A Marine Protected Area for the Beaufort Sea:

Multiple Account Evaluation

Prepared for:

BSIMPI Working Group

Inuvik, NWT

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Preface

Canada Department of Fisheries and Oceans retained GSGislason & Associates to summarize and assess the environmental, economic, and social impacts of a proposed Marine Protected Area (MPA) in NWT for the Beaufort Sea Integrated Management Planning Initiative (BSIMPI) Working Group.

The consultants have benefited from discussions with Inuvialuit people, the private sector, and government. Several individuals provided comments on a draft of the report. Notwithstanding this assistance, the authors have final responsibility for the analyses and conclusions of the study.

Executive Summary: Multiple Account Evaluation of the Proposed MPA for the Beaufort Sea

1. Background

- The federal government is considering establishing a Marine Protected Area (MPA) in the Mackenzie Delta-Beaufort Sea region
- The Beaufort Sea Integrated Management Initiative (BSIMPI) Working Group is tasked with making a recommendation on the proposed MPA.
- Three assessment reports (ecological, technical, and socio-economic) as well as a community consultation program on the proposed MPA have been completed.

2. Study Objectives and Approach

- Objectives
  - To synthesise material from studies and interviews into a concise document that focuses on key areas
  - To use a Multiple Account Evaluation (MAE) framework with four accounts – environmental, economic value, regional development, and social/cultural – to assess impacts
- Approach
  - Review over 25 studies and reports
  - Visit Inuvik, Yellowknife, and Calgary to interview Inuvialuit, government, and private sector interests

3. Rationale for an MPA

- Concern primarily for the conservation and protection of beluga whales and their habitat
- The MPA area accounts for 95% of the annual subsistence harvest of 110 belugas; the warm, shallow, turbid waters of the MPA are unique ecosystems that support moulting, feeding, and calve-rearing

4. Changes in Allowable Activities with an MPA

- Main potential industry impact on oil and gas exploration, development, and production
- Uncertainty exists over whether feeder pipelines will be allowed and how activity outside the MPA will be affected

5. Impacts of an MPA

- oil and gas scenario
  - 5 years planning, 7 years construction, 25 years operation to build and operate pipeline and gas fields
  - base case of 10,950 bcf production over 25 years, price of $3.50 per Mcf in Alberta ($Cdn 2002)
- environmental impacts
  - stronger, legal protection for the beluga (existing guidelines are voluntary under Beluga Management Plan)
  - consistent with precautionary principle in the *Oceans Act*
- economic value impacts
  - prevent potential erosion of net subsistence benefits of $2 million NPV ($Cdn 2002) from 25% decline in access to beluga populations
  - potential net losses of $11 million NPV ($Cdn 2002) from 1% loss in energy production
- regional development impacts
  - prevent potential erosion in subsistence impacts of $5 million GDP, $5 million wages, 200 person-years (PY) employment over 2008 to 2039 period
  - potential loss in oil and gas impacts of $400 million GDP, $77 million wages, $120 million in government revenues, and 1,570 PYs employment over 2008 to 2039 period
  - net loss in jobs and wages in NWT much less due to preferential hiring of northerners
- social, cultural, community impacts
  - preserve culture as well as beluga population
  - enhance self-confidence, self-esteem through the use of Inuvialuit Traditional Ecological Knowledge
  - consistent with community views and aspirations

6. Conclusions

- an MPA will enhance environmental and social values but at some cost in economic values and regional development
- potential to mitigate many of the negative effects

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Acronyms

AOI	*Area of Interest*
APG	*Aboriginal Pipeline Group*
BSBMP	*Beaufort Sea Beluga Management Plan*
BSIMPI	*Beaufort Sea Integrated Management Planning Initiative*
CAPP	*Canadian Association of Petroleum Producers*
CCBA	*Comprehensive Co-operation and Benefits Agreement*
CERI	*Canadian Energy Research Institute*
COGOA	*Canadian Oil and Gas Operations Act*
COPE	*Committee for Original Peoples Entitlement*
COSEWIC	*Committee on Status on Endangered Wildlife in Canada*
DFO	*Canada Department of Fisheries and Oceans*
DIAND	*Canada Department of Indian Affairs and Northern Development*
EISC	*Environmental Impact Screening Committee*
EL	*Exploratory Licence*
FJMC	*Fisheries Joint Management Committee*
GDP	*Gross Domestic Product*
GNWT	*Government of Northwest Territories*
HTC	*Hunters and Trappers Committee*
IFA	*Inuvialuit Final Agreement*
IGC	*Inuvialuit Game Council*
IRC	*Inuvialuit Regional Corporation*
ISR	*Inuvialuit Settlement Region*
JS	*Joint Secretariat*
MAE	*Multiple Account Evaluation*
MPA	*Marine Protected Area*
NEB	*National Energy Board*
NPV	*Net Present Value*
NWT	*Northwest Territories*
RWED	*Department of Resources, Wildlife, and Economic Development of GNWT*
SDL	*Significant Discovery Licence*
SMC	*Senior Management Committee (of BSIMPI)*
TEK	*Traditional Ecological Knowledge*
WG	*Working Group (of BSIMPI)*

1. INTRODUCTION

Background

1.1 The federal government, in partnership with the Inuvialuit and the oil and gas industry, is considering establishing a Marine Protected Area (MPA) in the Mackenzie Delta-Beaufort Sea region. This area is home to the world's largest summering stock of beluga whales. The area also offers the potential for significant oil and natural gas development.

1.2 An MPA is an area of the sea under Canadian jurisdiction that has been designated for special protection under the 1997 *Oceans Act*. The process for establishing and managing an MPA involves six steps (DFO, 1999):

1) Identification of Area of Interest (AOI)
2) Initial Screening of the AOI
3) AOI Evaluation and Recommendation
4) Development of a Management Plan
5) Designation of the MPA
6) Management of the MPA

1.3 The Beaufort Sea MPA is presently at Step 3. Under Step 3, three assessments have been completed: an ecological assessment (North South, 2002), a technical assessment (Elliot, 2002), and a socio-economic assessment (Kavik-AXYS, 2002). Community consultations on the proposed MPA were held in January and February 2003. A renewable resource assessment is currently being prepared.

1.4 The Beaufort Sea Integrated Management Initiative (BSIMPI) was created in June 2000 to guide initiatives related to the development of management planning processes for ocean-related activities in the Beaufort Sea. The Senior Management Committee (SMC) of BSIMPI created a Working group (WG) to implement activities in support of SMC priorities. In particular, the BSIMPI WG has been tasked with making a recommendation to the SMC on the proposed Beaufort Sea MPA.

1.5 If the BSIMPI WG makes a positive recommendation to the SMC and the SMC accepts it, then the Fisheries Joint Management Committee (FJMC) on behalf of the SMC will advise the DFO Minister of the intent to take the proposed MPA into the regulatory process.

Study Objectives

1.6 The intent of this study, conducted for the BSIMPI WG, is to synthesize the detailed material from the three assessments and community consultations and, where needed, to extend the analysis so that the BSIMPI WG can focus on the key elements of concern in making its recommendation.

1.7 In this work, we use a Multiple Account Evaluation (MAE) impact framework, a method to display systematically a range of impacts associated with development projects.

1.8 This study develops a framework for organizing information and the anticipated impacts of an MPA designation under different objectives or "accounts" and identifies key impacts for each account.

Work Program

1.9 The consultant reviewed the three reports (ecological, technical, and socio-economic), the results of the consultation exercise, as well as other related material (see Bibliography).

1.10 The consultant made a presentation to the BSIMPI WG at its November 2002 meeting in Inuvik.

1.11 The consultant also visited Inuvik, Yellowknife, and Calgary in February 2003 to conduct interviews with some Inuvialuit members of the Fisheries Joint Management Committee (FJMC), Inuvialuit Game Council (IGC) and the Inuvialuit Regional Corporation (IRC), and with private sector oil and gas interests and government. A total of fourteen individuals were interviewed (see Interview List at end of the report).

Report Outline

1.12 The next section presents the setting for the MPA assessment including the rationale for the MPA. The remaining sections of the report are:

Section	Topic
2	The Setting
3	Multiple Account Evaluation
4	Conclusions

Figure 1 at the end of this section gives a map of the proposed MPA areas.

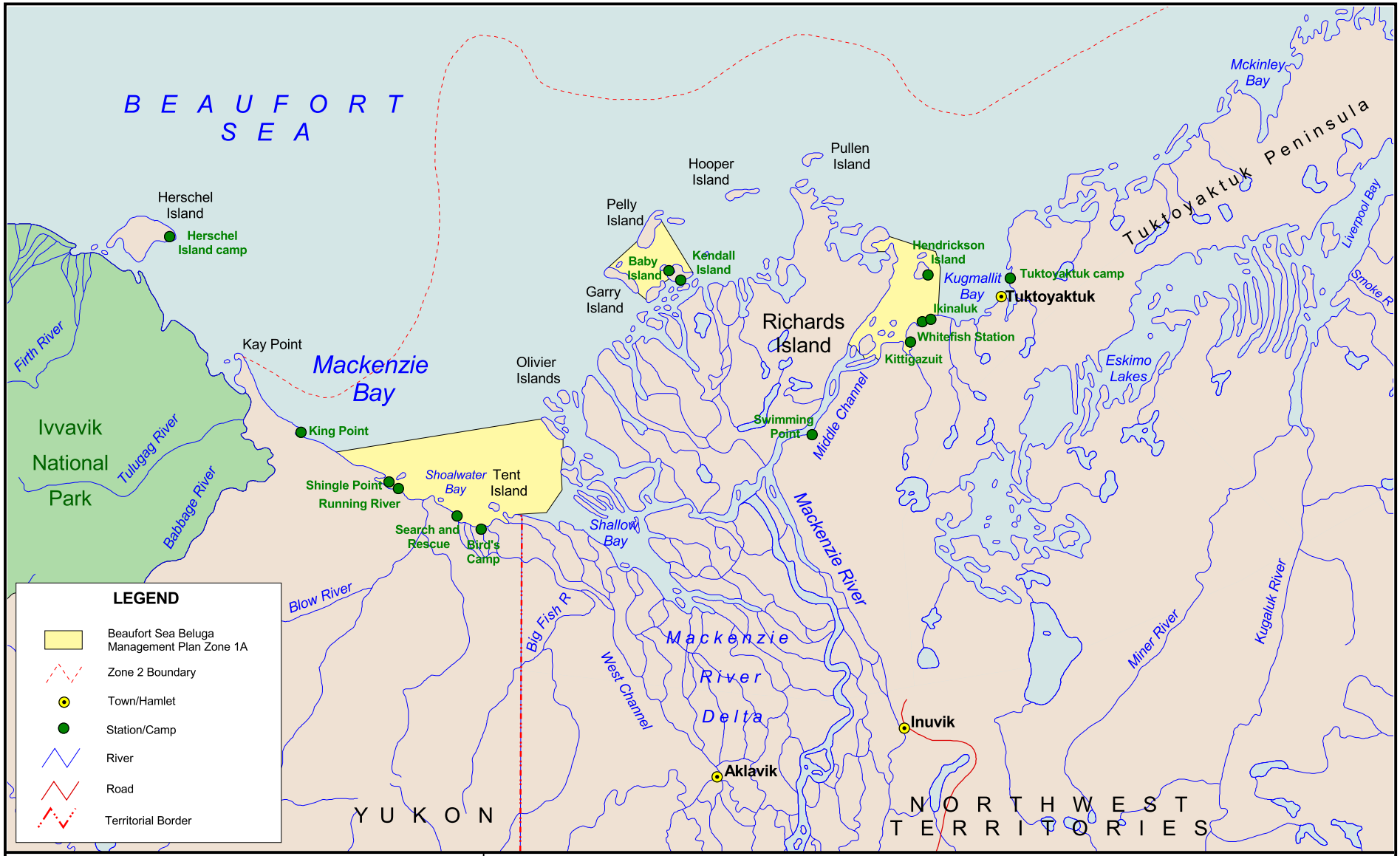

Figure 1.
Beaufort Sea MPA Area of Interest
Regional Study Area

2. THE SETTING

2.1 Several scientific and policy studies over the past 30 years have identified the need to protect beluga whales and beluga whale habitat in the Beaufort Sea (Elliot, 2002). For example, the Berger Inquiry recommended the establishment of a whale sanctuary in West Mackenzie Bay (Berger, 1977).

The AOI and the Inuvialuit Settlement Region

2.2 The candidate Area of Interest (AOI) for an MPA comprises three separate marine areas within the Beaufort Sea totaling 1,716 km^2. See Figure 1 at the end of Section 1:

- Shallow Bay within Mackenzie Bay (1,160 km^2),
- The Kendall Island area (193 km^2), and
- Kugmallit Bay (363 km^2)

The three areas are identical to the protected area Zone 1(a) under the Beaufort Sea Beluga Management Plan (BSBMP). The Fisheries Joint Management Committee (FJMC) has responsibility for the Plan.

2.3 The Zone 1(a) boundaries under the BSBMP were developed based on interviews with the Inuvialuit and other "Traditional Ecological Knowledge" or TEK. The areas of whale concentrations were confirmed through visual surveillance of beluga populations from aircraft.

2.4 The BSBMP followed from the 1984 Inuvialuit Final Agreement (IFA). The IFA was signed by the Committee for Original Peoples Entitlement (COPE), Government of Canada, Government of Northwest Territories, and Yukon Government. Under the IFA, a comprehensive lands claim agreement, the Inuvialuit received substantial co-management responsibilities for marine mammals, fish, and wildlife in the Inuvialuit Settlement Region (ISR) in the Western Arctic. The ISR covers 906,460 km^2.

2.5 People and businesses in and around three western Arctic communities – Aklavik, Inuvik, and Tuktoyaktuk –could be potentially affected by the MPA designation. None of the three communities lie within or immediately adjacent to the Zone 1(a) areas and coastline. However, the Inuvialuit people from these communities travel to the AOI seasonally where they participate in subsistence activities such as beluga wale harvesting during late June to August. And, businesses use the area as a transportation corridor for marine shipping, tourism ventures, and other endeavors. Oil and gas development in the area has the potential to generate substantial jobs and income to the people, business, communities, and governments of the north.

Human Activity in the AOI

2.6 Subsistence activities involve food production, food consumption, and more. The main subsistence activities in and around the Zone 1(a) areas are:

- Marine mammal harvesting – beluga whales, seals.
- Fish harvesting – whitefish, inconnu, dolly varden, cisco.
- Hunting – caribou, polar bears, grizzly bears.
- Geese and waterfowl harvesting – snow geese, Canada geese, mallards.
- Trapping – muskrat, fox.

All five are high-valued activities in AOI.

2.7 In particular, some Inuvialuit rely heavily on beluga whales as a winter food. And the Zone 1(a) areas are very important beluga harvesting areas – about 110 belugas have been harvested annually in recent years (Harwood and Smith, 2002).

2.8 Subsistence activities also provide very important social and cultural benefits to the Inuvialuit people through:

- Distribution – sharing of food among an extended family.
- Cultural expression – linkages to traditional lifestyles and ancestors.
- Socialization – integrating young people into work roles and the community.

These benefits are in addition to the food value of subsistence activities.

2.9 Businesses that rely on the marine environment and that could be potentially affected by the MPA designation include: 1) commercial fisheries, 2) oil and gas, 3) mining, 4) marine shipping, and 5) marine tourism.

2.10 Currently, there are no commercial fisheries in the area and the extent of mineral deposits is unknown.

2.11 Barges travel through Kugmallit Bay to deliver supplies to the coastal communities, defense installations, and oil and gas exploration sites. No tourism operations presently conduct boat tours to Zone 1(a) areas, although these areas are used as transportation corridors (Kavik-AXYS, 2002).

2.12 The sector potentially most affected by an MPA designation is the oil and gas sector. The Beaufort Sea has no producing wells yet, but the onshore Ikhil gas field supplies the community of Inuvik. The Beaufort Sea has been explored and significant discoveries of both oil and gas have been made including in the Kendall Island Zone 1(a) area (NEB 1998). There are also significant discoveries immediately adjacent to Zone 1(a) areas.

2.13 The future production of oil and gas in the Mackenzie Delta and Beaufort Sea is highly dependent on the construction of a pipeline. (Presently, there is no method to deliver gas and oil to market.)

2.14 Under the BSBMP guidelines, the oil and gas industry has voluntarily refrained from exploration work in the sensitive Zone 1(a) areas, but has requested permission to conduct seismic work.

Rationale for an MPA in the Beaufort Sea

2.15 The 1997 *Oceans Act* gives five (5) conservation and protection reasons for establishing an MPA – see Exhibit 1.

2.16 The proposed Beaufort Sea MPA scores highly on two of the five criteria, namely: Criteria 1) the conservation and protection of commercial and non-commercial fishing resources, including marine mammals and their habitats, and Criteria 3) the conservation and protection of unique habitats.

2.17 The rationale for the MPA is primarily for the conservation and protection of the non-commercial beluga fishery and important beluga habitat. The three Zone 1(a) areas are the areas where 95% or more of the subsistence harvest occurs and areas where belugas for centuries have returned each summer from late June to mid August. The warm, brackish, turbid, shallow, sand or coarse bottomed waters are unique ecosystems to support moulting, feeding, and calve-rearing of belugas. No other areas or estuaries of the Arctic Coast have this variety of conditions (North/South, 2002).

Exhibit 1: Reasons for Establishing an MPA in the Beaufort Sea

Section 35(1) of the Oceans Act defines an MPA as: an area of the sea...(that) has been designated...for special protection for one or more of the following reasons:

Reason ***Conservation & Protection of***	***Score for AOI***
1. Commercial and non-commercial fishing resources, including marine mammals and their habitats	*High*
▪ significant for beluga whale - *significant subsistence harvest in AOI (approximately 110 animals annually)* - *whales have returned to and harvesting has occurred in the same areas for hundreds of years* ▪ less significant for other species - *other mammals – AOI too shallow for bowhead whales, seals* - *fish – some subsistence harvesting, e.g., whitefish, inconnu, cisco* - *birds – snow geese harvest occurs on land*	
2. Endangered or threatened marine species	*Low*
▪ beluga whale populations are healthy ▪ some COSEWIC-listed species utilize habitat in or near AOI - *Eskimo curlew ("endangered")* - *Ross's gull ("threatened")* - *polar bear and ivory gull ("special concern")*	
3. Unique habitats	*Very High*
▪ significant for beluga whale - *three AOI areas are warmer, more turbid, less saline, and more shallow than rest of Mackenzie River estuary* - *warm water essential for rearing newborns* - *three AOI areas are summer home to largest stock of beluga whales in the world* - *no other areas of Arctic Coast have this variety of conditions* ▪ less significant for other marine species - *AOI provides overwintering habitat and migratory corridor for anadromous fish (including only known populations of northern Dolly varden)* - *AOI provides moulting, brooding, brood rearing, feeding and staging habitat for 35 species of waterfowl and seabirds* - *nearby Kendall Island Migratory Bird Sanctuary established in 1961*	
4. Marine areas of high biodiversity or biological productivity	*Low*
▪ biodiversity in AOI is not exceptional ▪ AOI characterized by low biological productivity	
5. Other marine resources or habitat necessary to fulfill mandate of the Minster of DFO	*Mid*
▪ promote scientific research ▪ support existing management initiatives, e.g., BSBMP ▪ AOI has potential to serve as benchmark/reference area for scientific monitoring, e.g., climate change	

Source: Derived form information in:
North South Consultants. "Ecological Assessment of the Beaufort Sea Beluga Management Plan Zone I(a) as a Marine Protected Area of Interest, " Report prepared for Fisheries and Oceans Canada, October 2002.

3. MULTIPLE ACCOUNT EVALUATION OF THE PROPOSED MPA

3.1 There is a need for an analysis tool that outlines the anticipated impacts – environmental, social, economic – of the proposed Beaufort Sea MPA in a consistent and transparent manner.

Evaluation Framework with Four Accounts

3.2 Multiple Account Evaluation (MAE) is a method for systematically displaying a broad spectrum of impacts associated with development projects or policy initiatives. An MAE framework organizes project information and anticipated impacts under different objectives or "accounts".

3.3 MAE makes the trade-offs between accounts/objectives transparent. But, MAE says nothing about how to arrive at a decision. MAE does not offer a process to choose from competing proposals since MAE does not have any explicit weighting and rating scheme for the various accounts. This is both an advantage and disadvantage.

3.4 Under the MAE approach, one develops a base case scenario of economic, social, and environmental activity/well-being in the absence of the proposal, in this case the MPA designation, and then develops the alternative scenario with the development. The impacts then are the differences between the "with" and "without" scenarios i.e. MAE focuses on incremental effects.

3.5 Our MAE framework for analyzing the potential Beaufort Sea MPA designation has four accounts:

- Environmental
- Economic value
- Regional development
- Social & cultural

3.6 The **environmental account** addresses potential impacts on natural resources in the area, including marine mammals, fish and other wildlife. The account can also address biodiversity, preservation and other indicators.

3.7 The **economic value account** distills in dollar terms the societal benefits less costs of the initiative. Social benefits include both market and non-market (intangible) benefits while social costs are the opportunity costs of capital, labour and resources in their next best alternative use. Benefits and costs incurring at different times are adjusted to a base year value through discounting, e.g. a net present value or NPV (similar to discounting car or mortgage payments to arrive at an equivalent lump sum purchase cost).

3.8 The **regional development account** measures the direct impacts of the MPA designation on the economy. Impacts include key economic indicators such as Gross Domestic Product (GDP), Labour Income (wages and benefits), employment, and government revenues/royalties. GDP is the sum of Labour Income and Business Income (interest payments, depreciation, pre-tax profits) and is the most comprehensive measure for describing the size of the economy.

3.9 The **social and cultural account** identifies the impacts on people and communities in terms of traditional lifestyles, social disruption, culture and heritage, etc. In many cases, social indicators are descriptive in nature rather than numerical.

3.10 The economic value and regional development accounts are more amenable to numerical measurement than are the social and environmental accounts. One should strive to quantify as much as possible impacts and effects under all four accounts. However, if impacts under one account cannot be quantified, this does not mean that such impacts necessarily are less significant or important than impacts that can be quantified.

Changes in Allowable Activities with an MPA

3.11 Exhibit 2 presents a scenario for allowable activities in the AOI under an MPA and identifies any changes from the "status quo" present situation. The scenario is developed from DFO community consultation materials on the proposed MPA. The actual list of allowable activities will be developed by regulation if the concept of creating an MPA is endorsed.

3.12 Subsistence harvesting of beluga whales and other marine mammals, fish and wildlife still will be allowed under an MPA.

3.13 No significant changes in shipping and dredging, port development, mining, commercial fishing and tourism will occur as a result of the MPA. For example, shipping through Kugmallit Bay to supply northern communities with dry goods and fuel will still be allowed. There will likely be some seasonal restrictions on tourist operations in the area, as currently exist under the BCBMP

3.14 The main potential impact of the MPA designation will be on oil and gas exploration, development, and production. Presently, there are two Significant Discovery Licenses or SDLs, both held by Suncor Energy Inc., that overlap a portion of the AOI. The two SDLs cover 3,025 hectares in total, of which 2,000- 2,500 hectares intrude into the AOI (Elliot, 2002). Both SDLs are in the Kendall Island area.

SDL # 028*	1,809 ha	Suncor Energy Inc.
SDL # 025	1,216 ha	Suncor Energy Inc.

* lies completely within the Kendall Island Zone 1(a)

Even with an MPA, as the Suncor SDL #28 was discovered many years ago before the 1997 *Oceans Act* was passed, the company has a legal right to the hydrocarbon resources associated with this SDL (and may be entitled to produce these resources under a Production Licence).

There are also several SDLs immediately adjacent to the AOI. New SDLs may be declared based on exploration around the AOI. (These SDLs may extend into the AOI.)

Exhibit 2: Scenario for Changes in Allowable Activities in Zone 1(a) Areas under an MPA - Preliminary

Activity	*Impact of the MPA on Activity Within Zone 1 (a)*
Traditional Activities	
1. Subsistence Harvesting	*No change, i.e., will still be allowed*
Business Activities	
2. Oil and Gas	
▪ Seismic	*No change, i.e., will not be allowed, except potentially one time winter seismic to fill in gaps on reserves maps.*
▪ Drilling	*No change, i.e., vertical drilling will not be allowed in MPA, but where SDL straddles boundary directional drilling will be allowed from outside the MPA into the MPA portion of the SDL.*
▪ Feeder pipelines	*??? (presently not allowed)*
3. Shipping and Dredging	*No change, i.e., will be restricted to designated lanes*
4. Port Development	*No change, i.e., will not be allowed*
5. Mining	*No change, i.e., will not be allowed*
6. Commercial Fishing	*No change, i.e., can not occur without EISC approval (no commercial fishing presently occurs)*
7. Tourism	*No change, i.e., during late June to mid August 1) boating tourists will not be allowed 2) airplanes will observe a minimum flying height (both provisions exist under the BSBMP)*

Source: DFO community consultation materials 2003.

Note: 1. Present moratoriums on oil and gas and tourism activities in the area are prohibited under the BSBMP (but the BSBMP encompasses guidelines not regulations)

2. All activities presently requiring permits or licenses will still require these regulatory approvals even with an MPA. An MPA does not regulate activities outside its boundaries – any restrictions on activities around an MPA will fall to other regulatory processes.

3.15 Exploration licenses (ELs) are licences that give a company the right to explore an area for oil and gas deposits. Exploration licences are split into two phases – the first five years in which a company must drill a well at a minimum, an event which then allows the company to extend the EL for another four years. ELs surround and abut the north, south and western boundaries of the Kugmallit Bay Zone 1(a). There may be some overlap between two exploration licenses and the Kendall Bay Zone 1(a). There are also some exploration licenses northeast of Shallow Bay Zone 1(a).

3.16 In many cases, an energy company will directionally drill from a single platform to the extremities of a reservoir within its license; directional drilling can offer both cost savings and a smaller footprint on the environment. The DFO information package suggests such directional drilling from outside the MPA boundary into the MPA will be allowed for the two SDLs. (A company would not drill directionally beyond the borders of its SDL area.)

3.17 Our discussions with the oil and gas industry highlight the uncertainty over what an MPA means in practice. In particular, industry desires clarity on several fronts including:

- whether feeder pipelines will be allowed in the AOI – feeder pipelines would be buried beneath the ocean floor and carry oil and gas from outside the AOI to land.
- whether the MPA would affect activity outside the AOI.

3.18 With respect to the former issue, it appears that feeder lines through the AOI may only be an issue in the Kendall Island area, and several options for routing exist. With respect to the latter issue, there will be no buffer zone around an MPA – an MPA does not regulate activities outside its boundaries

3.19 Other regulatory processes apply to activities within an MPA as well as the surrounding area. For example, the Environmental Impact Screening Committee (EISC) makes recommendations on development proposals in the ISR, and the EISC solicits input from the Fisheries Joint Management Committee (FJMC) and the Inuvialuit Game Council (IGC) before making any recommendations. The review of development proposals outside an MPA can and will look at impacts within the MPA.

3.20 Industry also indicates that the majority of activity in the Beaufort Sea is conducted by multinational companies that have investment opportunities and properties around the world. Beaufort Sea developments compete for scarce investment dollars with those global opportunities and the Beaufort Sea is a harsh, high cost place to operate. Uncertainty concerning the regulatory environment in the Beaufort Sea, if it is increased under the MPA process, could result in investments being diverted elsewhere. As well, loss of even a small amount of reserves could affect investor perceptions (DIAND, 2003).

A Focus on Belugas and Oil & Gas Activity

3.21 Exhibit 2 suggests that the key changes in activity and behavior with an MPA fall mainly to the oil and gas sector. The rationale behind the MPA is largely tied to protecting and conserving the beluga subsistence fishery and beluga habitat.

3.22 For this reason, our discussion to follow on the effects of the proposed MPA on the four accounts of interest – environmental, economic value, regional development and social and community – focuses on these two areas.

MAE – Environmental Impacts

3.23 The beluga whale population of the Beaufort Sea is healthy and not endangered. The most recent index of abundance is 19,000+ belugas of which the Inuvialuit harvest is about 110 annually (Harwood and Smith, 2002). The stock is thought to be much larger as the abundance survey did not cover the entire summer range or whales below the surface. The minimum estimated population of belugas is 32,000+.

3.24 The BSBMP has voluntary guidelines on allowable activities in the three Zone 1(a) areas – seismic drilling is not allowed under the guidelines. The oil and gas industry has respected the Zone 1(a) areas and BSBMP guidelines. The Hunters and Trappers Committees (HTCs) of Aklavik, Inuvik, and Tuktoyaktuk have developed guidelines for beluga hunting practices (Day, 2002). In short, there is voluntary self-regulation of the beluga harvest. There is no annual quota.

3.25 An MPA will strengthen the BSBMP through concrete regulation and would provide legal protection to the stock. It is unclear whether voluntary compliance with the BSBMP guidelines is sustainable or would hold in the long run. But beluga have legal protection under Marine Mammals Regulations, *Fisheries Act*. The MPA designation would enhance this protection.

The creation of an MPA is also consistent with the precautionary principle, a key cornerstone of resource management under the Oceans Act.

3.26 The relationship between beluga whales and the Beaufort Sea, especially the AOI, is unique (Harwood and Smith, 2002).

- The belugas migrate from wintering areas in the Bering Sea in early spring and travel in a northeasterly direction offshore of Alaska to their summer range in the Beaufort Sea and Amundsen Gulf.
- They congregate in nearshore habitats and estuaries during these summer months of late June to August, and also use the offshore during this time.
- The warm, shallow, less saline waters of the three Zone 1(a) areas in the Mackenzie River estuary are unique conditions for the animals to moult, feed on fish, and rear their calves (no other areas in the Western Arctic have this variety of conditions).
- The return migration to the Bering Sea starts in late August.

3.27 Beluga whales communicate and detect noise at higher frequencies than other marine mammals in the Beaufort such as bowhead whales (Lois Harwood, DFO, pers. comm.). Underwater noise from oil and gas activity in the AOI has the potential to disturb the belugas, which in turn could affect moulting, feeding, calving, and rearing activities and possibly disturb subsistence harvesting. However, the belugas are present in Zone 1(a) only seasonally, and this creates the opportunity to mitigate potential effects by scheduling work outside the time that they are present (late June to mid-August).

3.28 The effect of the MPA on seal, fish, polar bear, and other animal populations is thought to be limited in the AOI (North/South, 2002).

3.29 In conclusion, the MPA will bring much stronger, legally enforceable conservation and protection to beluga whale populations and their habitat, and would be consistent with the precautionary principle. This is important as the belugas and the habitat in the AOI are unique and irreplaceable.

MAE – Economic Value Impacts

3.30 Economic value is the difference between societal benefits and costs from the MPA initiative. Because subsistence harvesting is an ongoing activity whereas oil and gas development is finite, it is necessary to adjust subsistence and oil and gas values to a common base year through discounting, i.e., to derive a net present value or NPV. We employ a real, inflation-adjusted discount rate of 6%, i.e., the nominal non-inflation adjusted discount rate is essentially 6% plus the inflation rate.

3.31 Our assumptions on the timing of oil and gas development are:

- a planning horizon of 5 years through 2007,
- a 7 year construction period 2008-2014 for the gas pipeline and gas field development, and
- a 25 year operating period from 2015 through 2039.

The discounted dollar values from subsistence in perpetuity are compared to the discounted dollar values from the oil and gas development though 2039.

Subsistence Harvesting

3.32 In the late 1990s, an estimated 170 tonnes (170,000 kg) edible weight of marine mammals and fish was harvested annually for subsistence use in the Western Arctic, including 110 belugas at 335 kg edible weight each (37 tonnes). The harvest figures exclude harvests of a very small amount of marine birds. The figures also exclude harvests of caribou and other terrestrial animals (see Exhibit 3).

3.33 From the beluga, the Inuvialuit prepare muktuk (blubber or fat), oil, dried meat, and a variety of other food products. Muktuk in particular is a preferred food, and a food that the Inuvialuit have eaten for hundreds of years.

Exhibit 3: Estimated Subsistence Use of Marine-Related Mammals and Fish in NWT in the Late 1990s – Preliminary

THREE YEAR AVERAGE HARVEST		
Whales	- Beluga	110
Seals	- Ringed	900
	- Bearded	20
Polar Bear		55
Fish	- Char	9,000
	- Whitefish	28,000
	- Lake Trout	4,000
	- Other Finfish	34,000
EDIBLE WEIGHT ('000s kg)		
Mammals	- Beluga	37
	- Other	23
Fish		110
		170

Source: *GSGislason & Associates Ltd. "The Marine-Related Economy of NWT and Nunavut", December 2002 as derived from Inuvialuit Harvest Study Reports (1997, 1998, & 2000) for species except polar bear; GNWT RWED "Summary of Harvest Data for Species under Quota in the Inuvialuit Settlement Region, July 1997 to June 2002" for polar bear (includes sports harvest)*

Notes: *1. Edible weights per animal from: Peter J. Usher, "Standard Edible Weights of Harvested Species in the Inuvialuit Settlement Region", June 2000.*

2. The NWT Harvest Study covered six communities – Holman, Paulatak, Sachs Harbour, Tuktoyaktuk, Inuvik, and Aklavik.

3. The important social and cultural values from subsistence activities are not reflected in the harvest numbers.

3.34 The total harvest of marine mammals and fish is worth an estimated $3.4 million annually, based on $20 per kg as the replacement cost of food protein in local food stores. The figures exclude the value from the use of animal hides, bones, and other byproducts for clothing, arts and crafts, etc. The beluga share of the $3.4 million is 22% or $0.74 million.

3.35 The $20 per kg valuation reflects both the high cost of food in the North and the high protein content of country food. In the smaller northern communities, food costs are twice or more than those in Southern Canada (NWT Bureau of Statistics). The protein content of country food such as beluga whale and fish is approximately 60% greater than for domestic meats such as beef, pork, and poultry on an equivalent weight basis (see Usher 1976).

3.36 Subsistence harvesting also provides very important social and cultural benefits to aboriginal people. These non-economic benefits are substantial and may even exceed the benefits of subsistence as a food source. Berger, Usher and others have argued that it is better to estimate the replacement food costs of subsistence, and appreciate the limitations as a measure of "value" rather than to not value subsistence at all (Berger 1977, Usher 1976). We follow this approach.

3.37 The costs of subsistence harvesting in the North have been estimated as 25% of value (Usher 1976). Therefore, the net economic value of the subsistence harvest is $2.6 million annually (75% of $3.4 million). The discounted value of this is $46 million ($Cdn 2002)

3.38 The beluga economic value based on food value (net) alone is $0.56 million annually, or 22% of the $2.6 million total subsistence value (net). For the purposes of this study, we estimate the beluga "economic value" at risk to be one-quarter of the beluga economic value, or $0.14 million. This loss in value results from reduced harvests and/or increased costs of harvesting, i.e., the beluga could move from traditional territories. We assume that the risk starts with the development phase in 2008. The discounted value of this risk is about $2 million ($Cdn 2002).

3.39 The very important social, cultural, and community benefits from beluga are discussed later.

Oil and Gas Activity

3.40 Wright Mansell Research Ltd. conducted an economic analysis of the construction and operation of the Mackenzie Valley Pipeline and gas fields (Wright Mansell, 2002). They assume production of 438 bcf/year for 25 years, or 10,950 bcf in total (310 billion m^3). The delivered price in Alberta is $ 3.50 Cdn 2002 per Mcf in the analysis.

3.41 The net benefit to Canada from the total Mackenzie Delta-Beaufort Sea development and sale of 310 billion m^3, based on Wright Mansell analysis, is estimated to be $1,100 million (discounted $Cdn 2002). This is the return over and above a normal return based on a real discount rate of 6%. (The net benefit includes royalties paid plus private sector investment benefits.) The net return figure would be much larger if the normal return at 6% had not been netted from the calculation.

3.42 The lost production from the two SDLs overlapping the AOI would likely be no more than 1% of total production.

3.43 If the regulations under the MPA allow feeder lines, or such lines can be easily rerouted around the AOI, and if regulations on activities in areas adjacent to the MPA are not onerous, then volume of gas foregone or lost through the MPA would likely be less than 1% of total reserves. In addition, loss of economic access to the AOI could be mitigated by facilitating exploration and development outside the MPA.

3.44 The loss from 1% foregone energy production under an MPA is about $11 million NPV (discounted $Cdn 2002), i.e., 1% of the $1.1 billion above.

MAE – Regional Development Impacts

Subsistence Harvesting

3.45 The direct economic impacts of the subsistence harvest of marine mammals and fish of Exhibit 3 have been estimated (Gislason, 2002). Summing these annual estimates over the 37 years 2003 to 2039 results in:

GDP	$94 million
Labour Income	$94 million
Employment	3,700 person years

There are approximately 400 subsistence active harvesters in the north (Usher 2002). We assume that 4 harvesters represent one PY.

Subsistence activities are not jobs *per se*, but involve significant non-economic attributes tied to social and cultural factors. Subsistence benefits a much larger group than indicated above because subsistence harvest is shared among the family and the community including elders.

3.46 The beluga "resources at risk" component of the impact total above during the 32 years development plus operations phase - $5 million GDP, $5 million wages, and 200 person years of employment (over the 2008 to 2039 period).

Oil and Gas Activity

3.47 Exhibit 4 gives the economic impacts of the 7 year construction phase and 25 year operation phase of the Mackenzie Valley gas pipeline and gas fields (Wright Mansell Research Ltd., 2002).

3.48 Total construction and operation impacts to NWT and Canada are very large (see Exhibit 4).

	NWT	**Canada***
GDP	$33.9 billion	$40.2 billion
Labour Income	$3.9 billion	$7.7 billion
Government Revenues	$10.4 billion	$12.1 billion
Employment	72,400 PYs	157,200 PYs

* Canada impacts include impacts to the NWT. Most of the non-NWT impacts accrue to Alberta.

Exhibit 4: Direct Impacts of Mackenzie Delta Pipeline and Gas Development

	Pipeline		Gas Field		Total	
	NWT	**Canada***	**NWT**	**Canada***	**NWT**	**Canada***
7 Year Construction Impacts						
Capital Costs	3,017	3,283	4,330	4,330	7,347	7,613
GDP	879	2,127	2,068	3,239	2,947	5,366
Labour Income	636	1,444	1,505	2,260	2,141	3,704
Government Revenues	224	554	511	841	735	1,395
Employment (PYs)	11,354	28,782	27,867	47,354	39,221	76,136
25 Year Operation Impacts						
Output / Revenues	10,666	11,714	24,544	24,544	35,210	36,258
GDP	9,748	11,441	21,161	23,380	30,909	34,821
Labour Income	401	1,028	1,373	3,008	1,774	4,036
Government Revenues	1,751	2,204	7,852	8,507	9603	10,711
Employment (PYs)	8,166	21,091	25,049	59,988	33,215	81,079
Total 32 Year Impacts						
Investment/Revenues	13,683	14,997	28,874	28,874	42,557	43,871
GDP	10,627	13,568	23,229	26,619	33,856	40,187
Labour Income	1,037	2,472	2,878	5,268	3,915	7,740
Government Revenues	1,975	2,758	8,363	9348	10,338	12,106
Employment (PYs)	19,520	49,873	52,916	107,342	72,436	157,215

** Canada figures include the NWT*

Note: Financial figures in millions $Cdn 2002; employment in person-years (PYs).

Source: Wright Mansell Research Ltd. "An Evaluation of the Economic Impacts Associated with the Mackenzie Valley Gas Pipeline and Mackenzie Delta Gas Development", May 2002.

3.49 The NWT shares of total employment above (about 50% of construction and 40% of operations) are consistent with our investigations and recent industry experience in the North (see for example, Chevron et al 2001). Each petroleum company operating in the ISR must submit a Comprehensive Cooperative and Benefits Agreement (CCBA) to DIAND for its proposed operation under the *Canada Oil and Gas Operations Act* (COGOA). The agreements include preferential hiring and training for Northerners.

3.50 The "oil and gas impacts at risk" then would be 1% of those presented in Exhibit 4 as foregone production will likely be less than 1% of total reserves. At the Canada level that represents $400 million in GDP, $77 million in wages, $120 million in government revenues, and 1,570 PYs of employment.

3.51 The losses in economic activity to NWT will be less than the 1% loss figure for Canada. There are labour supply constraints in NWT related to both skill shortages and the sheer number of workers required for such a large project (Wright Mansell 2002)). Due to preferential hiring practices, most of the loss in jobs would fall to southern Canadians and not northerners.

MAE – Social and Cultural Impacts

3.52 Twenty-five years ago, Thomas Berger documented the importance of and interrelationship between the land, culture, social values and subsistence for the people of the Western Arctic (Berger 1977). Some of the analysis which helped to frame his recommendations was:

- *The native peoples of the North have values that are in many respects quite different from our own. These values are related to the struggle for survival waged by their ancestors and they persist in their struggle today to survive as distinct peoples.*
- *The land is an old friend and an old friend your father knew, you grandfather knew, indeed your people always have known.*
- *… not like the white people. We worry about our land because we make our living off our land. The white people, they live on money. That's why they worry about money.*
- *The native peoples identity, pride, self respect and independence are inseparably linked to the land and a way of life that has land at its centre.*
- *The tradition of sharing is seen by native people is an essential part of their cultural inheritance.*
- *There exist among the native people a special respect for the old. The elders are their historians, the keepers of their customs and traditions. They are respected for what they are, for the experience and the knowledge that their age has given them, and for all that they can in turn give to others.*
- *The native people of the North insist that they have the right to transmit to future generations a way of life and a set of values that give coherence and distinctiveness to their existence as Dene, Inuit and Metis.*

- *Although it is important to adopt an appropriate standard to measure the native economy and the value to be imputed to country food, quantification by itself is not enough. We should not allow the figures of measurement to obscure the qualitative importance of country food and of the way of life that is associated with it. The figures do not show how much native people prefer country food to store-bought food. Not only does country food taste better to them, but virtually all country food has far greater nutritional value than processed and packaged foods bought in stores. Still more important, these figures do not and cannot indicate the intrinsic importance of hunting, fishing and trapping as social and cultural activities. Neither do they nor can they indicate the value to the native hunter of the environment that provides these resources.*

- *Throughout the Western Arctic there exists an elaborate network for the exchange of country produce.*

- *White people, in general, are driven by economic and social values that are very different from those that motivate native society.*

3.53 Our discussions with the Inuvialuit during this study confirmed that these comments on social and cultural values and ties to the land are still largely valid today.

3.54 Belugas are special to the Inuvialuit. Beyond their importance as a food, belugas are part of the intrinsic identity of the people. Belugas are both a strong spiritual symbol and a focal point of traditional activities. Belugas are a rich part of cultural heritage and psyche of the Inuvialuit. Their ancestors used the same whaling camps and used the same food preparation techniques for muktuk and dried meat as the Inuvialuit of today use. Losing this rich endowment seems unthinkable.

3.55 The summer beluga harvesting activity, a family and household activity, helps the Inuvialuit to pass down values, tradition, and knowledge to their children and helps the Inuvialuit to maintain ties to the land. Beluga harvesting also helps to link households through sharing, exchange and partnership. Muktuk and meat is shared with elders. Beluga harvesting requires a level of knowledge, skill, and cooperation not necessarily required in harvesting terrestrial resources.

3.56 The Inuvialuit see the social and cultural values associated with the commercial harvest of beluga as more valuable than the food value.

3.57 Any disruption or threat of disruption to these traditional activities diminishes the culture. The Inuvialuit see an MPA as a mechanism that can strengthen the protection of both the beluga **and** their culture.

3.58 Our interviews also suggest that the creation of an MPA will empower the Inuvialuit and improve their self-esteem. It will prove to the people that they can have influence. It will validate Traditional Ecological Knowledge or TEK, perhaps for the first time in a major decision making forum. A large part of Inuvialuit TEK is tied to the beluga and the AOI boundaries were determined based on TEK.

3.59 Community consultations were held in January and February 2003. Subsequently the BSIMPI Working Group received letters supporting the establishment of the MPA from nine (9) community groups – three organisations (Community Corporation, Elders Committee, Hunters & Trappers Committee) from each of three communities (Aklavik, Inuvik, and Tuktoyaktuk).

3.60 In conclusion, the creation of the MPA will enhance social and cultural values of the Inuvialuit, increase their self-esteem, and be consistent with and endorsed by community views and aspirations.

4. CONCLUSIONS

4.1 Exhibit 5 summarizes the results of the MAE framework for the proposed MPA from the material in Section 3 under four accounts: environmental, economic value, regional development, and social/cultural.

4.2 The main rationale behind the MPA is tied to strengthening protection for beluga whale populations and their habitat.

4.3 Proceeding with the MPA results in gains to the environmental and social/cultural accounts at the expense of losses to the economic value and regional development accounts. The gains in the environmental account accrue to society at large. The gains in the social/cultural account accrue to Inuvialuit people.

4.4 The economic value and regional development account losses accrue to the oil and gas industry and to the economy at large through lost production or stranded reserves and associated foregone economic activity. Due to labour supply constraints in the north and the preferential hiring of northerners, most of any loss in jobs would fall to southern Canadians and not northerners.

4.5 There is potential to mitigate the effects on the oil and gas industry since the belugas are in the area only seasonally from late June through mid August, e.g., industry could schedule activities outside that period.

Exhibit 5: Multiple Account Evaluation of the Proposed MPA - Summary

	Status Quo	*Impacts of MPA*
Environmental	***Beluga Status***	***Beluga Impacts***
	▪ healthy population of 32,000 + ▪ population concentrated in AOI ▪ AOI is unique habitat ▪ voluntary compliance under BSBMP	▪ stronger, legal protection under MPA ▪ practice precautionary principle ▪ without MPA beluga could be dispersed from traditional areas
Economic Value	***Subsistence Harvesting***	***Beluga Harvesting Gains***
	▪ 170 tonnes edible weight marine mammals and fish annually ▪ 110 belugas harvested annually represent 37 tonnes or 22% of this ▪ net economic value of all marine mammal and fish harvests of $46 million NPV $Cdn 2002 (beluga share is $5 million) ▪ this valuation excludes crucial social and cultural values	▪ 25% of beluga harvests at risk from oil and gas production ▪ potentially $2 million net value NPV at risk from beluga relocation from Zone 1(a) areas from time development starts
	Oil and Gas Activity	***Oil and Gas Losses***
	▪ 310 billion m^3 of gas extraction over 37 years – 5 years planning, 7 years construction, 25 years production ▪ $1,100 million net value NPV ($Cdn 2002) from building and operating pipeline and gas fields	▪ 1% of total reserves at risk of being stranded ▪ loss of $11 million NPV ($Cdn 2002) or 1% of total
Economic Impacts (37 Year Totals)	***Subsistence Harvesting***	***Beluga Harvesting Gains***
	▪ $94 million GDP ▪ $94 million wages ▪ 3,700 PYs employment	▪ $5 million GDP ▪ $5 million wages ▪ 200 PYs employment
	Oil and Gas Activity	***Reduced Oil and Gas Activity***
	▪ $40 billion GDP ▪ $7.7 billion wages ▪ $12.1 billion government revenues ▪ 157,200 PYs employment	▪ 400 million GDP ▪ $77 million wages ▪ $120 million government revenues ▪ 1,570 PYs employment
Social and Cultural	***Inuvialuit Status***	***Inuvialuit Impacts***
	▪ strong social and cultural values to Inuvialuit ▪ link to ancestors and traditional lifestyles ▪ the land is an intrinsic part of identity, self-respect, and way of life.	▪ strengthen cultural values ▪ validate TEK, promote self-esteem ▪ consistent with community views and aspirations

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List of People Interviewed

Name	***Affiliation***	***Location***
*Aviugana, Donald**	*Aklavik HTC*	*Aklavik*
*Brackman, Cal**	*GNWT Oil & Gas*	*Yellowknife*
*Connelly, Roger**	*IRC*	*Inuvik*
*Day, Billy**	*FJMC & Inuvik HTC*	*Inuvik*
Greenall, Wayne	*DIAND*	*Ottawa*
Harwood, Lois	*DFO*	*Yellowknife*
*Lypkie, Bob**	*Suncor Energy Inc.*	*Calgary*
*Millman, Peter**	*Devon Canada Corp.*	*Calgary*
*Newman, Carol**	*CAPP*	*Calgary*
*Pokiak, Frank**	*IGC & Tuktoyaktuk HTC*	*Tuktoyaktuk*
Scott, Ian	*CAPP*	*Calgary*
*Tardiff, Andy**	*IRC Representative*	*Inuvik*
*Taylor, Tim**	*Petro-Canada*	*Calgary*
*Richard Zieba**	*GNWT*	*Yellowknife*

** face-to-face meeting*