BIOLOGICAL DESCRIPTION

Species	Activity	Abundance	Season
Snow Goose	Staging along the coast from Mason River to Baillie Island (\$6)	Potential for 200,000 (4,86)	20 May - 8 June (86) 20 Aug 10 Sept. (86)
Brant	Nesting (86)	Undetermined	25 May - 1 Sept. (86)
Whitefront	Nesting Molting	400 [±] (2) 2500 (2)	Mid May - Mid Aug. Barly July - Mid Aug. (4)
Ducks	Molting (86)	Undetermined	20 July - 25 Aug.
Canada Goose	Molting	1500	Early July - Mid Aug. (42

Notes

This is a critical area because of the numbers of spacies present. Although waterfowl are present throughout the open-water season, the most important periods are in spring and fall, when large flocks of snow gene may stage in the area, and mid summer (mid July to late August), when rafts of molting ducks congregate in coastal and offshore habitats. Protected bays and quist lagoons are especially important to staging and molting birds. As is the case with other parts of Liverpool Bay - Eskimo Lakes, there is a great deal of movement between Nason River and other nearby river deltas. Thus, events that affect populations at Mason River would be reflected to some extent in other areas.

RESOURCE HARVEST

Type of Harvest:	Goose and duck hunting	
Season:	Nid May to June (23)	
Intensity:	to tow	
Notes:	This is no longer an important area although it is still occasionally used (43,23)	•

CRITICAL AREAS FOR PRESENT USE - WATERFOWL

AREA 6: OLD HORTON RIVER OUTLET AND SOUTH SHORE OF HARROWBY BAY

BIOLOGICAL DESCRIPTIONS

Species	Activity	Abundance	Season
Brant	Nesting and broods (86)	Undetermined	25 May - 15 Sept. (86)
Whitefront	Nolting	700 [±] (2,9)	1 June - 1 Sept.
Ducks	Nolting	Large numbers (9)	20 July - 25 Aug. (86)
Biders	Nesting	Undetermined	Early June - Late Sept. (86
Snow Goose	Staging	Potential for 200,000 (4)	Mid May - Early June (4)
Canada Goose	Westing (river islands)	Undetermined	Mid May - Mid July (42)

Notes:

Despite the data gaps, this area is used by enough species to warrant "critical" status. Snow geess, which may stage here in spring and during molt migration, are of greatest concern because very large numbers of birds could be greatest at one time. This is particularly true in spring when 150,000 - 200,000 snow geese that bread on Banks Island may pass through and stop in the Cape Bathurst area. This part of Harrowby Bay is also important as a molting area for ducks, white-fronted and presumably for brant and Canada goose broods. The brant nesting area (near Ikplaugyuk Point) is of some concern with regard to possible oil/gas development activities; however, the number of birds involved has not been specified.

RESOURCE HARVEST

Intensity:	Important area for North Star Harbour residents (43))
Seeson	Spring to Fall (May to September) (43)	
Type of Harvest:	Goose and duck hunting	

CRITICAL AREAS FOR PRESENT USE-CARIBOU

AREA 7A: AROUND WOOD BAY BETWEEN ANDERSON AND MASON RIVERS. AREA 7B: ADJACENT TO AND SOUTH OF THE TREELINE, BETWEEN ANDERSON AND KUGALUK RIVERS.

BIO	LOGICAL DESCRIPTION	
	Species:	Barren-ground caribou
	Activity:	Winter range (marginal to the main winter range) or migration route (See Critical Areas - Caribou, Area 7C) if caribou winter further south (32,33).
	Abundance :	No estimate available - depends on weather and other factors in different years. Most of the Bluenose herd winters south of the treeline, primarily south of Area "A" $(17,32,33)$.
	Season:	October or November to late March or early April (depending on the year) (17,32,33).
	Notes :	The main winter range area is adjacent to or south of the treeling. Large numbers may winter to the south and southwest of the study area, but generally not as far south as Great Bear Lake (17,33). The extent of southerly movement and numbers of caribou winter- ing in Area "A" depends on the year. Only a small part of the Bluenose herd winters in or adjacent to the study area (17,33). In late November and early December 1969, when freeze up was late and snowfall limited, caribou were still concentrated on the barrens north of the tree line (32). Some caribou winter on Cape Bathurst, particularly in Area 7A (43). Small numbers of caribou are reported to winter outside these designated areas, including the southern side of the Eskimo Lakes and Liverpool Bay (43). During winter caribou understate considerable local movement (66 107.110)
	•	By mid-April, most caribou have generally left wooded areas and are heading north to malving and summer ranges (17.32.33). (See Critical Areas - Caribou, Area 7C).
	· .	

Notes:	7A is a hunting area for trappers who have camps in the area and occasionally for Nort Star Harbour residents (43). Caribou are occasionally killed by trappers in parts of 7B (43). See Current Land Use - Caribou, Area 2.5.
Intensity:	Low to moderate in 7A and very low in 7B
Season:	Late fall and winter (43,23)
Type of Harvest:	Caribou hunting
ESOURCE HARVEST	

POTENTIAL IMPACTS

2

Project Activity	Major Concerns	Severity	Duration	Controls	
SEISMIC	None anticipated				
EXPLORATION DRILLING	None anticipated				
PRODUCTION OPERATIONS					
Permanent roads	Block local movements	Moderate	Long-term	Unknown	
Gathering system	Block local movements	Moderate	Long-term	Unknown	
TRUNK LINE			•		
Permanent roads	Block local movements	Noderate	Long-term	Unknown	

Discussion:

The effects of development-related obstacles on caribou movements are variable and have been incompletely researched. Although there are few data on the effects of permanent roads and gathering systems on local movements of caribou on winter ranges, observations on the effects of these features at other times of the year indicate that they may be serious impediments to free movement of caribou. Simulated "pipeline" structures as well as permanent roads in conjunction with the elevated Alyeska pipeline caused caribou, particularly pregnant cows and calves, to avoid these structures (14,15,98). There may be seasonal variation in reaction to these obstructions, however.

Caribou displayed greater uncertainty about crossing the Dempster Highway in forested regions than in open tundra where the road was clearly visible. Steep embankments were a physical barrier to movement only where deep snow banks or drifts were present. Highprofile roads also present a visual barrier, and may cause avoidance reactions. Caribou were also reluctant to walk on the Dempster Highway, particularly if bare gravel was present (124). Other reports (7) indicate that caribou may winter near highways and readily travel across them.

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Although caribou have been described as selecting certain seismic lines for winter movements due to the greater ease of travelling there (44,57), caribou on Banks Island were found to definitely avoid new seismic lines as well as snow drifts over 30 cm (1 foot) in height along roads. them (92). Caribou frequently paralleled these obstructions rather than cross

This indicates that aboveground gathering systems or high, bermed roads may present serious obstacles to movement of caribou on their winter ranges. Caribou normally undergo quite extensive movements on their winter ranges (46,66,102) and obstruction of such movements could result in loss of large areas of range with population consequences.

MAJOR DATA GAPS

MUTICALESO DESTROY

The reaction of wintering caribou to permanent bermed roads and aboveground gathering systems is not adequately understood. Technological solutions to those problems require further development and testing, involving intensive research. There is a general absence of information on long-term effects of AS RING IN 10,000 dations laigned a st aront. ADTABLE aviantini privious testing, involved and avianting of the second aviant and the second aviant avi - sonsorias

CONCLUSIONS 111 W INTER, IS NOVEMBER, BY NOVEMBER, INFORMER, INFORMER, INFORMER, INFORMER, INFORMER, INC. SUPERATED SOUTHERS IN SOUTHERS I 11.386.92

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CRITICAL AREAS FOR PRESENT USE-CARIBOU

BIOLOGICAL DESCRIPTION

Species

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Season: zžela rojsod (4) accesto	Spring - March to June. Fall - August to November. By November, migration will 20012610000 have finished in all but the southern and southwestern portions of the study area deparent to Whiter Tanges (IP/32/33961 Meldorg Suchastern portions of the study area "The oblight to Whiter Tanges (IP/32/33961 Meldorg Suchastern portions of the study area
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t givelines pose a such i velepments such i vele	Spring migration, although variable, tends to be north and northeast from between the Ridgildk and Adress Riverss Indersof the scarbbdu arcomothogenorthrandor the tudra by Tate March or Carty Adril? "Indersof the scarbbdu arcomothogenorthrandor the de the Western Didenose Component State Smoking Mithue 117, 3deer The March March or to of the Western Didenose Component State Smoking Mithue 117, 3deer The March March or to of the Western Didenose Component State Smoking Mithue 117, 3deer The March of the state of the Western Didenose Component State Smoking Mithue 117, 3deer The March of the state of the State State State State State State State State State 11, 3deer The March of the state of the State St
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RESOURCE HARVEST

Type of Harvest:	Caribou hunting
Seasons	Late fall and early winter is the most important period. There is year-round hunt- ing on Cape Bathurst by North Star Marbour residents (43,23).
Intensity:	Borthern Cape Bathurst and areas south of Liverpool and Wood Bays are important hunt- ing areas. Most of the remainder of this area can be categorized as a low-intensity caribou hunting area. There is no recorded caribou hunting over much of the southern part of Area 7C.
Notes:	See Current Land Use - Caribou, Ares 1,2,3,5.

POTENTIAL IMPACTS

Project Activity	Major Concerns	Severity	Duration	Controls	
SEISHIC	None anticipated				
EXPLORATION DRILLING	None anticipated	a a stationar a	a da san ang sa		
PRODUCTION OPERATIONS					
Permanent roads	Block, delay or divert migration	Righ	Long-term	Unknown	
Gathering system	Block, delay or divert migration	High	Long-term	Unknown	
TRUNK LINE	· · · · · · · · · · · · · · · · · · ·				
Permanent roads	Block, delay or divert migration	High	Long-term	Unknown	

Discussion:

Reaction of barren-ground caribou to obstructions is somewhat variable and has been incompletely researched. The Alyeska pipeline and forder roads (with associated construction activity) apparently inhibited the northward progression of female caribou and calves adjacent to the right-of-way (14,98). The extent to which this avoidance was caused by the physical presence of the right-of-way and not the associated construction activity is unclear (98).

Most caribou refused to cross simulated pipeline atructures during summer at Prudhoe Bay (15). The extent to which this reaction was due to the methodology is unclear, as is the reaction of caribou to such obsceles during the course of migration.

Reindeer (and presumably caribou) may be unwilling to cross under newly-prested power lines (46). In woodland, migrating caribou were observed to be reluctant to leave 1001001018 traditional paths (58).

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Barriers, particularly those perpindicular to migration routes, doubt halt migration at least temporarily, and necessitate delays while circumventing them. Subsequent effects on the timing and location of calving and behavior of the caribou during calving could be critical (58); withough the location of calving by the Portupine herd reportedly varies

in accordance with the timing and ease of the apring migration (124). Impediments to the central Arctic states of the aparts of the central Arctic (1). Hawlon a contral Arctic (1) when a contral Arctic (1) and the central arctic (1) arctic (1) and the central Arctic (1) arctic (1

Caribou displayed greater uncertainty about drossing the Dempster Highway in forested Laringu displayed greater uncertainty about drossing the Dempster Highway in forested beau ac of case of the in open tundra where the road was clearly visible. Steep embankments were provide the provide of the provide the road was clearly visible. Steep embankments were provide roads also present a visual Derrier, and may dauge avoidance reactions. Caribou vawoursh le drive also reluctant to walk on or cross the Dempster Highway, particularly if bare gravel provide the provide the provide the start of the provide the

Sume edd prois contrained they could detect a distribution of the state the state of the state visadauce show bit is the state of the subcould be detected by determine the state of berned roads, above they ed yam (N Further reserved is required to develop ind prove the street of berned roads, above (kt) dpin at biological find systems) and observed power finds on the benevity of migrating caribou. spent should prove the street of a required to develop ind prove the street without which expenditures of the bred of the street of the street of the street without which expenditures of (11.8) bred of 1 bins and emergy of deficition flow migration fourter. Without the development and (11.8) bred of 1 bins and emergy of deficition flow migration fourter. Without the development and (11.8) bred of 1 bins and emergy of the appropriate technology it is highly probable that such obstacles implementation of the appropriate technology it is highly probable that such obstacles could result in loss of critical seasonal ranges and disruption of caribou behavior to such an extent that the visbility of a major component of the Bluenose hard could 208 200 20 be threatened.

16.1 and 4 way winter are the most impersant seasons. There is some hunting gets frud motal

The resction of migrating caribes to bermed, permanent roads, aboveground gathering systems, and overhead power lines is indedudately known. Technological solutions to these problems require further development and testing, requiring an intensive research effort. There is a general absence of information on long-term. effects of overlowent activities on caribos (22, 12). All the lines is a general absence of information

as A Major migration corfiders and criffes where the topogniphy tends to funnel migrating caribou (e.g. stream crossings) require delineation, if in fact such points exist in this area.

CONCLUSIONS

At present we foresee no significant problem interactions between barren-ground caribou migration and winter seismic operations or any exploration drilling activities conducted in accordance with good land-use practices. However, certain activities associated with production operations and trunk line phases of any development may be unacceptable with respect to barren-ground caribou migration. If aboveground pipelines or high bermed roads, alone or especially in conjunction with such pipelines, pose a significant berrier to caribou migrations such facilities are unacceptable.

Present information on the reaction of migrating caribou to impediments such as high bermed roads and aboveground pipelines is inadequate. However, we feel there is a high probability that the presence of these particular facilities will render any associated phases of development unacceptable due to obstruction of caribou movements and diversion of caribou migrations by more than 8 km (5 mi) in order to circumvent them.

These facilities can become acceptable if it can be shown that caribou will not be required to undertake diversions of more than 8 km (5 mi), or when techniques can be developed, proven effective, and implemented such that caribou will be freely able to cross such impediments after diversions of no more than 8 km (5 mi), and at all points where migrating caribou are traditionally funnelled by topographic or other natural features.

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CRITICAL AREAS FOR PRESENT USE- CARIBOU

AREA 7D: CAPE BATHURST, NORTH OF MASON RIVER MOUTH -- MACKENZIE LAKE LIDA & JAREA JE & Discont family of the second of the second seco

Fall and early winter are the most important seasons. There is some hunting year-found house by North Star Harbour residents in Area 7D (43,23).

Intensitive prist for fair and the source of the series of

PROPELIONS.

A: Vinter Beismin operations of Significant problem (nerolitions) howen tear hound caribou Fictard, b. Vinter Beismin operations of Mr. Exploration drilling activities (conducted in accordance with 3000 1) of the preditices. However, critical Sciulice Statistical Activities (conducted in accordance with 3000 of any dorrections any be inacceptable with respect to cariboral carboal carboal bod resting of any dorrect roads, alone or sepetality in conduction with and or other as bod to be prevising of high berned roads, alone or sepetality in conduction with and others, of a bode resident carrier to detailes, borned roads, alone or sepetality in conduction with and others, bode a significant carrier to detaile or second roads are detailed at a underston with and other and bode a significant.

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These facilities can become accoptable if it it out be shown that be the will fill be that so the same sate of a the start of the start

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فتشممه أأرمع فالعباد بعاريهم ترتبا الأولي والمتعور البراية المتقاتين الرياب والمتحال

roject Activity	Major Concerns	Severity	Duration	Controls
EISMIC	None anticipated			
ູ່ເບັດທີ່ໄປເມື່ອດີ ເຈົ້າດີທີ່ໄປເມື່ອດີ ແລະເກົ່າຂໍ້ເຫັດທີ່ເຫັນ ຈະການເປັນເປັນ ໂຮດຫຼາຍເປັນເປັນເອີ້ອ ເອເຊັ່ນເປັນເປັນເປັນເປັນ ເອເຊັ່ນເປັນເປັນເປັນເປັນ ເອເຊັ່ນເປັນເປັນເປັນເປັນເປັນ ເອເຊັ່ນເປັນເປັນເປັນເປັນເປັນເປັນ ເປັນເປັນເປັນເປັນເປັນເປັນເປັນເປັນເປັນ ເປັນເປັນເປັນເປັນເປັນເປັນເປັນເປັນເປັນເປັນ	a ettects in tar boy idtin ble thig and bar boy idtin alving and cost of noise alving and cost of ancie all forse of development id be ivoided between agr	ούτα αριύστη ογλή Νατογραφία το του του του του του του του του του	ano save states ano save set a constant a constant constant a constant constant constant constant constant con	15
Difficulty Cramping Weil-Delig of a Difficulty fox clitical migration (1)01.	Ο το το το το του του του του του του του	ອີດອີດອີດອີດອີດອີດອີດອີດອີດອີດອີດອີດອີດອ	Shořtuterá Balvíra : Rovie Bře + 1 Riveri 1 Py' ő Fre : Potroti Potrotiet : Potro * Poduáciácia:	These facilities should not a """ be up field in calving range "26- Chen defugied by caribou. .(1(.)) 230.
Gravel extraction	Babitat destruction	ande af this time	danasi» jo sing danasi si jo sing	Calving grounds
Camp operations	Disturbance, Human presence	Moderate	Short-term	These facilities should not be located in caribio call
entrent BODUTION BODUTION BODUTION Permenent Tobdo	mea: 23#3+5 %%2, 350%99%99%99%64 .510 fedhaois gidal solution .540, %6%90%91%9 (chtensif%) .mecs ajaway6 49 501 dation	ie for de la company de la compa company de la company de	udtinis Laubodi fiupolsijonisi Vib loatitu oga s ^e at Bông-Cata t	11280-YO. DelGUDDO"nodu 198782 "The Leoka tong 5 1282 "Doseens on the Leoka tong 5 1222 "Doseens on the Company 125 "A general - Stennes "The A general - Stennes "The
Aircraft Aircraft Aircraft Aircraft Aircraft Aircraft Aircraft Aircraft Camp operations 10 101257400 10 10125740 10 10 10 10 10 10 10 10	<pre>bit tied it of a street bour test bit of the sector of the street of the street bit of the sector of the street of the street bit of the street of the street of the street bit of the street of the street of the street of the street of the street of the street of the street of the street of the street of the street of the street of the street of the street of the street of the street of the street of the street of the street of</pre>	to the state of the second of	A standard is A stan	<pre>>>::::::::::::::::::::::::::::::::::</pre>
Discussion	Reaction of barren-ground incompletely researched. such obstructions, althou intended to simulate eler roads and aboveground pi (14,98). Thus, although Alyeska line and haul ro	d caribou to man- in general, car ugh most research vated pipelines (pelines was compo calves and pregn ad, it was not po	made obstacles ibou appear unw on the problem 15) or situatio unded by human ant females avo ssible to diffe	is variable and has been illing to go over or under has involved either barriers has where the presence of berned- precence or vehicular activity ided areas adjacent to the remtiate between the presence of the ower of the vehicular

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Both females and young were frequently observed to be reluctant to cross under any artifical, elevated structure (15). The separation of cow/calf pairs that often resulted, and the inhibition of free movement on the calving ground could seriously hamper normal use of traditional calving ranges and possibly result in behavioral abnormalities. Both of these possibilities would have deleterious effects on calf survival and recruitment to the herd.

During winter caribou displayed some reluctance to cross the Dempster Highway, particularly in forested areas, if deep snow was present or the road had a high profile (124). The extent to which these reactions can be extended to the calving ranges is unclear.

Further research is required to determine the effects of bermed roads and aboveground gathering systems as well as overhead power lines (46) on caribou calving and post-calving behavior. Similarly, research is required to develop and to demonstrate the effectiveness of techniques whereby caribou can successfully negotiate these barriers with no undue expenditure of time or energy and no significant behavioral changes.

Barren-ground caribou are sensitive to disturbance by noise and human presence on their calving grounds. Aircraft operation causes strong reactions, decreasing as altitude increases. Helicopters may be more disturbing than fixed-wing aircraft (57, 124), although some data do not substantiate this (13).

Some research has shown caribou to be more sensitive to the presence of humans and aircraft during the calving period than at other times (48,120,124), although other data do not support this (12). Given this controversy, we feel it is prudent to adopt a conservative approach, and suggest that all development-related disturbance between May and August could have deleterious affects on caribou during the calving 1165011650116 bas soutile no the past-calving periods. Thus it is advisable that all aircraft maintain a minimum piove bas signifi difficult of at least 300 m (1000 ff.) over calving and post-calving grounds. Although a new calving in the signification of the set o

spections settifies seeds. Esperar polylar, ni ber arguing in a strabon idered the most critical part of carlbou habited, boding vo bergumantaining the integrity of such areas is essential for the long-term well-being of a boding vo bergumantaining the integrity aggregations are believed to provide an opportunity for critical herd (8,11). Post-calving aggregations are believed to provide an opportunity for critical for the second during another (10), con blooms noisestsxersesialization of the previous winter bands disrupted, during, spring migration (110), ionoistication nei-making.epiled and of disturbance of this time of grained and this time of grained and the second se abarorp parvis

processing the second states and the second states of the second states #104×:1042. SS STSDOM Disturbance, Suman Camp operations. MAJOR DATA GARS ALSO AL DAJATOL MO Soneserd.

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13:02378000 seddikippedginfermation is required as to the location of traditional caribou calving grounds in Ares LAS the puspers of caribou using such areas, and the degree of Tidelife of the bound of particular defining grounds at She selestipp of guch data requires intensive, long-term research and the selection of the selec

present no bairier to digitou movements. In such a case : ro (c astruction should commit and and

Hits ring > bilons noise to send associated areas and winter seismic and exploration, drilling operations At present, we forgise no significant problem interactions between barren-ground caribou calving and post-calving activities and associated areas and winter seismic and exploration, drilling operations in Area "A", including gray Sathurates and the same time, gertain activities associated with the exploration drilling, production operation, and trunk line phases of any development may be Unacceptable With Headser to another satisfying and posts calving activities. A sound of the set of the

to harrangeround participuq saying and possessiving states in an and sonedrussid should be and a solution of the presence of humans is unacceptable in any area if disturbance of caribou on calving or post-calving grounds results. We believe that compliance with these restructions would effect ively restrict any seismic and exploration of the importance of the presence of the pres

isolairs as an analysis that is a second of garibou to impediments such as high, berned roads and above-ground pipeline systeme de indequate. However, we feel that there is a high probability that the presence of these particular facilities will render any associated phases of development totally unacceptable on caribou selving and gost celving grounds. Aspress STATULON. Justiant .oodsdausela. nolforisky love o

INGLATION

(Anolitibers of all stable of an analysis) and the second acceptable (subject to the above vestrictions on noise, human presence, and other disturbance) when such facilities can either be shown to have no inhibitory effect on caribour movements or behavioral patterns, or when rechniques can be developed, proven effective, and implemented such these caribour movements and behavior will not be arrested out of the locally, with the second caribour and implemented such these caribour movements and behavior will not be arrested out of the second caribour caribour movements and behavior will not be arrested out of the second caribour caribour movements and behavior will not be arrested out of the second caribour caribour movements and behavior will not be arrested out of the second caribour carbour caribour caribour caribour caribour caribour caribour caribour caribour A DEBERRICON COUNDO SALA BAUSST

Buattion of herren-ground catthou to gamenade obstale ... wetable and has been incompletely researched. In genural, catthou apress much incompletely researched. In genural, catthou apress much incompletely researched. In genural, catthou apress and provide a second of the group of the group of the second of the group of the second of the group of the second of the Alyeska line and haut road, it was not possible to differentiate patheon the presence of the lacilities par se and the associated artivity as to the marse of the avoidance . 126.41)

Soch females and going were drugaently cheerved to be to unsant to oross under any the securation of new cair pairs that fiten rest ad. artifical, elevated structure (15). The separation of nour cait pairs that then result and the inter result of the inter articles by harrai normal use of traditional calving ranges and cossibly result of benacical shoot dailer a benacical shoot dailer a benacical shoot and restably restably a client of these presides would have deleterings clients on this structed and restably been 13.2 to the he d.

During witter garibet anguly barenene tellerunte to drose the Dempster digreasy parenauterig in received areas, is dues stopp of generic or the pract of a high fractic fractic tot. extent to which thus reactons for extracted to the contract congres is undert.

Further research is required to determine the offering the permet roads and above and above and Farther resumption is required to the main of the structure the structure of the second and the second the second second

CRITICAL AREAS FOR PRESENT USE- SEALS

AREA 8: HARROWBY BAY

BIOLOGICAL DESCRIPTION

Species	Activity	Abunda	nce	Season
Ringed seal	All habitat functions (pupp molting, feeding and over- vintering)	ing, No est availa	imate of population ble	on Apperently year round
Notes:	Ringed seals are widespread adjecent to Cape Bathurst (shore ice between Fall and	in the western 85,90). Immatu spfing (88,89;	n arctic, includin ure scals tend to 90,118). There as	ng those landfast ice areas concentrate in unstable off- re wide seasonal movements
	of certain age classes of s beaufort Sea (82).	eals, primeril	y in shear zones i	long the polar pack in the
	Winter lairs of mature seal in the let of pressure ridg bays (89,90,118). Recent d stable ict are an important and April (85,90,118) and r	s as well as be as in the extent the indicate the part of the be squire over two	irth lairs are found naive landfast ico hat offshore areas reeding habitat (o months for weans	and primarily in show drifts a reas, including the deeper of shifting but relatively 15). Youny are born in March ang (118).
	Netween May and July, scals this time they lose much of of some feeding activity du to stress at that time, a p (103).	haul out onto their blubber ring that perio roblem to which	the ice to bask a reserves (84,118) od (84). This west hair (phorid) se	nd molt (90,114,118). During despite an apparent continuatio ight loss has been attributed tals are commonly susceptible
	In summer many seals, partia areas of polar pack ice which of mature seals is less ext where all year round, includ buto land at this or other i from unstable, offshore ice in the same direction at fro howe out of inshore areas w winter residence under the i	tulafly inmatur ch are found at ensive, and the ing the open-wa imes (123). onto the fast sere-up (118). it the progree fast ice (118).	re animals, are as t some distance fr isse in deep bays i ster period (118). There is a tendenc ice at breakup, a As fast ice form saing ice edge, le	addiated with the widespread on shore (\$8,91). Movement requently remain in the general Ringed seals rarely move y for immature seals to move and a less pronounced movement as in fall, most young seals avving the adults in their
SPENIDER HABURER				
Type of Harvest: 1	ieal hunting			
Season:	wqust. Sentember (43)			
Intensity, 1				
Notas: 1	Notal harvest is relatively North Star Harbour resident:	low, but Harro	owby Bey is an imp	ortant seal hunting area for
POTENTIAL IMPACTS				
Project Activity	Major Concerns	Severity	Duration	Controls
SEISMIC OPERATIONS	None anticipated			
EXPLORATION DRILLING				
Drilling activity (blowouts)	Habitat loss, mortality, oiling	Moderate	Short-term	Offshore drilling should not be conducted in winter until the technology to control and
				clean up blowouts has been developed. In summer, oil must
		en de la composition de la composition La composition de la c		be contained and cleaned up immediately.
PRODUCTION OPERATION				
Cluster facilities an pipelines (blowouts a ruptures)	d Habitat loss, and mortality, oiling	Moderate	Short-term	Offshore drilling should not be conducted in winter until the technology to control and clean up blowouts has been developed.
				In summer, oil must be containe and cleaned up immediately.
TRUNK LINE	None anticipated			

AREA 8: HARROWBY BAY

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BIOLOGICAL DESCRIPTION

Species	Activity	Abundan	ĉe Naŭ Maralizzar en 16 Marzo - M	Season
Ringed seal	All habitat functions (pupp molting, feeding and over- wintering)	ing, No esti availab	mate of population le	Apparently year round
Notes:	Ringed seals are widespread in the western arctic, including those landfast ice areas adjacent to Cape Bathurst (83,90). Inmature seals tend to concentrate in unstable off- shore ice between fall and spring (88,89,90,118). There are wide seasonal movements of certain age classes of seals, primarily in shear zones along the polar pack in the Beaufort Sea (82).			
	Winter lairs of mature seals as well as birth lairs are found primarily in snow drifts in the les of pressure fidges in the extensive landfast ice areas, including the deeper bays (89,90,118). Recent data indicate that offshore areas of shifting but relatively stable ice are an important part of the breeding habitat (85). Young are born in March and April (83,90,118) and require over two months for weaking (118).			
	Between May and July, seals haul out onto the ice to bask and molt (90,114,118). During this time they lose much of their blubber reserves (84,118) despite an apparent continuation of some feeding activity during that period (84). This weight loss has been attributed to stress at that time, a problem to which hair (phocid) seals are commonly susceptible (103).			
	In summer many seals, parts areas of polar pack ice whi of mature seals is less ext area all year found, indlud ento land at this or other from unstable, offshore ice in the same direction at fr move out of inshore areas w winter residence under the	culatly inmatur ch are found at ensive, and tho ing the open-wa times (123). T onto the fast este-up (118). ith the progres fast ice (118).	e animals, are ase some distance fro se in deep bays fr ter period (118). here is a tendency ice at breakup, an As fast ice forms aing ice edge, lea	ociated with the widespread m shore (88,91). Movement equently remain in the general Ringed seals rarely move for immature seals to move d a less pronounced movement in fall, most young seals ving the adults in their
RESOURCE HARVEST			and a second second Second second	
Type of Marvesti	a set out the set of t			
5048001	August, September (43)			
Intensity: Notes:	LOW Total harvest is relatively North Star Harbour resident	low, but Harro S.	wby Bay is an impo	ftant seal hunting area for
POTENTIAL IMPACTS				
Project Activity	Major Concerns	Severity	Duration	Controls
SEISMIC OPERATIONS	None anticipated			
EXPLORATION DRILLING				
Drilling activity (blowouts)	Habitat loss, mortality, oiling	Hoderate	Short-term	Offshore drilling should not be conducted in winter until the technology to control and
				clean up blowouts has been developed. In summer, oil must be contained and cleaned up immediately.
PRODUCTION OPERATION				
Cluster facilities a pipelines (blowouts ruptures)	nd Habitat loss, and mortality, oiling	Moderate	Short-term	Offshore drilling should not be conducted in winter until the technology to control and clean up blowouts has been developed.
				in summer, oil must be contained and cleaned up immediately.
TRUNK LINE	None anticipated			

Discussion:

The primary problems which could have significant impacts on seal populations are blowouts during offshore drilling as well as massive fuel spills. Short-term (24-hour) exposure to fresh crude oil caused transient eye problems, and minor kidney and possibly liver lesions, but no apparent permanent damage. The same exposure to oil following lower-term captivity (a high-stress situation) rapidly resulted in the death of the seals (84,103). Long-term exposure to oil (as of seals in fast ice areas) would likely result in permanent eye disorders.

The effects of a blowout would be particularly serious on stressed seals or those which are in poor nutritional condition (84,103). Pre-weaned scals inhabitat subnivean birth lairs (85,118) and these would be highly susceptible to fouling Subhivean birth lairs (8),113) and these would be highly susceptible to touting by oil (103). Although phocid (hair) soals are generally not susceptible to thermoregulative problems due to billing the affect on young in birth lairs could be greater (84,103,104). Increased Stress as a result of oil spills or blowouts, particularly during the molting period, would conceivably result in greater mortality of seals, especially those in poor condition (51, 1911)

Although injestion of small quantities of oil may not be harmful to seals, their prey species could concentrate hydrocarbon metabolites to a level where they may be 25 SIEPSI with the seals (84). At present, oil spill or blowout countermeasures are inadequate under most summer conditions in the Beaufort Sea, and would be almost totally angfentive under winter conditions, particulary in the transition and polar pack zones (50). W 25912 1992 DEILLIABDA SVBA SW

STILL for reaction of basking seals to aircraft overflights apparently varies with the STILL provident of Relativities, Star Sreance of cliffs (which solo signaft noise) and the weather. Seals exhibited relatively minor responses to aircraft at 150 m (360 ft) during periods when weather was optimal for basking, although this effect was greater recourses that is, treas supporting dilimiting in tions

Smith (119) found that 75% of the seals up to a distance of 400 m (0.25 miles) dived 25 555555 dive mater after a place passed at 12 - 30 m (40 - 100 ft) altitude. There are no data regarding the ultimate effects of such disturbance on weals Ringed smalls may be under the greatest physiological stress during the molting-basking period (103), bebasgxe rol silibility Das nei fic security and roll roll of the security of the roll of

Intensive marine seismic operations conducted within the limits of Alaskan regulations Intensive marine seismic operations conducted within the limits of Alaskan regulations did not appreciably displace seals from landfast ice wintering areas during the seismic BLILDIIWoperation of the following spring sets (bdb) in yard call the second

resources they support, were harvested in the past. MAJOR DATA CAPS

The number of seals using Harrorby Bay for critical life-cycle functions is unknown. Detailed responses of seals to development-related distuision and the longer-tarm physiological and behavioral responses have not been adequately researched.

ist and wildlife resources of significance for potential CONCLUSIONS

Defilitory with a former and arrive conflicts between reismic artivities or trunk line construction and operation and the seals utilizing Harrowby Bay. Although massive fuel spills dould not a problem, it is considered unlikely that any spills would be of such a magnitude as to have a serious effect on the seal population there. During the exploration drilling and production operations phases, however, the risk of underwater blowouts renders of shore drilling in the rowby Bay unacceptable at any serious for the form-

seal population charter, but the space with the out of the seal population operation operation of the population of the space with the seal of underwater blowout schulers of the seal of the sea

For each area delineated on Figure 4, there follow

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CHAPTER 5

The effects of a blowoot we had be parent at which are in poor sucricional condition (84,103). Pre-weared scale inhabitat subnivean birth lairs (85,118, and these would be high susceptible to douling Although injustion of small quantities of oil mover of me listhifue to smalls, their Although any stren of anall quartities of oil boy for he institute to seciet any next prevented concentrate hytroad and a straight and the seciet where the bay be toxic to seals (34). At prevent oil spill of buck to the seciet seconds under more succes conditions in the Brancers Sch. at work to be in straight inder any conditions particulary in the straight be block BW tores to be a straight of the second straight of the straight of the second straight to be a straight of the second straight of the straight of the straight of the second straight to be a straight of the second straight of the straight of the straight of the second straight of the straight of the second straight of the straight of the second straight of the sec **Still file** reaction of pasking scale of singest overflights apparently voture with the bill for how but of addition bandred or sail life: the store of all and the the weather. -Seals exhibited relatively minor respondes of arriving at 100 minor to during periods when weather was optimal for basking, sith are this affect was greater and the second stream of a str resources; that is, areas supporting animal pepulations Smith (119) found that 75% of the seals up to a distance of 400 a (0.25 Miles) dived Antennak Margarman a milate marged at it will be 10 m 100 ft) alto the formation of the second seco the most important sources of IISN and Wildlife for expanded within the contract of the source of th not appreciably displace scals from lanofast its wirrering as as our ap the tetento human use. Many of these areas a griating singhoand dwildlife resources they support, were harvested in the past. MAJON DATA GARS respo se prist autor of seals using datroupy Bay for critical life-pycle dunctions is unkto an Detailed response to the seal of the search and the search an responses have not been adequately researched. fish and wildlife resources of significance for potential beiläinebni varonnes saestones preventiors verent astimute antivutes of transities constructs on and speration and the seals utilizing farrenty Bay. Although the voltage of any office on and the constdered unlikely that are splits would be of such a magnitude as an inter on any office of the second decomplete as an inter of the second decompl **NO 20**4 A THE CONSIDERED UNLIKELY FRACTORY SPILLS WOULD BO OF SUCH A RAWAITSUE AT COMMEND AND THE SAME OF THE contaition could be relatively long-term. population could be relatively long-term. Serious seel multic could also "evilt visor of the local cude a since excee to the local land serious seel multic could also "evilt fisore it in the seriou can excee to the local land serious the local cust is present. The sould have a since cauge to the local land soliting period or when the resent. The sould have a since cauge to the local transition soliting period or when the resent. Diting period or when ice cover is present. The state inter a state in this area could broome in terrally period beriod and the new offention work of states in the state of the state of the state of the states of of moderate or high severity were considered on and main prize of the price of the prize prize of the prize o For each area delineated on Figure 4, there follow catalogue sheets which summarize the biological description, resource harvest, potential impacts, data gaps/and conclusions. References indicated by teference/ numbers on the catalogue sheets are listed at the back of this volume.

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Summary of Conclusions

Our general conclusions regarding the impact of exploration and development side of the largas del Priested as critical for potential use are essentially the same as those for the wareas we identified as critical for present Few problems are anticipated with land based explorause. nort Daniand VEEst Offilling onase activeties; and those that are Pranticipated arepatrour tylews control Pable wha existing 99 operations in this area should not coardinations in this area should not . In the most serious problems anticipated are asso roreM ciated wrth water-Based exproration and drilling programs, Wespectfrcaply blowouts with respect to the fatter; and the Benif Poirst fon and Focat for of the intrastructure required . for a producing field and the human activity associated with eltuil daiw some concerns and recommendations for the specific critital areas shown on Figure 4"are summarized below." Certain resurictions on infrastructure siting should be - 320 Seld Area 1:1- Small Inland Takes (noted for lake trout and Whitefish). We foresee limited potential for st . Je wand based exploration and development activities affecting the Fish resources of these waterbodies. This of course w assumes that appropriate operating conditions are applied to Tand use permits and adequately enforced. We would, however, recommend that explosive seismic operations and waterbased drilling programs hot be permitted in these water

bodies.

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Area 2: "Fingers" Area of Eskimo Lakes. Landbased exploration and development activity in the "fingers" area is not regarded as detrimental to staging and molting explanditions and the second as appropriate of the banditions laws respecting location and timing of saghivity are sapplied to land use permits and adequately enforced ar Water based of -drilling programs should not be permitted however .980 The tent are Area 3: Anderson River Deltar Wood Bay Enlight son Peninsula, Winter exploration and land based test drilling operations in this area should not constitute any marticular threat to nesting staging dand molting waterfowl. Major infrastructure development should not be permitted near to nesting colonies however, and certain sativities would have to be curtailed when waterfowl are presents No water based of tilling operations should be permitted in Mood Bay 5 101

Area 4: Cape Dalhousie. In our Miewa exploration and development can be accomplished in this area with little disturbance to nesting, molting, and staging waterfowlers Certain restrictions on infrastructure siting should be applied in the area, however, and pertain activities curtailed or carefully controlled when waterfowl are present. Sciences a Area 5:, Baillie Island and Northern Cape Bathurst. With adequate controls to ensure that waterfowl staging, and molting areas are not fouled by spills of blowouts, and that human activity is curtailed during periods when large numbers of waterfowl are present, no major probleme are anticipated in this area. It should be noted, however, that the

bodles.

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Cape Bathurst portion of this area is located within Critical Area 7 for Present Use.

Area 6: Wood Bay. No major long-term impacts are anticipated in this area as a result of exploration and development activity if certain operating conditions are applied to ensure that fish habitat is not degraded.

Area 7: Mouth of Horton River. Water-based drilling operations and gathering systems should not be permitted in this area. With adequate controls, other activities could probably proceed in this area.

CATALOGUE SHEETS FOR FIGURE 4

CATALOGUE SHIRTS FOR FIGURE 4

CRITICAL AREAS FOR POTENTIAL USE-FISH

AREA 1: SMALL INLAND LAKES

BIOLOGICAL DESCRIPTION

Species	Activity	Abundance	Season	
Lake trout	Spawning, feeding, overwintering	Moderate to High	All year	
Whitefish	Spawning, feeding, overwintering	Moderate to high	All year	

Notes: - lake trout are predominant in some lakes, whitefish in others

- lakes appear to function as relatively independent systems

- easily overexploited or disrupted due to size of lakes
- there may be other lakes similar to these in the study area that are presently not identified

RESOURCE HARVEST

Type of Harvest:	Potential domestic or limited commercial fishing
Season:	Primarily fall and early winter
Notes:	Many of these lakes were fished by trappers in the past when dogteams were used. They may become important in the future if there is an increase in trapping intensity
	in the study area or if there is a return to the use of dogteans.

POTENTIAL IMPACTS

Project Activity	Major Concerns	Severity	Duration	Controls
LAND SEISMIC	None anticipated		· · · · ·	
WATER-BASED SEISMIC				
Explosives	Pish-kills	Righ	Potentially long-term	Air-cons
EXPLORATION DRILLING				
Drilling activity (blowouts)	Toxicity	High	Potentially long-term	Present controls inadequate
Site preparation	Siltation	Nodezate	Potentially long-term	Method, location
PRODUCTION OPERATIONS			 District State 	
Permanent roads	Siltation	Noderate	Long-term	Location, design
Process westewater	Toxic spills	Moderate	Long-term	Method
Cluster facilities and pipelines (blowouts and	Toxicity -	Xigh	Potentially long-term	Present controls inadequate
TRIDE LINE				
Permanent roads	Siltation	Noderate	Long-term	Location, design
Trenching	Siltation	Noderate	Long-term	Location, design

Discussion:

Ne office

The main potential impacts to fish in these lakes are the same as the long-term impacts expressed for Area 3 in the catalogue sheets accompanying the Critical Areas for Present Use Map. These are fish-kills resulting from explosive water-based seismic, blowouts and pipe ruptures in water, siltation caused by erosion from permanent road and pipeline rights-of-way, and toxic spills from the discharge of process wastewater.

Explosive water-based seismic in these lakes is felt to have potential for long-term impact to fish because of the possible isolated nature of these populations. Lack of recruitment from nearby waterbodies may increase the recovery time of these fish populations to more than three years. This impact can apparently be controlled by using air-guns rather than explosives as an energy source (25). None the less, even air-guns should not be used under ice until this method is shown not to be harmful to fish.

Description Description <thdescription< th=""> <thdescription< th=""></thdescription<></thdescription<>	•	Concern about blow ice platform, maki ruptures of underw ice. Again becaus impact may take lo lakes be prohibite drilling from land	outs of water-based well; ng access to the wellhear ater collector lines wou e of the relatively isoli- nger than three years. I d. An acceptable alterna	is greatest if drilling difficult. During prod d also be very difficult ted nature of these lake We therefore recommend the tive to in-lake drilling	is done from an uction operations, to repair under s, recovery from at drilling in these would be directional
<pre> trong trong to subsect: could be a president source of could pills. These matters direct count with a subsect could be a president source of could pills. These could be a subsect of the s</pre>		Potential long-ter and pipeline right distance from lake project components investigation will	m impacts from siltation s-of-way can be controlle s (37), and in areas of a should include adequate be required for location	originating from erosion of by locating these right concrodable, stable soils silt-control methods. De of permanent road and p	of permanent roads ts-of-way a suitable . Design of these stailed geophysical ipeling:rights-of-reguera
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CRITICAL AREAS FOR POTENTIAL USE-WATERFOWL

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SCIENC COLORA PIC.	Activity	Abundence	WES WOISD DESCE	Season
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or molting in the Eskimo Lakes "fingers". Ducks that become fouled with raw oil or freshly spilled fuel in most cases will not survive. Because birds usually gather in very large flocks during molting or staging, opportunities for large-scale die-offs caused by oil/fuel spills cannot be discounted.

Frequent passage of aircraft over flocks of ducks or over critical habitats during molting and fall staging periods could cause birds to avoid or abandon key feeding and resting habitats which in turn could jeopardize survival through winter. However, such conflicts should not have measurable effects on regional populations because intensive disturbance is anticipated only during construction phases, not during operation of production facilities, should any be located within this area.

MAJOR DATA GAPS

Sec. Later

- description of specific habitats used by molting and staging ducks

- numbers and species of ducks during spring, mid-summer and fall concentration periods

CONCLUSIONS

Land-based oil/gas development within the Eskimo Lakes "fingers" areas can be accomplished with a minimum of disturbance to molting and staging ducks as long as measures are taken to protect birds and their habitat from pollution and persistent disturbance from aircraft and other construction-related activities.

To reduce the possibility of destructive impacts on molting and staging ducks, (a) no wells, trunk lines, or fuel storage sites should be located on coastlines, riverbanks, or in offshore areas where spills or blowouts will pollute duck concentration areas, and (b) aircraft should not be operated within 3.2 km (2 miles) of, or lower than 610 m (2000 feet) altitude over, critical habitats when waterfowl are present.

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Mid May + Zarly Sept. Mid July + Mid Aug. (96)	4.000 - 8.000 (85.%) Undebagni ed	2012 - 2012 - 2012 - 2012 - 2012 - 2012 - 2012 - 2012 - 2012 2012 - 2012	ang mang mang mang mang mang mang mang m
Mid May - Early June	Potentia: 1:1 200,000 (4,86)	47.25.1.9.1.9. 9.721.73 2000(1797) 410 200 9.0000 001, 36 (1	
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Mid May - Barly July (41.7) 20 July - 25 Aug. (86) Mid May - Mid Sare Mid Aug Mid Sare	Understation Potential Eur 75.000 (36) Potential For 75.000	5:01220 0:1022 0:1226	8/15.,Q

The critical esterior the period is ald May to late Aljust. Key issues in order of invortance are: (a) estring ataging oy show gease which could subber 150,000 to 200 000 (b) has'n present and show gease, which could subber 150,000 to 200 000 witherable to distribution and show which have and the specially are issa why a storted by all structonces. Nusting which heing flightless is activities owing to that interconces. Nusting which heing flightless distribution bettern of distribution and development ectivities owing to their disperse, pattern of distribution who become is object is the Anderson beits (1) a disperse, pattern of distribution who become is an entry in the Anderson beits (1) estably soment of the Anderson kiew its importance to birds is reflected in the estably soment of the Anderson River Windstory Bird Sanctuary.

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CRITICAL AREAS FOR POTENTIAL USE - WATERFOWL

AREA 3: ANDERSON RIVER DELTA, WOOD BAY, AND NICHOLSON PENINSULA

BIOLOGICAL DESCRIPTION

Snow GooseNesting, brood rearing Pre-molt migration and staging (36) Spring staging (1n bad weather) (36)4,000 - 8,000 (86,9) UndeterminedMid May - Early Sept. Mid July - Mid Aug. (86)BrantNesting, brood rearing Molting2,000 - 3,000 (9,36)Late May - Mid Aug. (8) Mid July - Mid Aug. (8)BrantNesting, brood rearing Molting2,000 - 3,000 (9,36)Late May - Mid Aug. (8) Mid July - Mid Aug. (8)WhitefrontStaging Nesting, brood rearing Melting0ndetermined 2,000 (9)Mid May - Mid Aug. (8) Mid July - Mid Aug. (8) Mid May - Mid Aug. (8) Mid May - Mid Aug. (8) (9)Canada GooseMolting4002 (3) MeltingEarly July - Mid Aug. (4) Mid May - Mid Aug. (8) (4) (4) Potential For 75,000 (96)Early July - Mid Aug. (4) Mid May - Mid Aug. (4)	Species	Activity	Abundance	Season
Spring staging (in bad weather) (36)Potential for 200,000 (4,86)Mid May - Early JuneBrantNesting, brood rearing Nolting2,000 - 3,000 (9,86)Late May - Mid Aug. (8)NhitefrontStaging Nesting, brood rearing Nesting, brood rearing Nelting000 (9)Nid Juny - Mid Aug. (8)NhitefrontStaging Nesting, brood rearing Nelting000 (9)Nid May - Mid June (23)Canada GooseMolting2,000 (9)Mid May - Mid Aug. (86, Staging (10)DucksNesting Nolting000 ¹ (9)Early July - Mid Aug. (400 ¹ (9)DucksNesting NoltingUndeteralined Potential For 75,000 (96)Nid May - Early July (4) 20 July - 25 Aug. (86)	Snow Goose	Nesting, brood rearing Pre-molt migration and staring (26)	4,000 - 8,000 (86,9) Undetermined	Mid May - Early Sept. Mid July - Mid Aug. (\$6)
Brant Nesting, brood rearing Molting 2,000 - 3,000 (9,06) 3,000 (9) Late May - Mid Aug. (4) Mid July - Mid Aug. Whitefront Staging Mesting, brood rearing Nolting Undetermined 2,000 (9) Mid May - Mid June (23) Mid May - Mid Aug. (46, 3,000 (9) Canada Goose Molting 000 [±] (9) Early July - Mid Aug. (4 Mid Aug. (4 Mid May - Mid Aug. (4 Mid May - Mid Aug. (4 Mid May - Mid Aug. (4 Mid May - Éarly July (4) Ducks Nesting Molting Undetermined Molting Mid May - Éarly July (4) Potential For 75,000 (96)		Spring staging (in bad weather) (\$6)	Potential for 200,000 (4,86)	Mid May + Early June
Nhitefront Staging Nesting, brood rearing Undetermined 2,000 (9) Nid May - Mid June (23) Malting 2,000 (9) Mid May - Mid Aug. (86, 3,000 (8) Barly July - Mid Aug. (86, Barly July - Mid Aug. (86, 10) Canada Goose Molting 400 ² (9) Barly July - Mid Aug. (40) Ducks Nesting Molting Undetermined 905 Mid May - Mid Aug. (40) Ducks Nesting Molting Undetermined 905 Mid May - Mid Aug. (40)	Brant	Nesting, brood rearing Molting	2,000 - 3,000 (9,86) 3,000 (9)	Late May - Hid Aug. (%) Mid July - Mid Aug.
Canada Goose Molting 400 ¹ (3) Early July - Mid Aug. (4) Ducks Nesting Undetersined Nid Hay - Early July (4) Molting Potential for 75,000 (86) 20 July - 25 Aug. (86) Starting Potential for 75,000 Mid Hay - Mid July	Whitefront	Staging Nesting, brood rearing Nolting	Ondetermined 2,000 (9) 3,000 (9)	Mid May - Mid June (23) Mid May - Mid Aug. (86,4) Early July - Mid Aug. (4)
Ducks Nesting Vadeteralhed Mid May - Rarly July (4: Molting Potential for 75,000 (86) 20 July - 25 Aug. (86) Staring Potential for 75,000 Mid May - Mid June	Canada Goose	Malting	4002 (3)	Early July - Hid Aug. (42)
Mid Aug Aid Sept.	Ducks .	Nesting Molting Staging	Vndeteralned Potential for 75,000 (86) Potential for 75,000	Mid May - Rarly July (42,73, 20 July - 25 Aug. (86) Mid May - Mid June Mid Aug Aid Sept.

Notes

The critical waterfowl use period is mid May to late August. Key issues in order of importance are: (a) spring staging by show gaese which could number 150,000 to 200,000; (b) neating brant and snow gaese, whose colonial breading habits make them especially vulnerable to disturbance; and (c) molting ducks and gaese which, being flightless; are less able to avoid major disturbances. Neeting whitefronts are not as likely to be adversely affected by oil/gas exploration and development activities could not be dispersed pattern of Jistribution when Brueding. In general, the Anderson Delta is a recognized "critical" waterfowl area; its importance to birds is reflected in the establishment of the Anderson River Rigratory Bird Sanctuary.

RES	OURCE HARVEST	
	Type of Harvest:	Potential goose and duck hunting
	Seasons	Spring to fall (May to September)
	Notes:	This used to be a good hunting area but is now part of the Sandtuary and no hunting has been allowed in the past few years. If hunting is once again allowed, this may become an important goose hunting area as some Tuktoyaktuk hunters-trappers currently have camps in the area (43).

POTENTIAL IMPACTS

roject Activity	Major Concerns	Severity	Duration	Controls
EISMIC OPERATIONS	None anticipated			· · · · · · · · · · · · · · · · · · ·
PLORATION DRILLING				MOT PLUTIMON
Gravel extraction to en- to since (a) no wells setuto contes (b, initiate Drilling activity (c)	and other the state of the stat	Potential destruction S. Asadonment of nest Ploudes of the prise (c. secondary slides are prioritants for a c. c. Prioritants for a c. c. Prioritants	ACE NET CONTRACTOR ACE NET LEAD ACT	Do not locate gravel sites of in of hear brant or snow a goost colonies work of sever historie cesis sperce ing in the for the severe ing in the for locate will where
(; 12 miles) d Creatifi es (; miles) of of liver s are present. Operations (ons.	Auto Santa Statistics (Statistics) (Statisti	scale losses of molt- ical stading, populations, the shandonmant of brant and shandonmant of brant colonies	μίο ανά το	Dibuout will foul critica moling mesting of start habitar was able to be new amainer outside issue is
Staging (fuel handling)	Same as preceding	Same as preceding	Potentially long-term	Do not stage fuel where spills will foul critical molting, nesting or staging habitats
Site development	Habitat degradation and displacement of nesting brant and snow geese	Potential abandon- ment or destruction of colonies	Long-term	Do not locate sites in colonies
ODUCTION, TRUNK LINES		en en la seconda de la seco La seconda de la seconda de		
Cluster facilities and pipelines (blow- outs or ruptures)	Fouling or displace- ment of (a) molting and staging ducks and gease, (b) nest- ing brant and snow gease	Potential (a) large- scale losmes to molt- ing/staging populations; (b) abandonment of brant and snow goose colonies	Potentially long-term	Do not locate wells or pipe lines where blowouts or ruptures will foul critical molting, nesting, or stagir habitats
Staging (fuel hendling)	Same as proceeding	Same as preceding	Same as preceding	Do not stags fuel where spills will foul critical molting, staging or nest- ing habitats
Construction of: pads, cluster facilities, camps, permanent road, processing plants	(a) Nesting brant and snow geese (b) molting geese and ducks, in order of concern	Potential destruction of colonies or reduct- ion in numbers of breed- ing residents; reduced numbers of molting and staging waterfowl	Long-term (colonies) short-term (molting, staging)	Do not build facilities or roads in or near colonies
Permanent roads (traffic)	Displacement of nest- ing brant and snow geese	Loss of nests and pro- duction potential, aban- donment of colonies	Potentially long-term	Do not build roads in or mear colonies
Operation and maintenance	Displacement of molt- ing and staging geese and ducks, and nesting brant and snow geese	Loss of nests and re- duced production for snows and brant; re- duced numbers of molt- ing/staging waterfowl	Potentially long-term	Schedule activities to minimize disturbance
Aircraft	Displacement of nest- ing brant and snow geese	Loss of production in colonies; reduced numbers of molting/ staging waterfowl	Potentially long-term	Do not fly directly over colonies or molting sites at low altitudes; schedule flights to avoid bird con- centrations
Discussion: And bai and ici	derson River delta and Wood bitat within the study area i molting ducks and geese of ularly vulnerable to distur	Bay are the most important Delta and offshore hab f several species. Both r bance because at these ti	nt centres of v itats are used molting and sta	waterfowl production by flocks of staging sging flocks are pert- to gather in very

The most serious potential problem is the presence of oil or fuel in offshore sites used by staging snow geese, molting ducks and geese, and staging ducks. As this is a critical waterfowl area in terms of numbers of species and individuals, extensive pollution could result in large-scale mortality in regional or flyway populations.

Frequent or long-term disturbance from people, construction activity, and production facilities within or near brant or snow goose colonies could result in large-scale production losses and possible abandonment of these colonies. Repeated disturbance from low-flying sircraft could drive nesting snows and brant off eggs or away from helpless young, leaving them open to cold weather or predators. Staging and molting ducks and geese may avoid traditional habitats if aircraft pass over often at low altitudes.

MAJOR DATA GAPS

- numbers of staging whitefronts and location of staging sites
- critical duck molting and staging sites

- description of snow goose pre-molt migration in terms of numbers and specific concentration sites

CONCLUSION

Me sites

The lover of project activities on regional waterful bopulations, barthousid those of Anaparixs lover geese and brant, could be severe and long-lasting enough to feduce their availability to residents of Tuktoyaktuk. If the present status and well-being of these populations is to be guaranteed, (a) no wells or fuel storage sites should be located where spills, ruptures, or blowuts will foot goods nesting colonies or waterfowl staging and molting habitats; (b) no major construction activity should take place within 3.2 km (2 Biles) of heating colonies of privical molting and staying habitats what birds are present; (c) wanning a pulling construction stations, processing plants and other facilities should not be located within 3.2 km (2 miles) of understations of stations (d) alread the facilities should not be located within 3.2 km (2 miles) of provide and (d) alread to be located within 3.2 km (2 miles) of provide and (d) alread to be located within 3.2 km (2 miles) of provide and (d) alread to be located within 3.2 km (2 miles) of provide and (d) alread to be located within 3.2 km (2 miles) of provide and (d) alread to be located within 3.3 km (2 miles) of or lower than 610 m (2000 feet) over goose colonies or critical motting and staging habitate want birds are present. Operations of winter seismic programs are not expected to have any measurable impact of regional populations. Prince 20 provide the set of the set o

fo not stage luei snère spille will faul critice, molitine, sessing of scaulos	Potentially inne-term	Same as preseding	Same as preceding	Staging (fuel hendiing)
habitata				
Do not locare sitte in colontes	tord≁ser#	Potential atrudun ment ar destructur of valonies	Rabitat degradation and displacement of nesting brant and snow geese	Site fevelopacit
	an an ghan an			SERIA XNURT , NOITOOD
To not logure weils or sin - lines where biowents or ruptures will foul erisin molting, nessing, or staring Saitits	8**en****119 +C17**term nt 5	Rotential (a) lande scale losats to adi- ing/staning population (b) abacaonsert of bra and anow succe colonie	Fouling or displace- ment of (a) molting and staging ducks and geese, (b) nest- ing brant and snow	Cluster facilities ind pipelinos (blow- outs of ruptures)
Do not stage fuel where spills will four orthus molting, staing or nest- ing heattets	Sime as preacting	Same as preceding	Same as proceding	Staging (ital handling)
Do not build satisfies at Roads in us nate colonics	(191-2-19) (191-2-2) (191-	Redind Accessors in the second of the second	(a) Nesting brant and anov geese (b) ducks, in order of concern	Construction of pads cluster facilities camps, processing plants
so ne build coads in cr near colonise	VIII 441 76400) 43 20 - 20 21 4 31	Loss of nears and one diction pocunitial 	Displacement of rest- ing brant and srow geese	Permanent roads (trafile)
ar səidiyirdə əlrbən:3 Jonadrirdi. Ər mini.	fotsi: 515-15: 515-1655-	Loss of nests of re- ducted prudection for answs and branci e- duced numiting voltion.	Displacement of mouth ing and chaptog center and ducks, and mosting brant and whow could	tar oplisigo enneguism
<pre>contract and a provide a provide a contract a cont</pre>	ilst.urses Attestation	ταςτυρικά ματοποτιτός αιτοστα οι 30 τίος αιτοστα το το το αιτοποτιστ	Displacement of mesta ing start was show gease	21070-14

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Proquest of Long-sern disturbance. Econ percus, intestation or obsider of and greaters resulties with or new brunt or none grade or contones with control in integersed is production losser at scretche standenment of to be contones. And and charter first lowellying sinces and the control of the second products. If each of and the helpiess young, leading and the cost of second or products. If each of and the distances. . cobustdia

CRITICAL AREAS FOR POTENTIAL USE- WATERFOWL

AREA 4: CAPE DALHOUSIE

BIOLOGICAL DESCRIPTION

Species	Activity	Abundanse	Season
Snow Goose	Staging	Potential for 150-200,000 (4)	Nid May - Early June
Brant	Nesting (and brooding) (86)	Undetermined	Late May - Mid Aug.
Ducke	Molting (oldsquaw, scaup, scoters) Staging	Potential for 600,000 (9) Patential for 1=2 million (86)	20 July - 1 Aug. Spring and Fall

Notes:

Snow geese migrating to banks Island breeding grounds have been known to stop at Gape Dalhousie during bad weather. Thus, the main use period is mid May to early Jung. In fact Cape Dalhousie lies along the major migration flyway for most waterfowl that breed along the coast or farther north; this is especially true for oldequew and eiders which move along coastal and offshore areas in spring and fall in very large numbers.

RESOURCE HARVEST

Notes:

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There is no record of any duck ar goose hunting in this area. This could be due to difficult accessibility of this area in spring. However, ducks and geess that stage and molt here are hunted in other areas.

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POTENTIAL IMPACTS

Project Activity	Major Concerns	Severity	Duration	Controls
SEISMIC OPERATIONS	None anticipated			
EXPLORATION DRILLING A JUNE STORE	<pre>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>></pre>	Potential destruct- ion and abandonment of colony	00(%) m 0ið nær Long-term	J newol ic the (selim final Do not locate gravel sites in or near brant colony
Drilling activity (blowouts)	Fouling or displace- ment of molting and staging ducks and geese and nesting brant	Potential (a) large- scale losses of molt- ing and staging birds and (b) abandonment of brant colony	Potentially long-term	Do not locate wells where blowouts will foul critical molting, nesting, or stag- ing habitats
Staging (fuel handling)	Same as preceding	Same as preceding	Same as preceding	Do not stage fuel where spills will foul critical molting, nesting or stag- ing habitats
Site development	Rabitat degredation; displacement of nest- ing brant	Potential destruction and abandonment of colonies	Long-term	Do not locate sites in brant colonies
PRODUCTION AND TRUNK LINES	a se a la contra de	and a second	an a	
Cluster facilities and pipelines (blowouts) and ruptures)	Pouling or displace- ment of molting and staging ducks, snows, and mesting brant	Potential (a) large- scale losses to molt- ing and staging pop- ulations and (b) abandonment of brant colony	Potentially long-term	Do not locate wells or pipe- lines where ruptures or blowcuts will foul critical molting, staging, or nest- ing habitats
Staging (fuel handling)	Same as preceding	Same as preceding	Potentially long-term	Do not stage fuel where spills will foul critical molting, mesting, and stag- ing habitats
Construction of: Pads, cluster facilities, camps, permanent roads, processing plants	Habitat degradation, displacement of nest- ing brant and staging snows	Potential destruct- ion of brant colony; reduced numbers of staging snows	Long-term (brant) Short-term (staging)	Do not build facilities or roads in or near colonies or critical staging sites -
Permenent roads (traffic)	Disturbance of mest- ing brant, staging snow geese	Possible abandonment of brant colony; re- duced numbers of staging snows	Potentially long-term	Do not build roads in or near colonies; schedule tzaffic flows to avoid staging snows
Operation and main- tenance	Displacement of stag- ing snows and nesting brant	Potential abandonment of brant colony; reduced numbers of staging snows	Potentially long-term	Schedule activities to reduce disturbance

Discussion:

A large segment of the snow goose and diving duck population may use coastal and offshore habitats for staging and molting in any given year. Presence of fuel or oil during use periods could foul and kill thousands of birds. Potential effects of construction, human presence, or aircraft are of some concern but are not expected to threaten the long-term stability of regional populations. Although there is no information on the size of the brant colony, it seems likely that only a small number of birds mest in the area and these should be relatively easy to avoid.

MAJOR DATA GAPS

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- Size and location of brant colony
- Specific sites used by snow geese and ducks
- Numbers and species composition of ducks

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CONCLUSIONS

Oil/gas exploration and development in the Cape Dalhousie area can be accomplished with little or no disturbance to nesting, molting, and staging waterfowl populations as long as protective measures against pollution and disturbance effects are carefully followed. These measures include: (a) no wells or fuel storage sites should be located on coastlines, river banks, or offshore areas where spills, ruptures, or blowouts will invade waterfowl concentration areas, (b) no major construction activity should take place within 3.2 km (2 miles) of critical habitats during times of waterfowl use, (c) construction camps, compressor stations, processing plants, and other facilities should not be located within 3.2 km (2 miles) of critical habitats, (d) aircraft should not be operated within 3.2 w (2 miles) of an lawor than 610 m (2000 fact) over critical habitats when waterfowl are present.

km (2 miles) of, or lower t social isverp stabol fon of ynoled finite task for hi	han 610 m (2000 mratrened	feet) over, critical hat -soursest Initeson snearnobputs bas not ynulos to	ara twoirestaw nadw agatic Displacement of nest- ing branty nebitat degradation	presenta inclusional investo
Do not incate Wells Where hrewowes Will foul ceneration multing, nesting, of Stayr 1 c habities	Potentially long-term	Potensial (a) large- scare forces of noith- ing and stating birls and (f) acaronneot of orant colony	Fouling or displayer ment of molting and staging dvoke and geecu and nesting brans	Drilling activity (blowcutg)
Do not stage fuel where spills will foul cricipal molting, menting or stage ing hasitats	inne ss pricecing	Зале за ртесекций	Same as preducing	Stading (fuel handling)
lo not cocate sites in brant colonies	ವ್ಯಾಂ <u>ತ - ಶಿ</u> ರಣಕ್ಷ	Petential destruition - and abandement of colonies	Habitat dag-adation; displacement of nest- ing brant	supplications and strain the stra
ал. 19. ш. — АР- 1		i i sana a na prin na prin	an an an ann an Anna a Anna an Anna an	COLETION AND TREEK LINES
30 1.5 locate weils of plans tines where reptures of blowers will roal stilles. molting, stading, of anar- ing habitars	şil±i:##Jo¥ TIEJ-D⊧OJ	Potenziel (a. large- scale losses to mole- ing and stagsing pop- ulations and (b) abandonnent of prest colony.	Pouling or displace- ment of wolting and staging ducks, snows, and nesting brant	Cluster facilities and pipelinad (blowouts) and ruprures)
No not stage fuel snere spills will frui cristeal moltissy, neuting, and shich ing hebitate	C tentuály Notiveza	same se presedence	Same as preceding	(gnilbaan Loui) gatgest
Do not critical factors or sound to read the start of the start of the start of the start of the	#192+9074 (256574) (276574) (27-23032 (27-242)	Potential destruct- ton of brunc oclony: reduced numbers of stiging shown	Habitat degralation, displacement of nest- ing brint and scuging snows	 >nsuruction of: facs, cluster facs, camps, permanent plants
Do mot build reads is of addr colonias; readule arating flows to syc- stating snows	Болексікі 1979 - цетв	Pessiale abandonment of breat colony, ic- duced numbers of staging snows	Distuzbance of nest- ing blant, scating snow guese	BDACY Staterys" (SITERS)
ζάμεχαιέ αστέγλετες τη Γεάμεχαι άτοτιστος	Pong-tern Iong-tern	Potential standormant of prant colony; reduced numbers of staging snows	Displacement of state ing shows and resting brant	∼alsu das noistor; Poaros

A large segment of the show youse and diving duck gopulation hay use chartal and offshore habitate for stading and mouting in any diving duck gopulation hay use chartal and off ducing use periods could fout and will the stands of billshy Potential effects of countraction, count presence, or siturate are of some concert but are not evpented to threater if i runter stability of regional populations. Although there is no information on the size of the brant colony, it scents likely that only, a stall number of his seat is the area and there should be relatively easy to avoid.

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an an a' san
- Size and location of brant colony

- Spacific sites used by snow geene and ducks

- Numbers and species composition of ducks

CRITICAL AREAS FOR POTENTIAL USE - WATERFOWL

AREA 5: BAILLIE ISLAND AND NORTHERN CAPE BATHURST

BIOLOGICAL DESCRIPTION

Species	Activity	Abundance	Season
Snow Goose	Staging (86)	Potential for 200,000 (4)	20 May - 8 June 20 Aug 10 Sept.
Oldsguaw	Molting (16)	Part of a regional pop- ulation of over 1 million	Mid July - Late Aug.
Ducks	Migration, staging (73,86)	Part of a regional pop- ulation of over 1 million (86)	Late May - Mid June Mid Aug Mid Sept.

Notes:

The area is a major migration pass for large numbers of sea ducks, many of which stage or molt in the vicinity of Baillie Island. They and the snow geese, which are part of the large Banks Island population, are present during spring and fall; however, snows frequently congregate on land whereas ducks tend to remain offshore. Of the two groups of waterfowl, the snow geese are potentially of greatest importance for human use.

RESOURCE HARVEST

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Type of Harvest:	Potential duck and goose hunting	
Season:	Nid May to Mid September	
Notes:	There used to be goose hunting on northern Cap Island when people lived in these areas.	• Bathurst and duck hunting on Baillie

POTENTIAL IMPACTS	Nator Concorne			
		Severity	Duration	CONTROLS
SEISMIC OPERATIONS	None anticipated			
EXPLORATION DRILLING Solic site pluce Drill Ref Stervey, so of critical states boyer, sriccal	and the set of the set	0 0. (d. austric runnat 1903 Potential Largewscale 0. Stadioses of moltingrand.) ge! Staging: Staks Andmitige ing snow geese	ton iwoite.ew et in Potentially: L.J dongeterm one F Ligit/ Westerer .Soare	o Do not locate sells where blowputs.willsfoul oritical o molting on staging points 575 (000 000 000 000 000 000 000 000 000 0
Staging (fuel handling)	Same as preceding	Same as preceding	Potentially long-term	Do not stage fuel where spills will foul critical molting or staging habitats
PRODUCTION AND TRUNK LINE	ŝ			
Cluster facilities a pipelines (blowouts and ruptures)	nd Fouling or displace- ment of molting and staging ducks and snows	Potential large-scale losses to molting and staging populations	Potentially long-term	Do not locate wells or pipe- lines where ruptures or blowouts will foul critical molting or staging habitats
Staging (fuel handli	ng) Same as preceding	Same as preceding	Potentially long-term	Do not stage fuel where spills will foul critical molting and staging habitats
Construction of: Pads, cluster facilities, camps, permanent roads, processing plants	Habitat degradation; displacement of stagi snows	Reduced numbers of ng staging snows	Potentially long-term	Do not build facilities or roads in critical staging sites
Permanent roads (traffic)	Displacement of stag- ing snow geese	Reduced numbers of staging snows	Potentially long-term	Schedule traffic flows to avoid staging snows
Operations and main- tenance	Same as preceding	Same as preceding	Same as preceding	Schedule activities to avoid staging snows

· Discussion:

Extensive pollution of critical offshore habitats used by staging or molting ducks is the most serious potential problem -- birds coming in contact with crude oil or large fuel spills would almost certainly die. Because of the large numbers of birds that pass through the area, losses could be great enough to noticeably reduce harvest by Tuktoyaktuk residents.

Snow geese, while extremely sensitive to disturbance when staging, are not likely to suffer large-scale losses to regional populations because of oil/ges development on Cape Bathurst. Compared to the Mackenzie Delta-Yukon coast areas, Cape Bathurst is not a critical fall staging area for snow geese arriving from Banks Island. Disturbance by aircrift or human activity would probably cause snows to leave this area for major staging sites to the wost. Blowouts and fuel spills into coastal or wetland habitats used by snows could result in direct mortality; however, this is not likely to be as serious as in the case of ducks because staging snow geese typically congregate in upland areas.

Human activity and frequent passage of low-flying aircraft will disturb molting or staging ducks and could cause them to abandon traditionally used habitats. By forcing birds to avoid favourable feeding and resting areas and by repeatedly interrupting normal behavior, molting and staging flocks squander energy reserves needed for migration or breeding. This along with the increased stress brought about by disturbance could raise mortality rates. However, it is unlikely that any noticeable decrease in regional populations would result from such disturbance.

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MAJOR DATA GAPS

- Numbers of ducks and snow geese present during any given year
- Specific concentration ereas
- Season of use by ducks
- Species composition by season

CONCLUSIONS

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Although Area 5 contains important molting and staging habitats for ducks and snow geese, oil and gas development can probably be carried out without causing major or long-term disturbance of birds during critical use periods. But it is essential that sensitive offshore habitats be protected from pollution and that aircraft stay away from waterfowl concentrations if development is to proceed. For recommended controls to be effective, it is also essential that more precise descriptions of waterfowl numbers, habitats, and use periods are obtained.

To prevent excessive disturbance of molting and staging waterfowl in the Baillie Island-Cape Bathurst area (a) no wells or fuel storage sites should be located on coastlines, river banks, or offshore areas where spils or blowouts will invade waterfowl concentration areas, (b) no major construction activity should take place within 3.2*km=(2/miles) of critical:habitats duringstines.of/waterfowl uses/ide):construction camps, compressor(1/17) Stations://piceissing/glaits, and=othermfacilities/should hotsheadocated wishim 3.3%km (2/miles) of critical-habitats (d):wireraft should motion operated within 3.2*kmb(2 miles)/pafies of located wishim 3.00 glass of critical habitats when waterfowl are present.

go not stage fuel views. spills will foul trites. bills will foul trites.	Potencially long-term	Same is preceding	Same as preseving	Staginy (fuel handiing)
				SOUCTION AND TRUNK LINES
Do not letate while of the lines where contures of plowouts will four criticat molting or stating adoltc	Sorestraily Long-term	Potential large-scale loses to molting and staging population:	Fouling or displace- ment of molcing and staging ducks and snows	Cluster facilities and pipelines (blowouts and ruptures)
Do not stays fuel viere spills will foul officel molting and staying hatitats	Potentizily iong-serm	butpaderd ar ener	Same as preceding	Scaeing (fust handling)
re seithlach facht seet roads in criticit steet sites	Potratially Icar-turn	Reduced numbers of staging snows	Habitat degradation; displacement of stanng snows	<pre>% matruction of: Pada, cluster facilities, camps, permanent roadn, processing plan*3</pre>
Schräule traffic flows to avoid staging slows	Pocenterlly	Reduced numbers of stows	Displacement of stag- ing snow geose	Verminent roads (traffic)
Schedule activities to	Same 43	entheoarg as estat	Same as preceding	

INGLIAUDA .

Extensive pollution of original offenore habitata usel by stading or moleting dreat is compare serious potential problem -- birds confing in contact with crude oil or large fuel splits vould almost cartainly die. Because of the large number, of firds that pass thouse the area; losses could be great enough to noticeably reduce harvest by luktoyadtak result to

Snow geess, while extremely sensitive to disturbance when stading, are not likely to suide large-scale losses to regional populations bocaver of oil gus development of 0 pe Sathurit, Compared to the Muckenzie Dolis-Yuke coast aros, Case Unduct is not a critical fall station area for snow geose arriving from Banks Island. Done inburce by element of or buttor scaling probably cause snow to leave this read for major stating stating static to do the vestice and fuel spills into constal or wetland paticats used by snows collected to the statice between this is not likely to be as sations as in the case of ducks because statice area typically congregate in upland area.

Human activity and frequent pratige of howstlying arroubly will disture molitic or casing ducks and could cause them to mandon traditionally used habitate. By forting biret to crott favourable feeding and resting users and of regrated in interrupting normal buistion for the and stating flocks squancer theory tradities needed for mercation of freeding. This ison with the increased stress tradies about by distribunce could relate for a reading incrude unlikely that any notionable decrease in indical population or distribute incrude and

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. Jumbers of ducks and snow geese present during any given year

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CRITICAL AREAS FOR POTENTIAL USE-FISH

AREA 6: WOOD BAY

BIOLOGICAL DESCRIPTION

Species	Activity	Abundance	Season
Whitefish	Spawning (?), feeding, overwintering	High	All year
Lake herring	Spawning (?), feeding, overwintering	High	All year

Notes: - excellent fishing potential for whitefish (broad, lake, and inconnu) and lake herring

- probably an important overwintering area
- spawning in Anderson River drainage

RESOURCE HARVEST

Type of Barvest:	Domestic fishing - potential commercial fishing
Seasons	Primarily fall and winter (43) - possibly some spring fishing
Intensity:	Low
Notes:	There is some fishing in Wood Bay by trappers who have camps in the area (43) and possibly some fishing in conjunction with spring goose hunting in the Mason River delte area. Wood Bay is thought to have a good commercial fishing potential (23).

POTENTIAL IMPACTS

Project Activity	Major Concerns	Severity	Duration	Controls
LAND SEISMIC	None anticipated			
WATER-BASED SEISMIC	No long-term concerns anticipated			
EXPLORATORY DRILLING	No long-term concerns anticipated			
PRODUCTION OPERATIONS				
Permanent roads	Siltation	Hoderate	Long-term	Location, design
Process westewater	Toxic spills	Noderate	Long-term	Location, method
TRUNK LINE	$\mathbf{A}_{i} = \left\{ \mathbf{A}_{i}^{i} \in		ал ж арана К	
Trenching	Siltation	Noderate	Long-term	Location, design
Permanent roads	Siltation	Noderate	Long-term	Location, design

Discussion:

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Because of the large size of this area and the circulation of water through the bay, fewer long-term impacts to fish caused by petroleum development are anticipated here. It is primarily because of the abundant fish population available for harvest that this area is considered critical for potential use.

Permanent roads and trenching are considered to be persistant sources of siltation. The most appropriate controls for these sources of siltation are to locate roads and pipelines away from the shoreline of Wood Bay and through areas that are not susceptible to erosion (37). In addition, adequate erosion control structures may be required in the design of these features.

Discharge of toxic process wastewater could cause impact to fish for the duration of operation of a gas or oil processing facility. The most effective control of this impact is to locate processing facilities away from Wood Bay, and dispose of process effluent by injection below the permafrost or detoxify the effluent before release into natural waterbodies.

MAJOR DATA GAPS

- importance of Wood Bay as an overwintering area

- timing and amount of fish movement between Wood Bay and the Anderson River

CONCLUSIONS

In considering only long-term impacts to fish, petroleum exploration and development activities are acceptable in and around Wood Bay if controls, that can be accommodated within the existing regulatory framework, are employed. Specifically, these controls are: appropriate location and design of road and pipeline rights-of-way to limit erosion and minimize siltation; and injecting process wastewater below the permafrost, or detoxifying before release into Wood Bay... Construction activities and permanent facilities should be located; so: that interference with mesonage use and traditional campsises is Aavoided. d. sp orde ್ ಮಾರ್ಥನ ಇಲ್ಲಿ ನಿವರಿಸಿಕೊಂಡಿಗೆ ಸಿಲ್ಲಿಗಳ ವಿಧಾನಕ್ಷ Summer in estually. the ends of a stated opti-1.545 3. 3. L low relation of stress all year upstream Palawige and an an analysic many cases and reasons and a second part of the second state of the second state of the second A BOUK AL LAND BUS CLEADER - fish pallage essential to survival of population -TESTAR BLADDER และการการการการการการการการการสู้ปกระวงสู่สุดมีสุดรู้ไปรัฐสุดสุดสุด - ระดิดตระสุดรูสุดรูสุดรูสุดรูสุดรูสุดรูก There has be limited fighted in this steps durably as this Botton River is reportedly 2015K roceive adde use 1 Gapping intensity in the Morbon River area increases. الارتفاع منتكر المراجع الدينية متنام متحاد المراجع التوريقي 270-1A DALTHAR E BURNE STR. S. elorino5 1. Sec. + 1113 SAVERSEY 4.200000 00.000 and the second sec 07:07 8 644 CONTRACTOR MON 22 40 101 CST 01 10 2 501 wateerus stades and pe-Sas giptiers BRANDES STREET POST W STATES AND THE REAL STATES basagen -ra 🗄 🚓 200 በ 300 በ 300 በ 300 በ 300 🖉 crist raid SCATOSON PREXONIC AN ONCOMEND nyissik ,nottevoi, - BERRAR CONFILMENTS SUN - SEAL SLOTSHOD PRESTS. an treat is been and extension we wante 52352 · OF 1 Sisterate where eacher was a compared by gate 1. 134. HH. ANDES BISIGER STATES D'SCRAGE MODERES Location, aveign 11. 37-3. W. mp 20 - p.5.02 Holes see 5.1t .*: " O HELSED , HOLJEDOJ a company was a second and an intervention of the second second second second second second second second second 100 L 88 8 6 6 10.0 . 5 VL:1 * The major long-term converse in this area area the polential effects of sultarion and that blockson reading that provide the state of a person on a converse of a server area in the state of the second set of th αναιαστη τος βαραφικά του ματά του βιαστος (μ). Το βίονδατά ος βίονδατα το διατίδος σύμπου του διο Αναιτικός βαραφικά του διαστος Τός παι του βιαστος (μ). Το βίονδατά ος βίρος σύμπου σύμπου του διο S. 620

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CRITICAL AREAS FOR POTENTIAL USE-FISH

AREA 7: MOUTH OF HORTON RIVER

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Notes: - "best" char river in Area A

- fish passage essential to survival of population

RESOURCE HARVEST

Notes:

Type of Harvest: Domestic fishing potential

There may be limited fishing in this area currently as the Horton River is reportedly fished to some extent by trappers in fall and early winter (43). It is not expected to become an important domestic fishing area due to its remoteness. It could, however, receive more use if trapping intensity in the Horton River area increases.

POTENTIAL IMPACTS

Project Activity	Najor Concerns	Severity	Duration	Controls
LAND SEISNIC	None anticipated			
WATER-BASED SEISNIC	No long-term concerns anticipated	•		
EXPLORATORY DRILLING	No long-term concerns anticipated			
PRODUCTION OPERATIONS			· · · · · · · · · · · · · · · · · · ·	
Permanent roads	Siltation/fish blockage	Noderate	Long-term	Location, design
Cluster facilities and	Toxicity	Hoderate	Long-term	Present controls inadequate
pipelines (blowouts and ruptures)				
TRUNK LINE				
Permanent roads	Siltation/fish blockage	Moderate	Long-term	Location, design
Trenching	Siltation	Moderate	Long-term	Location, design

Discussions

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Other harvestable fish are present in the Horton River, but only arctic char are considered here because this is the major identified arctic char river in the study area.

The major long-term concerns in this area are: the potential effects of siltation and fish blockage that may be caused by presence of a permanent road, siltation originating from trunkline trenching, and the possibility of blowouts or pipe ruptures in the estuary of the Horton River.

Siltation from roads and trenching can be controlled by locating these development features away from the river mouth. If a trunkline is to cross the river it should be upstream at a location of stable river banks, and adequate silt control structures should be employed on the right-of-way. The use of bridges for river crossings rather than causeways and culverts would minimize siltation from the crossing site, and would lessen the chance of blocking fish migrations.

Because of the importance of estuaries to anadromous arctic char life history (26), there is increased concern about the consequences of well blowouts and pipe ruptures in this area. Underwater blowouts or pipeline ruptures could cause long-term reduction of arctic char populations. Because control of this event is presently not practical, drilling and/or gathering systems are felt unacceptable in the Horton River estuary.

-8

MAJOR DATA GAPS

- size of arctic char population

- soil and bank stability in this area

CONCLUSIONS

Use of the Horton River estuary is essential to the anadromous arctic char population of this river. With controls that can be accommodated within the existing regulatory framework, petroleum exploration and development is acceptable within this river drainage. Specifically, these controls are: appropriate location and design of road and pipeline rights of way to limit erosion and minimize siltation; and appropriate location and design of road and pipeline river crossings to avoid blockage of char migrations.

Petroleum exploration and development activities are not acceptable in the Horton River estuary because control of blowouts and ruptures is presently inadequate.

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