Socio-Economic Overview Report of the Proposed Qikiqtait Marine Protected Area

Contents

Introduction

Internationally, Canada made a commitment to establish a network of Marine Protected Areas (MPAs) at the 2002 World Summit on Sustainable Development, and in the 2004 United Nations Convention on Biological Diversity Program on protected areas. The current Government has put forward mandate commitments to protect 25% of Canada's oceans by 2025 and 30% by 2030. The establishment of an MPA (or other such protection) through regulations requires a socio-economic analysis as part of the federal regulatory analysis process set out by the Treasury Board of Canada Secretariat. This socio-economic scan profiles the economic activities of key interested parties (including regulatory authorities, stakeholders and Indigenous organizations) linked to the larger geographic area within which the study area may be located.

The socio-economic overview of the Qikiqtait was developed by the policy and Economics sector of the Ontario and Prairie Region of Fisheries and Oceans Canada, in consultation with other sectors of the department including Marine Planning and Conservation, Science, and Resource Management. Key elements of the report were: (i) the need for further information to support the refinement of geographic boundaries, the assessment of regulatory options for cost-effectiveness, and consultation; (ii) key points where socio-economic information can help meet client needs; and (iii) a common understanding of the information that can be provided at the various stages of MPA development. This socio-economic overview report was created for the intents of establishing a Ministerial Order MPA. Should future protections be sought for the area, the report will be updated with the most up-to-date information available.

The Qikiqtait and the Belcher Islands Area of Interest (AOI) have been identified as a potential area for protection considerations. The Qikiqtait and Belcher Islands are a distinctive geographic and oceanographic region in Southeast of Hudson Bay spanning from the north end of James Bay in the south to Inukjuak in the north (Yurkowski et al., 2023). The archipelago covers approximately 3,000km of land and a total area of approximately 13,000 square kilometers. The AOI was identified as a potential area for protection based on its ecological and biological significance, diversity of marine wildlife, and support from the Regional Inuit Association, the Qikiqtani Inuit Association (QIA). While there is support for conservation measures within the area, the QIA would like to see the AOI protected as an Indigenous Protected and Conserved Area (IPCA).

The Qikiqtait AOI hosts the Belcher Islands, an archipelago of approximately 1,500 islands. These islands and their associated channels and fjords allow for the formation of biologically important recurring polynyas (DFO, 2011 and Yurkowski et al. 2023). These polynyas act as critical over-winter habitat for beluga and walrus, provides important feeding grounds for polar bears, as well as support large populations of eiders. The area supports high benthic diversity and is a feeding and calving area for a proportion of Atlantic Walrus, Bearded Seal, Beluga, Polar Bear, and Ringed Seal (Yurkowski et al., 2023).

Objective of the Socio-Economic Overview Report

The socio-economic overview of the Qikiqtait area provides an early identification of past, current, and potential future (limited to ten years into the future) social and economic activities linked to the geographic area within the community-driven protected area in and around[1] Belcher Islands. The overview is guided by the Fisheries and Oceans Canada (DFO) framework for integrating socio-economic analysis in the marine protected areas designation process, and by the Treasury Board of Canada Secretariat's *Canadian Cost-Benefit Analysis Guide For Regulatory Proposals*. Fisheries and Oceans Canada will consult with communities on a draft report to ensure it is an accurate description of the activities that have, and may, take place within the AOI - as well as to identify gaps that may exist in the report's content. Although the model for the creation of a protected area is yet to be determined by DFO and partners, the development of a socio-economic overview will assist with any regulatory protection measure that is pursued; as such, for the sake of this report, the steps when discussing MPA designation will be followed, as similar steps will be needed for other effective area-based conservation measures.

Should future federal regulatory measures be required, the information contained in the report will in part inform the regulatory triage statement as required by federal regulatory policy, and may be used to inform consultations. Additionally, this report will serve as the policy and economic baseline for potential future Cost-Benefit Analysis (CBA) if this type of analysis is required, in the subsequent steps of the effective area-based conservation designation process. If necessary, A CBA which will evaluate the incremental impacts (costs and benefits) of the regulatory intent for the proposed MPA Regulations will be finalized in the future to assist in the development of the Regulatory Impact Analysis Statement. The Socioeconomic Overview Report is also intended to provide information to partners to support their consideration of long-term marine conservation and protection in the area.

Methodology

The Framework for Integrating a Socio-Economic Analysis in the MPA Establishment process (henceforth DFO, 2016a) is aligned with the federal regulatory policy in the Cabinet Directive on Regulation (CDR) and the accompanying guidance documents developed by Treasury Board of Canada Secretariat (TBS), (henceforth referred to as TBS, 2007). This framework also informs the scope and content of this analysis.

The methodology adopted for the analysis is the Total Economic Valuation (TEV) technique (see Matrix 1), which relates all benefits to human welfare measures. The economic valuation method was chosen because (i) it is defined as the sum of benefits involved and can be used to assess economic benefits quantitatively or qualitatively; (ii) it allows for a robust measurement and comparison of values and presents these values in terms that people are familiar with; and (iii) it is both logical and comprehensive, due to its foundations in microeconomic theory, emphasis on marginal values, and inclusion of all aspects of the associated values. Moreover, since the TEV approach is followed by economists in valuing environmental goods and services, the relevant literature could be consistently analyzed using this framework.

[1] The socio-economic scan considers a potential management zone for the area of the Belcher Islands and the immediately surrounding waters.

To determine economic activities within the AOI, the Socioeconomic Overview Report considers past, present, and future activities. The current activities occurring within the AOI are those that have occurred within approximately the last 5 years. However relevant historical activities were also included in the report where appropriate. Additionally, potential future economic activities within the next ten years which have evidence of intent (e.g., leases, permits, submission of plans for approvals, etc.) were included in the report where information was available.

The socio-economic overview of the Qikiqtait AOI was developed in consultation with the Marine Planning and Conservation Program in terms of scope of the study and boundaries.

Data Sources

The data used to develop the community profiles around the AOI primarily came from demographic surveys conducted by the Nunavut Bureau of Statistics and the Canada 2021 Census. Other sources of information and data came from the Government of Canada, Government of Nunavut, industry and corporations, boards, academic researchers, and consultants.

While the extant literature provides limited data on the Qikiqtait area specifically, where appropriate, the report used information available at relevant publicly-accessible websites and in the literature as secondary sources of information. Moreover, where quantitative information was lacking within the report, qualitative assessments were used.

Supplementary reports and consultations with subject matter experts have been used to provide a quantitative and/or qualitative assessment of the future economic activities linked to the Qikiqtait area. Additionally, critical information and expert opinions were also obtained from various sources such as, Fisheries and Oceans Canada's Arctic Region's Resource Management Programs and Marine Planning and Conservation, Ontario and Prairie and Science Programs, and other various Government of Canada Departments.

Of note, the COVID-19 pandemic saw restrictions and subsequent impacts to social and economic activities across the globe. These impacts were also seen within Nunavut, the Qikitani Region, and even the AOI. Some data from 2020 to 2022 within this report may not be representative of a typical year as government restrictions and personal preferences may have influenced the ability or desire to participate in various activities.

All materials consulted or cited in the creation of this Socioeconomic Overview Report can be found in the bibliography, personal communications, and annex sections at the end of this report.

Demographic Profile of the Study Area

This section presents an overview of the AOI including community profiles, government and organizations, and baseline management measures.

Communities

The Qikiqtait AOI encompasses the Belcher Islands and the community of Sanikiluaq. The Belcher Islands are a group of approximately 1,500 small islands. The islands cover about 13,000 square kilometers. The Belcher Islands are known for their unique geology, which includes some of the oldest rocks in the world, dating back more than 2 billion years. The islands are also a home to a variety of wildlife, including polar bears, walruses, and numerous bird species. The area has been inhabited by Inuit for thousands of years, and continue to live there today. The only community within the borders of the AOI is that of Sanikiluaq. It is the southernmost community in Nunavut and is located on the North coast of Flaherty Island in Hudson Bay. The people of Sanikiluaq call themselves Sanikiluarmiut, meaning "people of the islands" (Qikiqtani Inuit Association, 2014).

Table 1: Summary of Demographic Profiles of Sanikiluaq and Nunavut

	Sanikiluaq	Nunavut	**Canada**
Population (2021)	1,010	36,858	36,991,981
Population (2016)	882	35,944	35,151,728
Age 15+ (%)	61	67	84
Inuit (%)	94	84	0.19
Labour Force Participation Rate (%)	48	59	64
Employment Rate (%)	36	49	57
Median Employment Income ($)	14,800	38,000	37,200

According to the 2021 Statistics Canada census (Statistics Canada, 2021), Sanikiluaq's population is 1,010, of which about 61% is age 15 or over, and approximately 94% are Inuit. Sanikiluaq has an employment rate of 36%. Most of the people employed work in education, law and social, community and government services, sales and service, and trades, transport and equipment operators and related occupations. The closest communities to Sanikiluaq are three Quebec coastal communities, Kuujjuarapik, Umiujaq, and Inukjuak, all of which are within 230 kilometers of Sanikiluaq (Figure 1).

The populations of Nunavut and Sanikiluaq are relatively young with populations being under the age of 15 being 33% to 42%, compared to 16% for Canada as a whole. This presents both opportunity and challenges for Nunavut and Sanikiluaq. One of the greatest opportunities is that there will be an available, young labour force when they come of age. However, with this cohort's relatively low employment and participation rates, there may not be enough jobs or job training available. In addition, one of the greatest challenges that faces Nunavut's younger population is housing affordability – this does not only impact youth, but younger populations have a significantly higher affordability challenge. In 2020, 76% of Nunavut households with a younger population were unable to secure housing in 2020

(CMHC, 2022). The Canada Mortgage and Housing Corporation found that in 2020, the minimum household income required to afford a bachelor rental unit was $70,000 and that the minimum household income required to afford a single-detached home was $166,000 (CHMC, 2022). Housing affordability challenges persist in the territory in part due to limitations of development of new housing – new development has been restricted due to high costs of construction and inadequate availability of land (CMHC, 2022).

When assessing Gross Domestic Product (GDP) of provincial and territorial economies from 2021-2022, Stats Canada found that Nunavut's economy advanced 1.6% following growth of 7.9% in 2021 (Bossé, 2023). Mining, quarrying, and oil and gas extraction rose 5.3% as all industries expanded. The construction sector registered a decline of 9.2%. Regarding service sectors, the largest gains were in industries that were recovering from the COVID-19 pandemic related restrictions; transportation and warehousing had a 35.5% increase and accommodation and food services increased by 25%. Real estate and rental leasing, wholesale trade, and retail trade all declined by 7.2%, 32.6% and 6.1%, respectively (Bossé, 2023).

Northern communities, such as Sanikiluaq, typicallyhave mixed economies featuring both "land-based" economy (e.g., fishing, hunting and trapping, sewing, arts and crafts, informal childcare) and wage economy (Vard, 2016; and Conference Board of Canada, 2023). The high price of importing goods into these communities due to their remoteness means individuals often supplement their incomes and diets with traditional country foods, crafting, or other traditional activities such as clothes making. Based on 2017 data, 83.3% of Inuit aged 25 to 54 living in Nunavut participated in one or more land-based activities. A total of 26.2% of those individuals participated for financial compensation or to supplement their existing income (Arriaga and Bleakney, 2019).

Government and Other Organizations

There are numerous levels of government and governmental organizations, non-government and community organizations with potential relevance to the Qikiqtait area. Details of the relationship between these organizations and the Qikiqtait area are highlighted in Annex 1.

It is important to note that on January 18, 2024, the Government of Nunavut, Nunavut Tunngavik Incorporated, and the Government of Canada co-signed the Nunavut Lands and Resources Devolution Agreement. This Devolution Agreement will transfer responsibilities over lands, resource management and rights in respect to waters; associated with this are provisions to assist with timelines, management of resources (human resources, assets, records, etc.), and funding to support the transfer. The parties involved will continue to collaborate to complete the transfer of responsibilities by April 1, 2027. This is notable as the implications of devolution will have socio-economic impacts on Nunavut and the Area of Interest. This agreement includes the management of small and enclosed bays, as such, small and enclosed bays have been excluded of the Qikiqtait MPA.

Infrastructure

All infrastructure within the Qikiqtait can be found in and around Sanikiluaq. A local co-op building offers a site for the trade of goods and foods. In the past, examples of goods include local crafts such as baskets made from lyme grass, stone carvings, and winter clothes made from eider down[2]. The

[2] http://www.sanikiluaq.ca/i18n/english/index.html

community also has two schools that support the education of the residents of Sanikiluaq. The Sanikiluaq airport is operated by the Government of Nunavut and receives semi-regular flights arriving from Winnipeg, Manitoba and Montreal, Quebec. The airport is primarily used for passenger transport while providing some cargo based opportunities for smaller goods. Lastly, Sanikiluaq utilizes an open beach area for marine shipment activities (e.g. Sea Lift). As of June, 2023, the community has also installed floating docks that can accommodate 10 to 11 boats – the community is hoping this will not only support harvesting efforts but increase the possibilities for tourism (Nunavut News, 2023). There is an ongoing project since 2019 to integrate clean energy into Sanikiluaq's existing diesel grid in efforts to achieve high diesel displacement. Natural Resources Canada and the Nunavut Nukkiksautiit Corporation have partnered to establish ten 100kW wind turbines and a complimentary battery energy storage system – this will generate approximately 4,500,000 kWh of energy annually, replacing approximately 50% of currently used diesel fuel (NRCAN, Website). In 2021, the Qikiqtaaluk Business Development Corporation announced $6.5M in funds from Natural Resources Canada to support the wind and battery energy storage project in Sanikiluaq (QBDC, 2021). Through personal e-mails, a representative of Nunavut Nukkiksautiit Corporation confirmed that construction began in 2023 on the access road for the Anuriqjuak Nikkiksautiit Project, as per the Nunavut Planning Commission/NIRB approvals – the company expects construction to continue throughout 2024.

Typical capital assets for subsistence and commercial activities in arctic communities include freezers, carving equipment, carpentry items, sewing machines, skin stretchers, drying racks, equipment repair tools, camping equipment, etc. Larger capital assets generally used for hunting purposes include boats, snowmobiles, all-terrain vehicles (ATV), motors, rifles, fishing nets, anchors, etc. (Kennedy, 2010).

Marine infrastructure in Nunavut's population centers is very minimal and is designed primarily for basic community freight needs. This infrastructure is critical as communities depend on the annual marine supply for food, vehicles, construction materials and other commodities that are not economically feasible to be shipped by airplane (Government of Nunavut, 2012). A protected area (MPA/IPCA) has the potential to increase ecotourism due to the preservation of natural ecosystem. It is estimated that ecotourism is among the largest sectors with respect to the ocean economy, making up approximately 50% of all global tourism (Morse et al., 2024). It is believed that moving forward, the addition of the already installed floating docks in Sanikiluaq will help support eco-tourism within the AOI (Nunavut News, 2023). It is known to QIA that the community has a desire to further advance marine infrastructure by requesting for a small craft harbour to be developed near Sanikiluaq to support socio-economic activities within region.

Air transport infrastructure provides a critical component to the Nunavut's economy. It allows for inter-community passenger flights, the movement of freight, and air ambulances (Government of Nunavut, 2021). With no road infrastructure connecting to other communities, and sealifts being restricted to summer to early fall, air transportation provides the only dependable year-round transportation option (Government of Nunavut, 2021). However, Sanikiluaq's airport has a gravel runway that is suitable for smaller aircraft (Aarluk Consulting Incorporated, 2011 and Government of Nunavut, 2021), restricting the size of goods to small-to-medium sized items. Whereas the Rankin Inlet airport is the only Nunavut airport nearby that has an asphalt runway suitable for servicing larger aircraft such as a Boeing 737-

400[3]. While flights are limited, members of Sanikiluaq have previously expressed a desire for a direct flight to Iqaluit and other communities within the Qikiqtani Region.

Representatives from QIA had brought forward information relating to interest in establishment of fibre optics within the area. Surveys have been carried out within the current boundaries, future efforts relating to the potential laying of fibre optic lines is an ongoing activity. In addition, QIA brought forward that there is a sealift improvement project for Sanikiluaq that is in design phases – This project will include expansion of laydown area for sealift cargo, reduction of barge pushout, improvements to existing sealift ramp, and lighting, fencing, and signage. It is believed that this project would have components that fall within the current boundary.

Baseline Management Measures

Marine wildlife and habitat within the Qikiqtait is managed through a combination of legislation, regulatory and non-regulatory measures, integrated fisheries management plans (IFMP), and other measures. These measures and plans pertain to fishing, harvesting, conservation, resource use, resource extraction, and marine transportation.

Key federal legislation and regulations with management authority over the waters of the Qikiqtait include the *Oceans Act*, the *Fisheries Act*, Marine Mammal Regulations, , *Species at Risk Act*, *Canada Shipping Act, 2001*, *Arctic Waters Pollution Prevention Act*, the *Migratory Birds Contraventions Act,* the Nunavut Land Claims Agreement, and The *Nunavut Act*.

Territorial legislation and regulations include The *Nunavut Wildlife Act,* Northwest Territories Fishery Regulations (enabled by the *Fisheries Act*) and the *Nunavut Planning and Project Assessment Act*.

There is an IFMP for Atlantic Walrus. IFMPs generally contain management measures such as stock status, harvest levels, shared stewardship arrangements, monitoring and reporting, licensing, sale and transportation, and habitat/ecosystem protection.

There is currently no Land Use Plan that impacts the Qikiqtait area. However, a draft Nunavut Land Use Plan is currently under consideration. During community consultations, when asked about sustainable economic development, Sanikiluaq community members identified the following as important to consider beyond those that were presented to participants: commercial fisheries, Eider duck down areas, soapstone areas, and beach grass material for baskets. The Nunavut Planning Commission believes that oil and gas and mineral exploration for the development of these resources would lead to the betterment of Inuit communities (Nunavut Planning Commission, 2021). In June 2023, a recommended Nunavut Land Use Plan was submitted to the Government of Canada, Government of Nunavut, and Nunavut Tunngavik Inc. for acceptance; if accepted, this proposed land use plan would apply to the Qikiqtait AOI.

The Nunavut Impact Review Board (NIRB) assists with the assessment of development within the Nunavut Settlement Area. The NIRB utilizes potential biophysical and socio-economic impacts of proposals and makes recommendations and decisions on which projects may proceed; projects with

[3] The Boeing 737-400 is the Critical Aircraft of Rankin Inlet. Critical aircraft are aircraft identified as having the most demanding operational requirements with respect to the determination of movement area dimensions, and other aerodrome physical characteristics at the aerodrome or part thereof (Canadian Aviation Regulations).

potential impacts on marine wildlife and habitat, such as mining projects, are required to develop a Shipping Management Plan in accordance with the *Canada Shipping Act*, the *Arctic Waters Pollution Prevention Act,* and associated regulations. The NIRB also has the authority to impose terms and conditions on a project certificate. Proponents are required to comply with these conditions and provide regular reports. This process aims to ensure that adverse social, economic, and environmental impacts of projects are effectively mitigated.

The most relevant treaties, codes, and agreements for the Qikiqtait area include the United Nations Convention on the Law of the Sea (UNCLOS), Convention on Biological Diversity (CBD), The International Code for Ships Operating in Polar Waters (Polar Code), the Migratory Bird Treaty, the Agreement on the Conservation of Polar Bears, the Convention on Persistent Organic Pollutants, the International Code for Ships Operating in Polar Waters (Polar Code), the Agreement on Cooperation on Aeronautical and Maritime Search and Rescue in the Arctic, the Agreement on Cooperation on Marine Oil Pollution Preparedness and Response in the Arctic (MOSPA), and the Agreement on Enhancing International Arctic Scientific Cooperation.

Additionally, in December 2016, the Government of Canada announced that the Canadian Arctic Ocean will be indefinitely off limits to new oil and gas exploration licensing. Since then, the moratorium has been extended until December 31, 2028, at which point it is expected to be extended (SOR/2022-274). However, this moratorium is only applicable to frontier lands and waters under the administration of the Minister of Northern Affairs and does not apply to the Qikiqtait area.

Overview of Current and Predicted Future Economic activities in and Around Qikiqtait by Sector

There is minimal economic activity occurring within Qikiqtait, with the majority being found in Sanikiluaq. The remote location, harsh environmental conditions, and low population are being identified as main reasons for limited economic activities in the study area.

This section includes a discussion on the current state of different sectors in the potential Qikiqtait area which may be considered as baseline situations of the uses of the area. The discussions of sectors/activities included in this section are: Commercial and Emerging Fisheries, Subsistence Harvesting, Oil and Gas, Mining, Shipping and Other Vessel Activities, Recreational and Tourism Activities, and research activities.

Commercial and Emerging Fisheries

From a preliminary scan, no commercial harvest data for the study area has been captured within DFO's Fisheries Management and Harvest Information System (FMHIS). However, it is believed that there are local sales of fish harvests within the community of Sanikiluaq; further exploration into the extent of these possible fisheries is required.

According to a staff member of the Hunters and Trappers Association , there is great interest by the community of Sanikiluaq to establish a multi-species commercial fishery surrounding the Belcher Islands targeting scallops, sea cucumbers, and possibly sea urchin. Community interest in developing this fishery has been consistent since the 1980's and there is a desire for the fishery to be as sustainable as possible; as such, research has continued to determine sustainability and feasibility. Current research efforts include enhanced bathymetry mapping, productivity of scallop beds and sea cucumber nurseries, and an estimation of the communities subsistence harvest of these species. To explore viability of this fishery, the World Wildlife Fund and the local Hunters and Trappers Association have all contributed to exploratory work (Pers. Comm. Hunters and Trappers Association, 2023). To advance understanding of the viability of a fishery, the community is seeking to obtain an exploratory permit for the 2024 season to harvest Scallops from in and around the Belcher Islands. This exploratory permit will allow a greater understanding of the feasibility and process to ensure a successful small scale commercial fishery. However, no application for a fishery licence or permit has occurred to date. Additional efforts by the community include updating the community freezers to become both a processing facility along with repaired freezers to become compliant to the Canadian Food Inspection Agency standards (Pers. Comm. Schroder, 2020 and Pers. Comm. Hunters and Trappers Association, 2023). Ideally, should a commercial harvest commence, the scallop harvests would be distributed locally and regionally throughout Nunavut while the sea cucumbers market would primarily be international with a focus on Asian markets; in addition, potential buyers from the USA have already expressed interest in the potential products offered by this fishery (Pers. Comm. Hunters and Trappers Association, 2023).

Currently, harvest efforts have been focused primarily towards providing subsistence to community members. The use of homemade hand dredges to harvest scallops has occurred for decades near the Kataaluk region of the Qikiqtait Islands; harvest of sea cucumbers is also done utilizing hand nets (Pers.

Comm. Hunters and Trappers Association, 2023). In addition, testing of multiple fishing equipment is underway (e.g., use of hand dredges), currently the community utilizes a 3 foot scallop dredge – it is estimated that this dredge can be filled in 5 to 15 minutes of slow trawling efforts. Should a commercial fishery become a viable option, the community would consider the purchase a larger boat, or lease vessel time, that could accommodate a married 2-3 3 ft scallop dredges; however plans have not been fully established to date(Pers. Comm. Hunters and Trappers Association, 2023). Bycatch from scallop fishing is echinoderms and cnidaria while bycatch from sea cucumber harvest are mussels and urchins; echinoderms and cnidaria are returned to the ocean unharmed whereas mussels and urchins are typically kept to be consumed; it is believed that the consumption of the mussels and urchins in inconsequential to the local populations (Pers. Comm. Hunters and Trappers Association, 2023). More scientific research and the establishment of an exploratory fishery is needed to help inform the prospect of a potential sustainable commercial fishery.

Subsistence Harvesting

Where the Government of Canada is responsible for implementing obligations under Land Claims Agreements or self-government agreements, Oceans Act MPAs will be implemented in a manner consistent with those obligations. Unless for a valid conservation purpose, public health or safety, or other treaty-based reasons, an MPA or other protection measures will not interfere with Inuit harvesting rights set forth by the Nunavut Agreement.

Subsistence harvest activities are vital to Sanikiluaq. Subsistence harvests largely include Beluga whale, Walruses, and seals. Polar bears, eider ducks, lemmings, foxes and arctic hare are found on land.[4] The coast near Sanikiluaq is also home to Arctic Char, Capelin, Cod, Lump fish, Scallops, Sea Urchin, Sea Cucumber and Sculpin (Sanikiluaq.ca, Gilchrist and Robertson, 2000). Food insecurity is a major concern in Nunavut: compared to the national average it is eight times higher in the territory (Council of Canadian Academies, 2014). Subsistence harvesting provides an arguably healthier, food option relative to food purchased in a grocery store (Chan et al., 2006). However, it was found that Country foods are expensive to acquire relative to store-bought foods – this is due to the increased costs of equipment (gas, guns, ammunition, and transport) and that store-bought foods are subsidized by national taxpayers, while country foods costs fall directly on the individual hunter or immediate family (Hoover et al., 2016). Traditional food costs may be less expensive than market bought food if (1) the harvester has hunting supplies and equipment and/or (2) if community members share harvesting costs or receive free food – in these situations the use of traditional food stretches income allowing families to spend their limited income on other necessities that would otherwise be spent on store bought groceries (Chan et al., 2006). The benefits of Nunavut's country food economy are valued at more than $200 million a year (Awan et al., 2023).

Even with the importance and desire for country foods the advancement in technologies have increased the costs for equipment used in hunts, ultimately putting additional strain on Inuit hunters and communities. It is estimated that capital start-up costs for seasonal hunters in Nunavut have been estimated between $20,000 to $30,000 and an all-season hunting outfit can cost upwards of $70,000 (Awan et al., 2023). For hunting Beluga, it was determined that the greatest costs are access to boats,

[4] Discussions with community members is required to have a better understanding on where harvests take place in and around Qikiqtait for impacts of potential marine conservation efforts.

followed by fuel, guns, and then bullets (Hoover et al., 2013)[5]. The total economic valuation of subsistence harvests cannot currently be quantified due to the lack of data on utilization and revenues generated by the use of animal products for production of clothing, jewelry, crafts, and other traditional items. As such, for this analysis, subsistence valuations are separated from other harvest values.

To help combat high food costs, arctic communities such as Sanikiluaq can access the subsidy program, Nutrition North Canada. However, it was found that the subsidy isn't adequately addressing high food costs, it hasn't addressed the quality of perishable foods and subsequent food waste, and that there is a lack of clarity regarding the program objectives (Canadian Ecotourism Services, 2023). Hoover et al., (2016) also notes that there a general lack of awareness when it comes to food subsidy programs and often individuals who could benefit are not able to.

The harvest statistics reported below (Annex 2) are by community, not by the geographical borders of the AOI. This may result in harvest statistics that may be an overestimation of actual harvests that take place within the AOI. This approach was used to attempt the proxy estimate of harvests quantitatively within the AOI, as opposed to having a qualitative discussion only. Due to data limitations, this approach was deemed to be most appropriate.

Beluga

The harvesting and consumption of Beluga has provided social, cultural, health and economic benefits to communities since time immemorial (Symbion Consultants, 2009).

Five designatable units of Beluga are found in the Hudson Bay Strait Complex, the Western Hudson Bay, Eastern Hudson Bay, James Bay, Cumberland Sound, and the Belcher Islands units (Parent et al., 2023). Sanikiluaq has been found to primarily harvest Beluga from the Belcher Islands unit (Turgeon et al. 2012; Postma, 2017; and Parent et al., 2023). Similarly, nearby Nunavik communities also harvest from the Belcher Islands unit and the Eastern Hudson Bay unit (Parent et al., 2023). The Nunavik harvests are regulated using a combination of Total Allowable Catch and seasonal and spatial closures, as defined in management plans that are evaluated on a regular bases (Lesage et al. 2001 and Parent et al., 2023). Although genetically different from the Eastern Hudson Bay population, the Belcher Island and the Eastern Hudson Bay population are managed as one stock. This is done due to the two populations overlap spatially and temporally during summer surveys and thus being indistinguishable for management purposes (Parent et al., 2023). The Hudson Bay Beluga populations, including that of the Belcher Islands population, summer within their respective management unit and migrate through the Hudson Strait to their wintering area; however it is to note that some of the local Belcher islands population, and possibly other unknown populations, may overwinter around the Belcher Islands (Parent et al., 2023)..

Marine mammals, including Beluga and Walrus, are a source of food for both human and dogs and are a source of materials for day-to-day living. Beluga skin and blubber (mattaaq) are highly sought after among Inuit, in addition to its protein and caloric value, skin provides vitamin C, zinc, retinol, and other essential nutrients (COSEWIC, 2004).

[5] This study considered bullets and fuel are considered variable costs and rifles and boats fixed costs.

It is to note that in general, the food replacement value for the marine mammal species in this report does not account for other benefits of the subsistence fishery such as improving individual and community, health, food security, strengthening social connections, and supporting cultural values and practices (Government of Nunavut, 2016).

However, According to DFO monitoring reports, from 2017 to 2021, community members from Sanikiluaq reported a total subsistence harvest of 184 Beluga (Annex 2).

The formula used to calculate the gross edible weight value within this report is as follows:

The gross edible weight value = landings x edible weights estimate (in kg per animal) x value of weight per kg[6].

A review of relevant literature found that 63% of live weights of Beluga are edible, of the total edible weight, 45% of edible weight of Beluga may be used for human consumption and the remaining 55% may be used as dog food (Ashley, 2002). Of the total edible weight, outer dermis and skin (maktak) comprises 25%, loin meat and flippers 40%, and organs and some blubber 35% (Symbion Consultants, 2009). The value of the portion of edible weight used for human consumption was in the amount of $27.8/kg and the portion used as dog food was in the amount of $4.36/kg (Symbion Consultants, 2009; DFO , 2017a). Using the formula and Beluga information mentioned above, and an edible weight of 378 kg per animal (Symbion Consultants, 2009), the total value of beluga harvest by the community of Sanikiluaq generated an estimated food replacement value of $1.23 million during the five years from 2017-2021 (an average of $45,959.31 per year).

Walrus

Atlantic Walrus are hunted by communities mainly for its meat, ivory tusks and baculum. Mollusks found in Walrus stomachs are considered a delicacy in Inuit communities (DFO IFMP, 2017). The subsistence hunt provides opportunities to maintain cultural traditions and for experienced hunters to pass on their skills and knowledge to younger generations. The tusk and baculum of the Atlantic Walrus are valuable economic commodities and provide important sources of cash income, particularly, for the hunting communities (Fisheries and Oceans Canada, 2013). Walrus ivory can either be sold raw or carved into fine art pieces such as jewelry or sculptures. Some communities engage in a small-scale sport hunt conducted by non-Inuit hunters (Fisheries and Oceans Canada, 2017b). From 2017 to 2021, community members from Sanikiluaq reported a total subsistence harvest of 9 Atlantic Walrus (Annex 2). No Atlantic Walrus sport hunts have been reported by the community from 2017 to 2021.

Atlantic Walrus are managed via Management Units. The Management Unit that is found in the AOI is the South and East Hudson Bay stock (SEHB). The SEHB stock has been distinguished from seven other stocks based on distances, movements, differences in growth patterns, as well as differences in genetics, contaminants, and lead isotope ratios (Fisheries and Oceans Canada 2002, COSEWIC 2006, Stewart 2008, and DFO, 2023). From 2014 population estimation efforts, the SEHB stock had a population estimate of 200 animals and a PBR of 2 and 4, for a recovery factor of 0.5 and 1.0, respectively (DFO,

[6] The value of edible weight is expressed in nominal terms as the value is adjusted for inflationary effects across years. Inflation calculations were done utilizing Bank of Canada's monthly Consumer Price Index data.

2016b). The stock is harvested by Sanikiluaq, and Nunavik communities of Inukjuak, Kuujjuarapik, and Umiujaq (DFO, 2016b). Sanikiluaq hunters harvest Walrus from the Sleeper Islands in September and have reported a perceived decline of Walrus near the community and neighboring islands (DFO, 2016b).

Utilizing the previous edible weight methodology for Beluga as a proxy, and an edible weight of 462 kg per animal (Loring, 1996 and Ashley, 2002), it was estimated that the total edible weight value of harvest was in the amount of $75,123during the five years from 2017-21 ($15,024.53 per year).[7]

Seals

Seals (primarily bearded, harbour, and ringed) are harvested and used for food, clothing, and arts and crafts. Seal continues to be a valuable and preferred food source for Inuit. The cash value of seal skins as by-products of the hunt has historically been critical to Nunavut hunters for financing the subsistence hunt. However, it is believed by the local Hunters and Trappers Association that the value of skins has decreased to the point where it is not beneficial to sell them due to the amount of processing effort required. This money is used to purchase harvesting supplies and other necessary equipment. Seal hunting has always been an important foundation of Inuit culture and it sustains traditional sharing customs. Seal hunting also provides a unique knowledge of the seal resource and ecosystem, and the passing of skills and values from elders to youth. It is estimated that 40,000 seals are harvested per year in Nunavut. The replacement food value of seal meat is worth approximately $5 million, and Seal skin products are worth an additional $1 million to the arts and crafts sector (Nunavut DEIA, unknown).

From 1996 to 2001 the annual average seal harvest in Sanikiluaq was 892 seals per year (Priest and Usher, 2004)[8] (see Annex 2). There is currently no acceptable methodology for calculating edible weight for seals within Nunavut.

Polar Bear

Polar Bear continue to hold a position of significant cultural importance to Inuit. Inuit harvest Polar Bears for their meat[9], hide, as well as for tradition and economic benefits, such as income for guides and trophy exports.

Co-management partners (Nunavut Tunngavik Inc., Nunavut Wildlife Management Board, Regional Wildlife Organizations, Hunters and Trappers Organizations and Government of Nunavut – Department of Environment) work together to determine a total allowable harvest (TAH) for each Polar Bear subpopulation. Polar bears are classified as 'presumption as to needs species' in the *Nunavut Agreement*, which means the total allowable harvest is allocated to Inuit. Inuit may allocate a portion of the TAH for sports hunts. All bears harvested, whether for subsistence purposes, sports hunts or the Defence of Life and Property Kills (DLPK), are subtracted from the TAH (Co-Management Working Group, 2016).

[7] The value of edible weight is expressed in nominal terms as the value is adjusted for inflationary effects across years. Inflation calculations were done utilizing Bank of Canada's monthly Consumer Price Index data.

[8] While dated, these statistics were the most detailed and recent available information.

[9] No acceptable methodology to calculate edible weight (food replacement value) of Polar Bears at the time of this writing.

Inuit are directly affected by increased Polar Bear abundance from the standpoint of personal safety and property damage (e.g., lodging and food caches). Inuit store meat in traditional caches, both within small camps and communities. The loss of nutritious food due to Polar Bears raiding the caches is a significant cost to Inuit (Co-Management Working Group, 2016).

Globally, all polar bears are divided into 19 "subpopulations"; there are 12 recognized subpopulations of polar bears within Nunavut. In 2017-18, Sanikiluaq had a TAH of 25 and harvested 25 bears while also having 3 DLPK[10]. These harvests are from the Southern Hudson Bay subpopulation; Sanikiluaq is the only Nunavut community that harvests from this subpopulation.

Arctic Char

Arctic Char are harvested both for food and as a traditional social and cultural activity and are one of the most sought-after fishes for subsistence by Inuit. About 80% of Arctic Char harvests are returned immediately to the domestic economy. Advantages of Arctic Char as a source of subsistence include predictable harvesting times and locations, ease of catch, quick growth, and a relative absence of parasites. Subsistence fisheries are usually concentrated near communities and are traditionally harvested from well-developed estuarine and coastal fisheries with gill nets or weirs.

Arctic char is a healthy (i.e., typically low in contaminants such as mercury, Evans et al., 2015) and nutritious subsistence food source available in every Nunavut community (Priest and Usher, 2004). Given the overall accessibility in most Nunavut communities, limited resources required to harvest this species and the overall sharing culture within and among norther communities, Arctic char continues to underpin food security in the territory as it provides a high quality and reliable "country" food source (Pers. Comm. Harris 2022).

The collection of data on subsistence harvests is limited due to the remote nature of the fisheries, lack of internet access while harvesting, and the harvests not being regulated (no requirement to report harvests). From 1996 to 2001 the annual average Arctic Char harvest in Sanikiluaq was 9,769 fish (Priest and Usher, 2004)[11] (see Annex 2). Priest and Usher (2004), estimated that the food replacement value for char harvested for subsistence value across all Nunavut was approximately $5 million, adjusting this value for inflation, this value in 2022 would be $7.54 million.[12]

Ducks

Various species of ducks such as the Common Eider and King Eider are harvested for subsistence purposes as well as utilizing skins and feathers in the creation of textiles. This tradition has been passed on since approximately 1890, however, since the 1960's, fewer young generations are wanting to learn these skills (Oakes, 1992). Recently, Sanikiluaq has looked to commercialize the collection and sale of eider down. In 2015, a single kilogram of eider down could sell for 500 Canadian Dollars and a handcrafted eider down parka could sell for 1500 Canadian Dollars (Ellis Quinn, 2015).

[10] https://www.gov.nu.ca/sites/default/files/pb_harvest_table_2017-2018_eng.pdf

11 While dated, these statistics were the most detailed and recent available information.

12 Inflation calculations were done utilizing Bank of Canada's monthly Consumer Price Index data.

Between 1985-99 and 1997, Common Eider populations found on the Belcher Islands saw a population decline of 75%; this population decline raised serious risks to the population as the species is sensitive to reductions in adult survival (Gilchrist and Robertson, 1998). No available trend estimations have taken place since 1997 (Sea Duck Joint Venture, 2018). However, the local Hunters and Trappers association does a community eider duck survey every year.

Benthic Species

Subsistence harvesting for sea cucumber, scallops, mussels and sea urchin is done by community members in shallow waters close to communities. The harvest for sea cucumbers, mussels, and urchins utilizes , Long-Pole nets) and hand pulled dredges are utilized for scallops (Pers. Comm. Schroeder, 2020 and Pers. Comm. Hunters and Trappers Association, 2023).

Resource Extraction

Oil and Gas

The Qikiqtait AOI includes marine waters that is found within the Hudson Basin. Interests in the petroleum potential of this basin peaked in the early 1970s, with the industry and Geological Survey of Canada (GSC) acquiring over 46, 000 and 40, 000 line-kilometers of deep and shallow seismic data respectively. The seismic data acquired by industry was generally low quality due to acquisition problems. Based on these data, industry drilled five (5) offshore wells in the central part of the basin between 1969 and 1985, four of these wells targeted the fault play. No oil was recorded from the wells (Lavoie and Dewing, 2022).

Exploration Licences are the licences, permits or rights that any company must obtain to conduct exploration activities within any operating areas granted by Government Instrumentality. [13] In December 2016, a moratorium was issued by the Government of Canada that designated all Canadian Arctic waters as indefinitely off limits to future oil and gas licensing with a commitment to review the designation every 5 years through a science-based life-cycle assessment. In August 2019, Canada issued an order prohibiting oil and gas activities in the Canadian Arctic offshore. The moratorium has been extended until December 31, 2028, at which point it is expected to be extended (SOR/2022-274). This moratorium does not apply to the Qikiqtait AOI due to the order only applies to frontier lands under the Minister of Northern Affairs (those frontier lands north of 60°).

The most recent hydrocarbon resource assessment of Hudson Bay (Dewing et al., 2023) concluded that, "Hudson sedimentary basin has a mean estimate of 67.3 million recoverable barrels of oil equivalent[14] and a 10% chance of having 202.2 or more million barrels of recoverable oil equivalent. The mean

[13] Managing oil and gas resource development in the northern offshore waters is a federal responsibility. The statutory responsibility for petroleum management on Crown lands in the Northwest Territories, Nunavut, and Norther Offshore is administered by CIRNAC, specifically by the Petroleum and Mineral Resources Management Directorate (CIRNAC, 2022). The Canada Energy Regulator (CER) regulates, among other things, drilling, testing, producing from, and abandonment of wells in the Canadian Arctic offshore, the Hudson, James, and Ungava bays, Gulf of St. Lawrence, and the British Columbia offshore.

[14] Barrels of oil equivalent (BOE) are the sum of oil and gas volumes, where 5800 cubic feet of gas is taken to be equivalent of one barrel of oil. MMBOE are millions of barrels of oil equivalent abbreviated as MMBOE.

chance for the largest expected pool is about 15 million recoverable barrels of oil equivalent (MMBOE), and there is only a 10% chance of there being a field larger than 23.2 MMBOE recoverable.

A map showing the distribution of petroleum potential in the Hudson Basin is shown in Figure 2.

Dewing et al. (2023) acknowledged the limitations of the available data … "There are only seven wells, and outcrop is scattered in the onshore areas. There is a seismic grid over the center of the basin, but the data quality is poor compared to modern seismic surveys (Figure 3). There are no hydrocarbon discoveries or production data to guide estimates of field sizes..." It highlighted that the lowest chance of success for the petroleum system in the Hudson Basin is the presence of a viable source rock and its ability to produce and expel oil given the relatively low temperatures in the basin. Another compounding factor is that the potential sizes of accumulation in the basin are quite small, which makes them less attractive for exploration in an offshore setting. Although the report suggested some methods to gather more data to improve the understand of the source rock characteristic and distribution, the source rock risk and field size uncertainty can only be properly addressed by the acquisition of high quality three-dimension seismic data and subsequent drilling of wells to test the plays.

Several resource assessments have been made by various arms of the Government of Canada, other public institutions, and the industry within the Hudson Basin over the last 50 years. There are large differences in the potential hydrocarbon volumes predicted for the area in the different publications. The three most recent Government of Canada publications have median (P50) estimates ranging from 63 MMBOE to 1,346 MMBOE recoverable; with Procter et al. (1984) estimated a P50 of 1, 346 MMBOE, Drummond (2009) estimated a P50 of 142 MMBOE (north of 60° only) and Dewing et.al (2023) estimated a P50 of 63 MMBOE.

Several reports downplay the potential for economic hydrocarbon discoveries in Hudson Bay, for instance, "the amount of drilling and geophysics in Hudson Bay is too sparse to encourage more active exploration" (Procter et al., 1984), and "the chances of discovering major, economic accumulations of hydrocarbon in the Hudson Bay are so slim that additional expensive exploration is not justified". Tillement (1975). Research carried out by GSC, CNGO and other public organization in the 2000s to improve the understand of the geological history and hydrocarbon system of the basin (summarized in Lavoie and Dewing, 2022) points to a number of positive petroleum system elements including possible hydrocarbon slicks, areas where the source rock interval likely entered the oil window, and processes to enhance reservoir quality. While these results are included in the probabilistic assessment approach used in Dewing et al. (2023),

In 2024, Natural Resources Canada (NRCan) conducted a specific qualitative economic resource assessment for the Qikiqtait MPA. The resource assessment found that the value of petroleum resources was expected to be negligible and that commercially viable exploration would likely remain undeveloped (NRCan, 2024).

Mining

Mineral potential in the offshore area is unknown; but the onshore regions were previously assessed in NRCan's 2018 assessment on all prospective mineral occurrences (Hanna et al., , 2018). This assessment confirmed iron deposits on Belcher Islands coming from iron wells being drilled on the islands themselves (Figure 4) (Hanna et al., 2018)

The website of Hemlo Explorers Incorporated, formerly Canadian Orebodies Inc., shows an iron ore project on the Belcher Islands (Figure 5). In February 2012, an indicated iron ore resource of 230 million tonnes was announced by Hemlo Explorers Incorporated, along with an inferred resource of 289 million tonnes of iron ore in the Belcher Islands (Hemlo Explorers Website). The active iron exploration leases (Haig Inlet Iron Project) covers over 230 km^2 of the Belcher Islands. The Haig Inlet Iron Project has an indicated resource of 230 million tonnes of iron ore (Hanna et al., 2018). As of 2024, the company has expressed intention to sell or option the property to focus on other projects (Hemlo Explorers Website).

The Belcher Islands also contain a marble quarry that supplies over 50 tonnes of quality stone to local carvers (Hanna et al., 2018). It is believed that there may be many undiscovered carving stone sites in the Belcher Islands (Steenkamp et al. 2016)

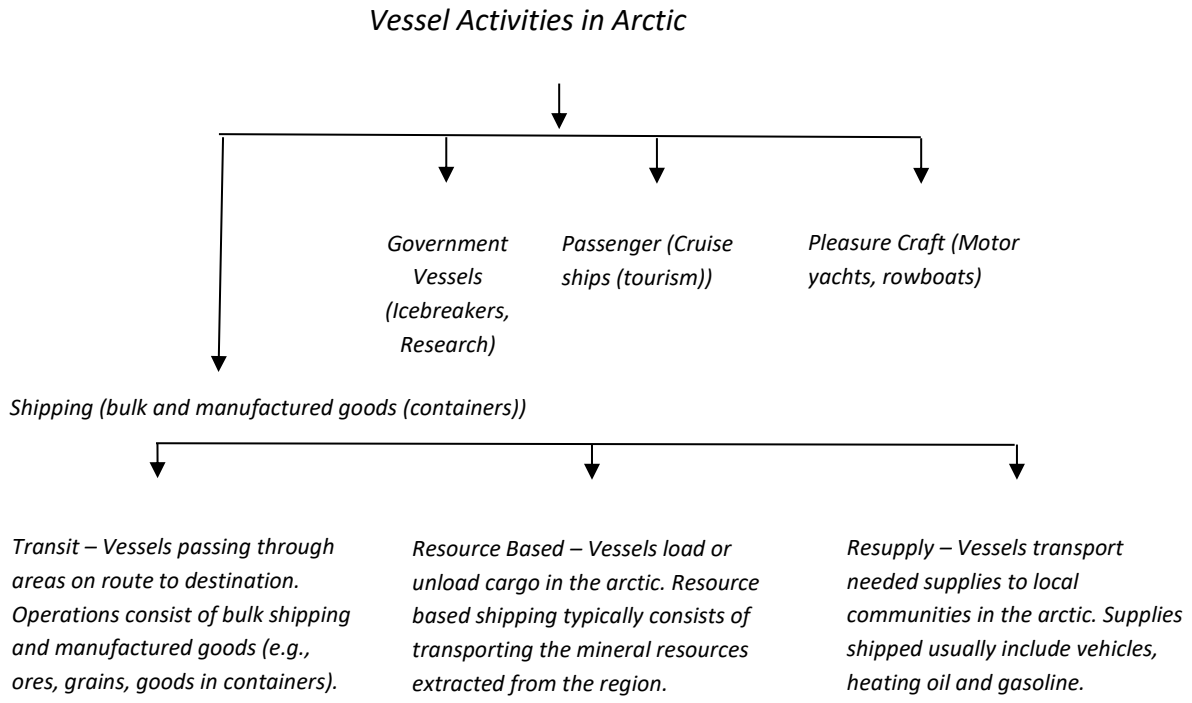
Commercial Shipping and Other Vessel Activities

Transportation infrastructure in Nunavut currently consists of a system of airports and seasonal sealifts. The territory does not have roads or rail lines that connect communities within Nunavut or to other provinces and territories due to extraordinary costs (NPC, 2016).

Marine infrastructure in Sanikiluaq, and other arctic communities, is quite minimal and is typically designed for basic community freight needs (Government of Nunavut, 2012). As there is no road network connecting Sanikiluaq to the mainland, and air transportation being expensive, shipping goods via marine vessels plays a crucial role for communities, industry, and government. Furthermore, marine infrastructure is critical for communities as they depend on the annual marine supply for food, vehicles, construction materials and other commodities that are not economically feasible to be shipped by airplane (Government of Nunavut, 2012). As such, the AOI is commonly used for resupply efforts as it offers a more direct path that allows for shipment goods that support land-based economic activity (i.e., transport of heavy lift goods or equipment). Should any restrictions on shipping result in vessels opting for longer routes to avoid the AOI, this extra travelling distance could potentially result in higher costs and a longer duration for the shipping activity. Shipping in the Arctic is seasonal due to ice conditions restricting passage. Often, a single vessel serves multiple communities, but if there's not sufficient time to reach them all, additional vessels may be needed, provided they are available. Due to the limited window for shipping operations, the challenging coordination to support the needs of many stakeholders, Arctic shipping is generally costly, alteration of these routes increases the challenges posed to shipping companies and those who rely on them.

When exploring vessel traffic in the AOI, vessel tracks show general cargo, tanker and tug/barge traffic, and icebreaking activities in and around the Belcher Islands (Dawson et. Al., 2017). Vessel corridors are known (Figure 6) however, the levels of vessel traffic are unknown., Due to the geographic positioning of the AOI, it is estimated that vessel traffic primarily relates to the community needs of Sanikiluaq and it is expected that minimal industry based shipping would traverse the area in the near future.

Chart 1: Vessel Activity and Commercial Shipping Type



Re-supply shipping activities ("sealift") consist of transporting supplies needed by local communities in the arctic. Supplies usually include items such as non-perishable food items, vehicles, heating oil and gasoline (Guy and Lasserre, 2016). Other items supplied to communities by sealift include home electronics, furniture, household appliances, snow machines, tools, textiles, footwear/headgear, construction equipment (e.g., front end loader, dump truck), lumber, drywall, wiring, other building materials and more (Chamber of Marine Commerce Canada website).

Sealift vessels can carry hundreds of 22 foot equivalent (TEU) containers. As an example, one sealift vessel can carry up to 665 TEUs (ArcticSealift.com). Commodity groups per TEU container can range in value from $3,500 (CAD) up to over $600,000 (CAD) (IHS Markit, 2017). As a crude example, a vessel loaded with 665 TEUs with an average container value of $3,500, will carry commodities that have an economic value of approximately $2.3M. Depending on the value of goods per container, and assuming a full load of containers, estimates of the economic value of commodities being shipped per vessel can be even higher. Generally sealift vessels are likely to carry millions of dollars worth of commodities per vessel per shipment.

Re-supply activities are critical to numerous communities in the Canadian Arctic that have limited to no road access and limited infrastructure to handle heavy aircraft (Arctic Council, 2009). Cargo ships leave southern Canadian ports with barges and tug boats loaded on deck. To unload, ships will anchor near a northern community then use the tugs boats and barges to unload cargo onto a beach ramp (Guy and Lasserre, 2016).

The shipping companies Nunavut Sealink and Supply Inc. (NSSI) and NEAS provide sealift carriage and related services to all communities in eastern Nunavut, including Sanikiluaq(Qikiqtaaluk Corporation, Website and NEAS, Website).

Arctic Gateway, owner, and operator of the Port of Churchill, also acts as a hub for transport within the Arctic. Since 1929, the Port of Churchill has been an important part of Canada's international grain exports as well as the aiding with development objectives within Nunavut. Since 2021, Nunavut resupply efforts through Churchill has increased over 250% (Pers. comm. Arctic Gateway). Significant investment into Arctic Gateway's rail network, that connects to the Port of Churchill, is underway – it is expected that with this investment in increased infrastructure, Arctic Gateway anticipates that they will be able to increase operations through greater accessibility to new markets and customers (Pers. Comm. Arctic Gateway).

Recreational and Tourism Activities

Recreational activities in and around Sanikiluaq include fishing, hunting, wildlife viewing, canoeing, hiking and cross-country excursions. There are opportunities to view basket weaving and soap stone carving. Sanikiluaq carvers are known worldwide for carvings made from locally extracted argillite (Explore Nunavut). Guides offer excursions to ancient Dorset and Thule sites near Sanikiluaq (Travel Nunavut, 2007). A community survey indicated that outfitting and guiding efforts are conducted within the Qikiqtait MPA. DFO has been made aware of one licenced outfitter[15] that is registered to operate within the boundaries of the MPA – services offered include boating, camping and hiking, eco-tourism, and fishing tours. Further evaluation on frequency and socio economic impact of outfitting and guiding are required.

The arts and crafts sector provides significant economic value to Nunavut and the Qikiqtani Region. In 2010, it was estimated that approximately 3,000 to 4,000 Nunavut residents received some income from the sale of arts and that the artists received more than $27.8 million in direct revenue (Nordicity, 2010). In addition, it was estimated that from the sales of arts and crafts that there was more than $50 million in end consumer sales, with more than $30 million generated through retail sales outside of Nunavut (globally) (Nordicity, 2010). Spinoff impact from the sector created totaled $10.5 million and created an approximate additional 240 FTEs (Nordicity, 2010). The arts and crafts production generated approximately just under $1.6 million in additional tax revenues for the Government of Nunavut (Nordicity, 2010). Total end consumer sales were estimated to be $52.1 million (Nordicity, 2010). Sanikiluaq is known for producing Argillite stone carvings and handcrafted lyme grass baskets (Northern Images Website).

Most expedition cruise vessels operating in the Canadian Arctic are members of the Association of Arctic Expedition Cruise Operators (AECO). The backbone of AECO is the development of guidelines and standards, that all AECO members must abide by, which often go above regulatory requirements. AECO and the Government of Nunavut have signed a Memorandum of Understanding (MOU) to work together on cruise ship tourism in the territory. The MOU includes the delivery of *Nalunaiqsijiit: the Inuit Cruise Training Initiative* where Inuit from Nunavut which aims to increase Inuit involvement and employment in the expedition cruise industry by providing training in hard and soft skills, as well as a placement on board AECO member vessels, in cooperation with the Government of Nunavut. Additionally, the

[15] Licenced by the Government of Nunavut to operate as an outfitter.

department provides training to communities — hamlets, artists, and various businesses — to prepare them to maximize benefits from cruise ship visits. The program is called *Cruise Ready!* and is delivered to two communities a year, based on demand. Data sharing protocols and the development of site-specific guidelines using the expertise of the Inuit Heritage Trust and the Government of Nunavut's Department of Culture and Heritage are also part of the MOU. As of 2023, there has been no known cruise operations within the AOI. However, there is community interest in having a greater tourist presence within Sanikiluaq – this can be seen by the recent efforts to create floating docks that can support the offloading of tourists (Nunavut News, 2023).

While there is a lack of information with regards to the frequency and value of recreational and tourism activities within the AOI ,there are, however, a few examples that can provide a general "snapshot" of the value/expenditures of some activities.. Based on the 2016 Nunavut Visitor Exit Survey (Insignia Marketing Research Inc., 2016) Final Report developed for Nunavut Tourism, in 2022, the average traveller (per person) in Nunavut would have spent[16] about $3,145 , not including airfare, for a seven-day trip. Of the $3,145, $1,803 was spent on packages and guide trips, $488 was spent on accommodations, $335.63 on restaurants/food, and $273 on art/carvings. Popular activities that travellers participated in (percentage wise) included hiking, visiting a cultural center, overnight camping, sport hunting or fishing, and wildlife or bird viewing. The survey estimated that 16,750 non-resident visitors visited Nunavut in 2015 and spent a total of $37.9 million, excluding airfare and cruise tickets (Insignia Marketing Research Inc., 2016), adjusting for inflation this value would be $45.9 million in 2022.The average cruise-based traveller (per person) in Nunavut spent about $838, not including cruise tickets and airfare, for a seven-day trip. Of the $838, $492 was spent on packages and guide trips, $18 was spent on accommodations, $18 on restaurants/food, $67 on entertainment, $80 on other shopping and souvenirs, and $70 on art/carvings. Popular activities that travellers participated in (percentage wise) included visiting a cultural center, going on a cruise or boat tour, visiting elders, browsing/purchasing art, viewing northern lights, and wildlife or bird viewing (Insignia Marketing Research Inc., 2016).

Recreational and tourism activities also provide spinoff economic benefits in and around communities as individuals or groups engaged in activities will spend money on accommodations, restaurants/food, supplies, transportation, etc. These expenditures create employment and income opportunities for local residents. It is estimated that community-led tourism in Nunavut is currently valued at approximately $96 million (Awan et al., 2023).

Research Activities

Socio-economic benefits from research activities includes direct local employment (guides, observers, interpreters, sample collectors, etc.) and other spinoff benefits such as accommodations, flights, food, among others. One study found that from 2000 to 2009 that publicly funded research within the Yukon, Nunavut, and the Northwest Territories totalled an estimate of $284 million (Carr et al., 2013), adjusting for inflation this total can be approximated as $320.65 million in 2022.[17] In addition, communities can

16 Utilized data from the 2016 Nunavut Visitor Exit Survey and adjusted for inflation to a 2022 value utilizing Bank of Canada CPI inflation rate change from 2015 to 2022: https://www.bankofcanada.ca/rates/related/inflation-calculator/

[17] Using Bank of Canada CPI inflation rate change from 2009 to 2022: https://www.bankofcanada.ca/rates/related/inflation-calculator/

gain a sense of oversight and understanding of the area through research outcomes (if research outcomes are appropriately shared following research activities).

Limitations and further research needs

This report provided a preliminary scan of socio-economic activities in and around the Qikiqtait area boundaries. Much of the information presented in this report is relatively brief, lacks detail, and is outdated to some extent (e.g. subsistence harvest information).Additional details provided by partners and stakeholders is required to better evaluate past, current, and future planned activities within the AOI.

Overview of Ecosystem Services, Option and Non-Use Values (See Matrix 1 for definitions)

Ecosystem Services

Ecosystem services are indirect functions of the environment that provide valued goods and services used by people (Loomis et. Al, 2000). These services include food and fibre and fuel but also the largely unpriced services of clean air and clean water, natural hazard protection, pollination, and spiritual sustenance (World Resources Institute, 2008). An ecosystem's economic value is generated by the combination of services provided by the ecosystem, which include provisioning (e.g., food), regulating (e.g., climate regulation) and cultural services, in conjunction with capital (e.g., investments, equipment, labour) (O'Garra, 2017).

Qikiqtait provides direct and indirect services to Sanikiluaq through maintaining ecosystems and biodiversity. Direct services (e.g., subsistence fishing) are captured with the corresponding direct benefits to the community.

It is harder to define the indirect services of ecosystems and biodiversity because they are much more intangible (Krantzberg and de Boer, 2006 and 2008). For example, ecosystems provides clean, breathable air by regulating gases (e.g., carbon dioxide) and protects the general maintenance of a habitable planet by regulating the local weather and climatic conditions of the region. These services are typically categorized in the literature as follows:[18] gas regulation; local climate regulation; water regulation; disturbance prevention; soil formation/retention; waste treatment; nutrient cycling; and habitat, refugium and nursery (Hayder, 2014).[19]

In the Arctic Ocean ecosystem services include water circulation and exchange, and gas and climate regulation. Vital ecosystem services in the Arctic include fish and seafood, primary production, nutrient cycling and carbon storage (Armstrong et. Al., 2019). A recent study has shown hotspots that provide a high degree of ecosystem services that should be considered for conservation actions – of these areas include the Hudson Bay Lowlands, taiga, and arctic ecosystems (Mitchell et al, 2021).

[18] For a detailed discussion on specific ecological services, see Marbek (2010).

[19] It is imperative to recognize that all the economic and other benefits derived by society are somehow linked to a healthy ecosystem. For instance, a healthy ecosystem ensures suitable habitats for fish populations and thus enables subsistence harvesters and recreational anglers to fish (Hayder, 2014).

Carbon storage comes into play as the warming climate reduces the earth's amount of snow and ice. The warming of the polar seas causes the sea surface to be frozen less in winter and glaciers to retreat, creating more open, ice-free water. Less sea ice causes a threat to marine mammals and other marine life through the loss of critical habitat. Loss of sea ice also creates a longer growing season for marine plants called phytoplankton and removes more carbon, in the form of carbon dioxide, from the atmosphere. The growth of phytoplankton generates more food for animals that eat the algae and store this carbon through growth of their bodies. This carbon storage by marine life is called blue carbon. When marine animals perish part of the blue carbon is buried in the seabed, and that carbon is removed from the carbon cycle. This trapping of carbon in the seabed or in other places is called sequestration (Barnes, 2020). Through a changing Arctic environment an escalation in absorption of carbon may be expected due to an increase in primary production and reduced ice cover. Currently there is a "blue carbon" initiative pushing for further recognition of the oceans as a climate mitigating environment providing vital regulating services for the wellbeing of humankind (Armstrong et. Al., 2019). It should be noted however that increased carbon dioxide absorption by oceans has led to a shift in their chemistry, through increased ocean acidification. Ocean acidification can have potentially detrimental effects on marine ecosystems (Armstrong et. Al., 2019). Potential future efforts in carbon reduction through a blue carbon approach may become an economic factor within the AOI – as of February 2024, there are no plans for any blue carbon economic activities within the geographic region of the AOI.

There is economic value of climate regulation services provided by sea ice and permafrost in the Arctic. As an illustrative example only, climate regulation services in the Arctic such as methane capture and reflecting sunlight into space (ice-albedo effect), has an annual value of billions of dollars. The annual per capita value to global beneficiaries (outside of Arctic communities)[20] is $29.27 (2016 $US) (O'Garra, 2017).

It is not possible to quantify the monetary value of the ecosystem services related to the Qikiqtait AOI in this report due to a lack of data, a viable method that is applicable to the unique ecosystem of the AOI, or coherent approach suggested in the extant literature. While it is not possible to estimate and place any monetary values on ecosystem services, the study included a qualitative discussion of the ecosystem services in an attempt to highlight the importance of such ecosystem services provided by the study area.

Option Value

Neither economic theory nor empirical literature provides adequate information to quantify the option value[21] of future use of the resources of the AOI (e.g., possibility of commercial/recreational fishing in the future) (Hayder, 2014). However, it should be noted that assets with less perfect substitutes are likely to have larger option values to make up the difference in value (Marbek, 2010). The AOI and associated unique biodiversity characteristics might be a case in point.

[21] Option value is represented by the amount someone is willing to pay to keep open the option of future use of the resources (e.g., possibility of commercial/recreational fishing in the future).

Non-Use Value

Non-use values[22] are the values people derive from a good or resource, independent of any use people might make from that good/resource, including the conservation of the ecosystem for future generations (e.g., future biodiversity) also known as bequest value and existence value arising from people intrinsically valuing the existence of the ecosystem regardless of its use.[23] Existence value includes the benefits from knowing that the resources are being used by others as well as cultural values for an economy.

Sanikiluaq, nearby communities, and people residing elsewhere in Canada derive substantial non-use value from the services provided by the area. As an example, O'Garra (2017) estimated the annual value per capita existence value for beluga whale populations as $96.30 (2016 $US), for Arctic nations with beluga populations. The same study also estimated the annual value per capita existence value for polar bear populations as $316.80 (2016 $US) for Canadian residents.

The examples below provide some context on the value of non-use values for marine mammals. It should be noted these examples are for geographical areas much larger than the AOI. The values attributed to the AOI would be a proportion of these examples.

Applying the formula used by Whitford (2008) to a willingness-to-pay value ($43.75 per Household), the present analysis estimates the total existence value of walrus in the amount of $802.9 million in Canada in 2021.[24] Walrus also provides significant benefits to society in terms of science exploration and research through direct and indirect research funding as well as through partnerships and consortiums (Whitford, 2008 and Fisheries and Oceans Canada, 2013a).

Although a few studies have estimated non-use values for different areas in Canada using direct stated preference methods (contingent valuation, discrete choice experiments), the non-use value for the AOI has not been studied so far. Neither has there been any study that could serve as proxy values for the area. Despite the challenge to capture the benefits of non-use values, it may be noted that even if non-use values of the attributes within the AOI might be insignificant at the individual level within the communities, aggregated values for an entire economy may likely be significant.

Overview of Social and Cultural Values

Traditional Ecological Knowledge (TEK) and *Inuit Qaujimajatuqangit* (IQ) is the practice of knowledge sharing between generations on important social, cultural, and environmental topics. When discussing conservation, TEK and IQ allow for important insights into historical and current knowledge on ecosystems and adaptation to any changes. Often times TEK and IQ are experiences shared through oral

[22] The value people derive from a good/resource independent of any use people might make of that good/resource.
[23] Although in theory non-use values are divided into existence and bequest values, the empirical studies do not always make the distinction and calculate them together as non-use values (Hayder, 2014).
[24] The present analysis inflated the willingness-to-pay value to $53.6 per household using Consumer Price Index from Statistics Canada and multiplied by 14,978,941 households in Canada (based on 2021 Census conducted by Statistics Canada). The estimated value is the one-time payment that Canadians are willing to make in the current year to conserve walrus at the approximate population levels.

conversations and discussions (DFO, 2008 and Parks Canada Agency, 2018). This use of TEK and IQ is important to maintain traditional values within the Qikiqtait area. For a more fulsome scan Fisheries and Oceans is required to meet with community members from Sanikiluaq to gain a better understanding of local social and cultural values.

Inuit Qaujimajatuqangit (IQ) is often translated to Inuit Traditional Knowledge, a source of information and wisdom based on historical observations and experiences by Inuit, which occurred through oral conversations and discussions (Parks Canada Agency, 2018). Donald Uluadluak Sr. and Gwen Frankton (Government of Nunavut, 2007) note that Inuit carried and guided IQ values, knowledge and skills that are continuously being passed on from previous generations to build and lead children towards independence and preparation by experiencing various life challenges. An essential aspect of IQ is that it is continuously being passed on. Inuit use of the marine area around Qikiqtait makes it possible for this to happen.

The AOI provides considerable subsistence, social, cultural, and spiritual benefits to regional residents and contributes significantly to the economy as a whole. No comprehensive quantitative information/data was available on such benefits derived from the AOI. However, this section presents a qualitative discussion of the socio-cultural values of the AOI.

As evidenced by the numerous archaeological sites found scattered across the archipelago, the ancient Dorset and Thule cultures both lived on the Belcher Islands (Travel Nunavut). Each culture has left lasting impacts on the Inuit who call the region home.

Inuit traditional use, including subsistence harvesting, takes place in the AOI. Marine mammals, such as walrus, seal, and beluga, are regularly available and they are relied upon for traditional use, as are marine resources such as clams, mussels, sea cucumber, and seabirds and their eggs. For people living in the Arctic, hunting, gathering, fishing, and processing of food are a vital part of social, cultural, and economic life in the North (Berkes et al., 2005). Having access to and eating wild food is important for cultural values. An example of important cultural values includes distributing subsistence harvests to relatives and neighbours (Berkes et al., 2005). Country food is quite valuable to communities because it is accessible, acceptable, nutritious, and affordable (Berkes et al., 2005).

Some benefits of the subsistence harvest include improving individual and community health, food security, strengthening social connections, and supporting cultural values and practices (Government of Nunavut, 2016).

Beluga harvesting provides traditional harvesting skills, the transfer of traditional knowledge, and the preservation of cultural identity (Symbion Consultants, 2009).

A successful walrus hunt is celebrated by traditional songs/dances, consumption of edible portions of animal strengthens physical and spiritual health, and bones are used for carvings and jewellery (Whitford, 2008 and Fisheries and Oceans Canada, 2013).[25]

[25] For example, ivory is used to construct harpoons, make toggles and handles, shoe sledges, thick skin is used to make summer tents and rope (Whitford, 2008).

Joining in walrus hunting, sharing of the proceeds and knowledge between older and younger generations among community members not only ensure future cooperation but also strengthen kinship ties and community cohesion (Fisheries and Oceans Canada, 2013).

Future Economic Activities and Trends

There is minimal economic activity occurring within the Qikiqtait, with the majority being found in Sanikiluaq. The remote location, harsh environmental conditions, and low population lead to the probability of low economic development over the next 5 years. Primary opportunities for economic growth within the Qikiqtait lie within natural resource management and eco and cultural tourism.

Underexplored fisheries have potential to drive economic growth for Sanikiluaq. The community of Sanikiluaq has a great interest in establishing a small scale multi-species commercial fishery in the area – targeting scallops and sea cucumbers (Pers. Comm. Hunters and Trappers Association, 2023). However, a better understanding of the local fisheries is needed to fully realize this commercial potential.

Beyond fisheries, there is potential for future mineral extractions if an interested party is willing to purchase the rights currently held by Hemlo Explorers. Additionally, NRCan believes there is limited to no oil and gas potential within the Hudson By Basin. Furthermore, the extraction and sale of carving stone could create additional economic opportunity for the community.

There may be opportunity for eco-tourism around Sanikiluaq. The Belcher Islands are known for their unique natural beauty and wildlife. Developing eco-tourism infrastructure and services could provide new opportunities for economic growth and job creation within the community. As well, there may be opportunities for Sanikiluaq residents to participate in the growing market for Indigenous arts and crafts. The community has a strong tradition of producing Inuit art, including carvings, prints, and textiles; these are highly valued by collectors and tourists. Increasing production and promoting local artists could create further economic opportunities.

Conclusion

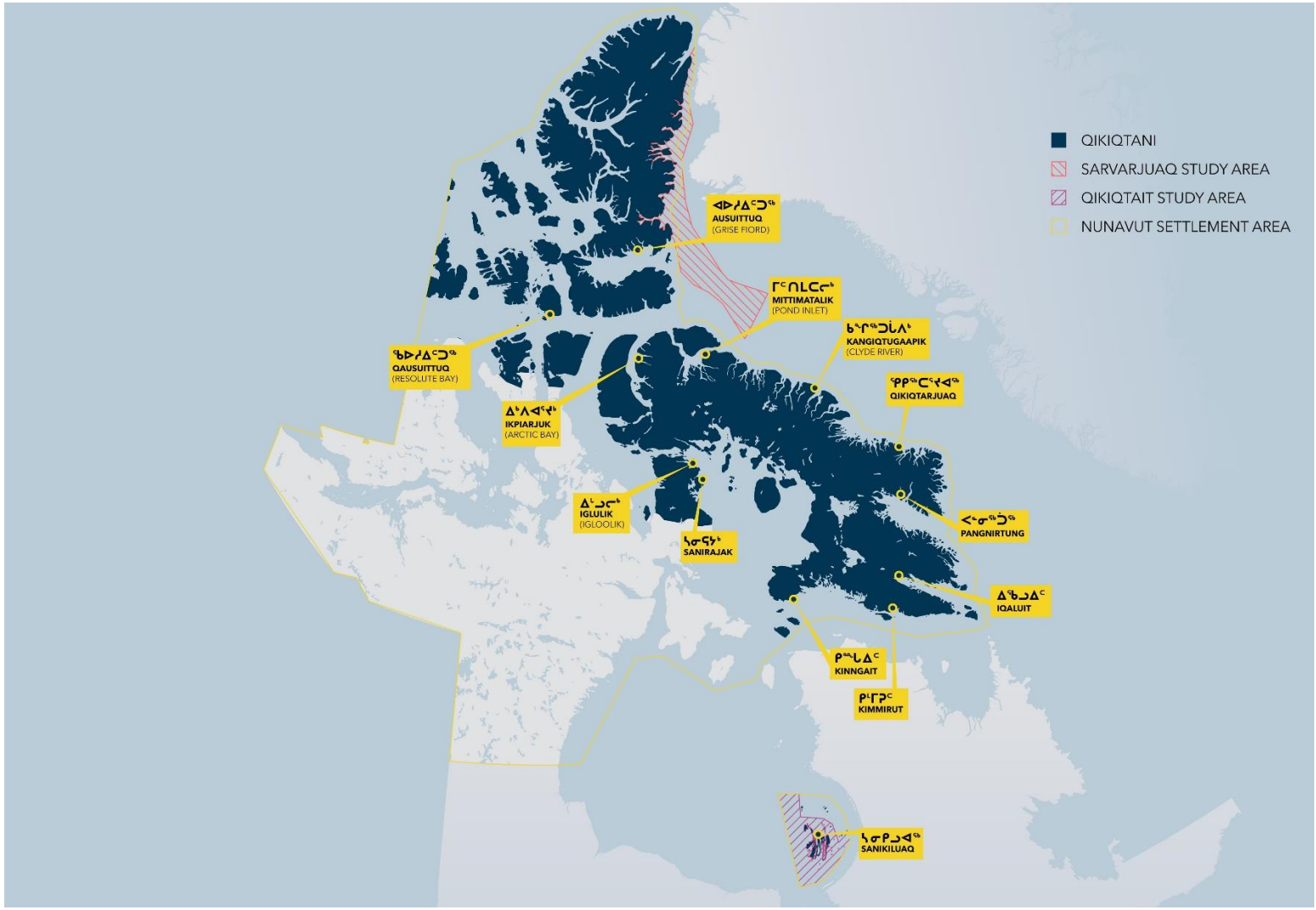
The objective of this report was to provide a brief socio-economic analysis the Qikiqtait area. Specifically, the paper included an overview of the past, current, and potential future social and economic activities linked to the Qikiqtait AOI.

Baseline values (by sector) or magnitude of economic activities linked to Qikiqtait have been estimated either quantitatively or elaborated qualitatively. Moreover, based on supplementary reports and consultations with subject matter experts, the report provided a quantitative and/or qualitative assessment of the future economic activities linked to Qikiqtait.

The report found that Qikiqtait provides a wide variety of economic benefits. Qikiqtait provides a varying degree of economic, subsistence, social, and cultural benefits to Sanikiluaq and should permanent protection measures be further explored with community members and stakeholders.

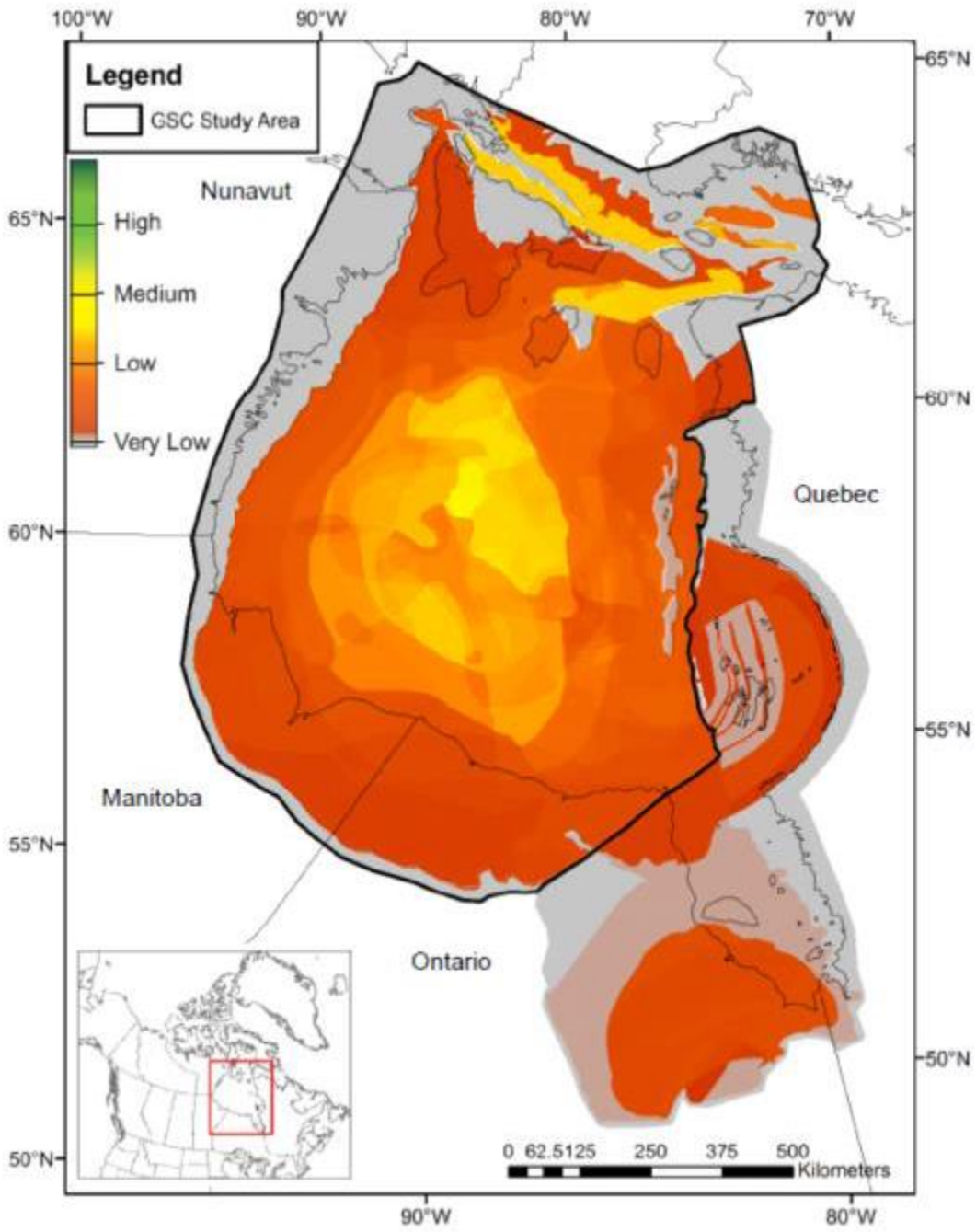
The report highlights community interest in resource related opportunities, such as the potential scallop and sea cucumber fishery. As well, the report highlights the importance of vessel-based transportation within the AOI and surrounding areas as there are limited transportation alternatives.

Figure 1: Qikitani Region



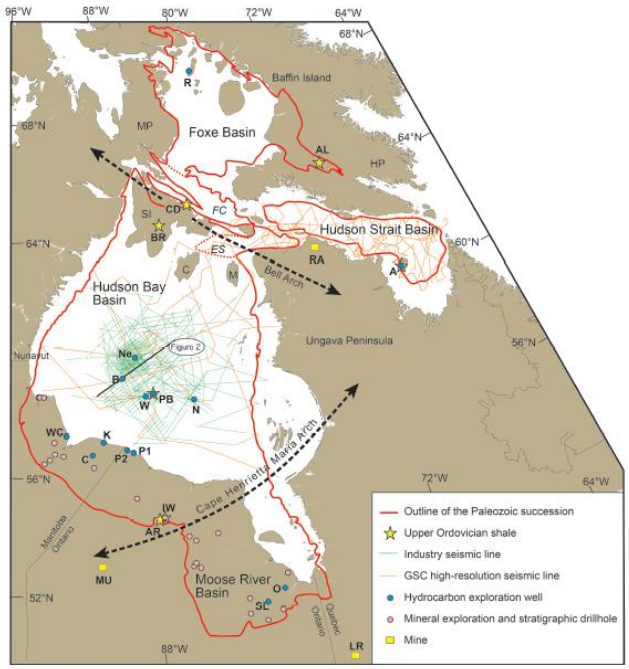
Source: Map produced by Marine Planning and Conservation Program, Arctic Region.

Figure 2: Petroleum Potential Within Hudson Bay Basin



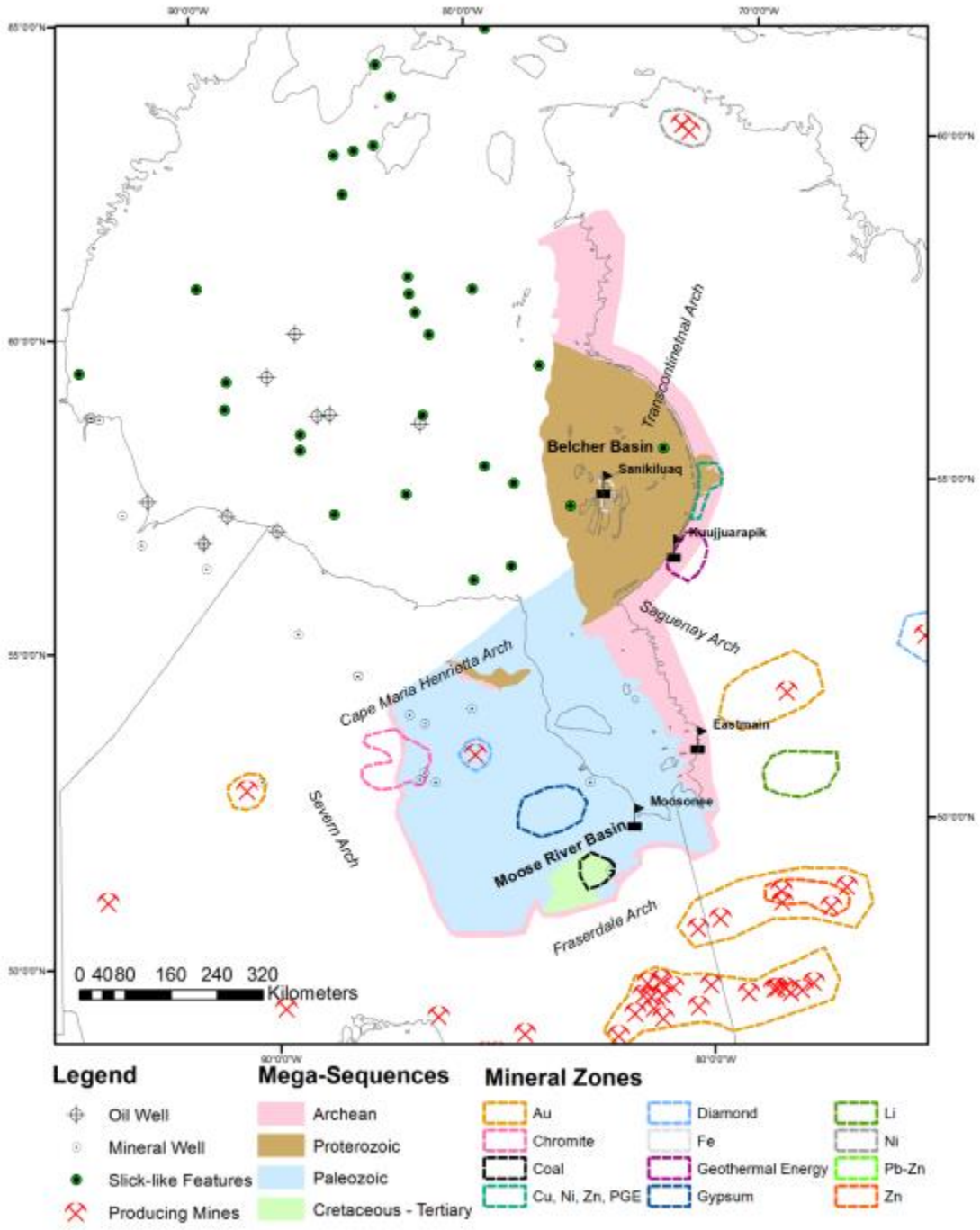
Colour code – gradation bar ranges from no potential (grey) and very low potential (pale pink) to low potential (red) to the highest potential (dark green, globally competitive for exploration). The study area (black outline) contains low to medium petroleum potential areas. More interpretive mapping, modern seismic, and potential field data would need to be acquired to generate a more accurate representation of the petroleum potential. The petroleum potential of eastern Hudson Bay and James Bay is discussed in GSC, 2023.
Source: Qualitative Petroleum Resource Assessment of western Hudson Bay, Foxe Channel, and Repulse Bay, Manitoba, Nunavut, Ontario, and]

Figure 3. Distribution of Seismic Data Acquired and Wells Drilled in the Hudson Basin



Source: Lavoie and Dewing, GSC Bulletin 609. *(Note depending on boundary of AOI, limited to no industry seismic data has been acquired or wells have been drilled within the Qikiqtait AOI*.).

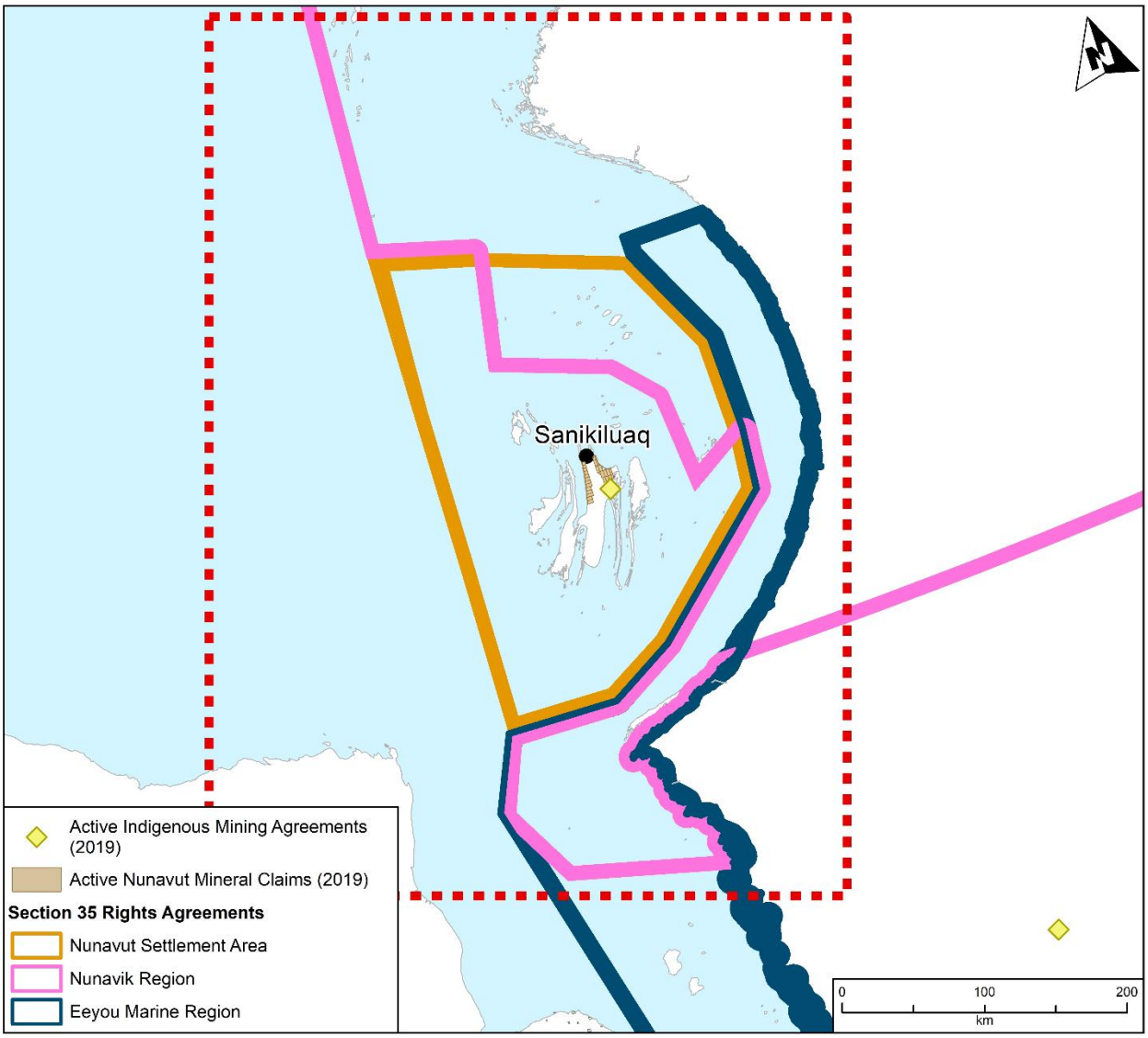
Figure 4: Mineral Analysis of Hudson Bay Basin



Eastern Hudson Bay and James Bay geological mega sequences, select petroleum system indicators (sea surface, slick-like features) and well locations. Wells shown are both petroleum and mineral wells drilled in the Hudson Bay Basin, the Moose River Basin, and into the Canadian Shield. The abundance of mines in the SE corner of the map are located within the Abitibi Greenstone belt of Quebec and Ontario. Iron wells drilled on the Belcher Islands are not shown on the map, but are primarily within the Fe polygon of the mineral zone.

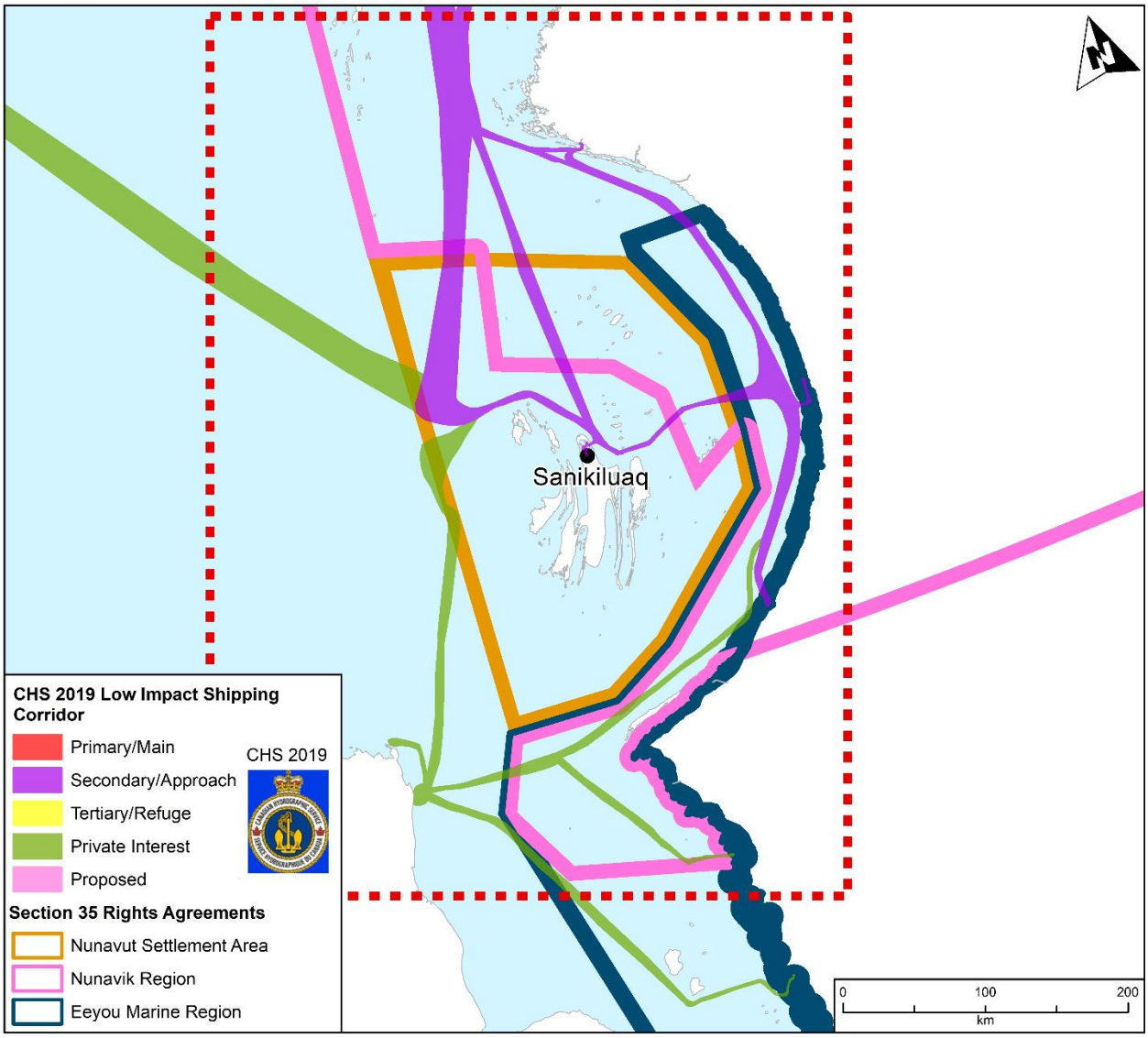
Source: taken from Hanna et al., 2018

Figure 5: Area of the Qikiqtait/Belcher Islands with Mineral Activity



Source: Map produced by Marine Planning and Conservation Program, Arctic Region.

Figure 6: Shipping Corridors Through the Qikiqtait AOI.



Source: Map produced by Marine Planning and Conservation Program, Arctic Region.

Bibliography

Aarluk Consulting Incorporated. (2011). Sanikiluaq Integrated Community Infrastructure Sustainability Plan Vol. 2, May 26, 2011. Prepared for the Government of Nunavut.

Arctic Council. (2009). Arctic Marine Shipping Assessment 2009 Report.

Arcticsealift.com. https://www.arcticsealift.com/. Accessed August 2023.

Armstrong, Claire W., Naomi S. Foley, Dag Slagstad, Melissa Chierici, Ingrid Ellingsen and Marit Reigstad. (2019). Valuing Blue Carbon Changes in the Arctic Ocean. Frontiers in Marine Science. June 25, 2019.

Arriagada, P. and Bleakney A. (2019). Inuit Participation in the wage and land-based economies in Inuit Nunangat. Aboriginal Peoples Survey, Statistics Canada. June 13, 2019. ISBN 978-0-660-30914-9

Ashley, B. (2002). Edible Weights of Wildlife Species used for Country Food in the Northwest Territories and Nunavut. Wildlife and Fisheries Division, Department of Resources, Wildlife and Economic Development, Government of the Northwest Territories, Yellowknife, NWT. Manuscript Report No. 138.

Awan, T., Twigg, M., Sushant, and Desrochers, C. (2023). Inuit-led Economic Development: An Overview of Nunavut's Blue Conservation Economy. Smart Prosperity Institute.

Barnes, David. (2020). What is Blue Carbon and Why Is It Important? Frontiers for Young Minds. The Earth and Its Resources. February 4, 2020.

Berkes, F., Fast, H., Manseau, M., and Diduck, Al. (2005). Breaking Ice: Renewable Resource and Ocean Management in the Canadian North. University of Calgary Press.

Bossé, S.M. (2023). Gross Domestic Product, 2022: An in-depth look at provincial and territorial economies, Analysis in Brief. Produced for Statistics Canada.
Gross domestic product, 2022: An in-depth look at provincial and territorial economies (statcan.gc.ca)

Calm Air. Website. Calm Air, Cargo Products, Country Food Service. Accessed, December 2023. Calm Air: Cargo Products

Canada Gazette. (2022). Canada Petroleum Resources Act. Order Prohibiting Certain Activities in Arctic Offshore Waters, 2022: SOR/2022-274. Canada Gazette, Part II, Volume 157, Number 1.

Canadian Orebodies Inc. (2019). Management's Discussion and Analysis of the Financial Condition and Results of Operations Three and Nine Months Ended October 31, 2019.

Canadian Mortgage and Housing Corporation (CMHC). (2022). Housing Market Information, Northern Housing Report 2022. Indigenous & Northern Housing, Canadian Mortgage and Housing Corporation.

Carr, K., Natcher, D.C., Olfert, R. (2013). Measuring the economic impact of publicly funded research in Northern Canada. Polar Geography, p. 291-304. DOI: 10.1080/1088937X.2013.826746

Chan, H. M., Fediuk, K., Hamilton, S., Rostas, L., Caughey, A., Kuhnlein, H., and Loring, E. (2006). Food security in Nunavut, Canada: barriers and recommendations. International journal of circumpolar health, 65(5), 416-431.

Chamber of Marine Commerce Canada. (2020). https://www.marinedelivers.com/wp-content/uploads/2019/01/List-of-Arctic-Goods.pdf

CIRNAC. (2022). Northern Oil and Gas, Annual Report, 2022. Prepared by Crown-Indigenous Relations and Northern Affairs Canada.

Conference Board of Canada. (2023). The Role of the Hunter in Inuit Nunagat's Mixed Economy. https://fsc-ccf.ca/wp-content/uploads/2023/04/the-role-of-the-hunter-in-inuit-nunungat_2023.pdf.

Co-Management Working Group. (2016). Nunavut Polar Bear Co-Management Plan.

COSEWIC (Committee on the Status of Endangered Wildlife in Canada). (2004). COSEWIC assessment and update status report on the narwhal Monodon monoceros in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vii + 50 pp. www.sararegistry.gc.ca/status/status_e.cfm.

COSEWIC 2006. COSEWIC Assessment and Update Status Report on the Atlantic Walrus (Odobenus rosmarus rosmarus) in Canada. Ottawa: COSEWIC.

Council of Canadian Academies. 2014. Aboriginal food security in Northern Canada: An assessment of the state of knowledge. Ottawa, ON: The Expert Panel on the State of Knowledge of Food Security in Northern Canada, Council of Canadian Academies

Dawson, J., Copland, L., Mussells, O., and Carter, N. (2017). Shipping Trends in Nunavut 1990-2015: A report prepared for the Nunavut General Monitoring Program. Ottawa, Canada and Iqaluit, Nunavut.

Destination Nunavut. https://www.destinationnunavut.ca/en/places/sanikiluaq

Dewing, K.E., Lister, C.J., King, L.E., Atkinson, E.A., King, H.M., Kalejaiye, A.M., Krakowka, A. (2023). Hydrocarbon resource assessment of Hudson Bay, Geological Survey of Canada, Open File 8989.

Drummond, K.J. (2009). Northern Canada Distribution of Ultimate Oil and Gas Resources. Indian and Northern Affairs Canada.

Ellis Quinn. (2015). Eye on the Arctic. https://www.rcinet.ca/eye-on-the-arctic/2015/06/26/nunavut-canada-community-revives-eiderdown-business/

Evans, M. S., Muir, D. C., Keating, J., & Wang, X. (2015). Anadromous char as an alternate food choice to marine animals: a synthesis of Hg concentrations, population features and other influencing factors. Science of the Total Environment, 509, 175-194.

Explore Nunavut. https://www.explorenunavut.com/sanikiluaq.php. Accessed August 2023.

Fisheries and Oceans Canada. (2002). Atlantic Walrus. Stock Status Report. E5-17, 18, 19, 20.

Fisheries and Oceans Canada (DFO), Ecosystems and Fisheries Management (2008).Traditional Ecological Knowledge Strategy for Oceans Management.

Fisheries and Oceans Canada. (2013). Socio-Economic Analysis of the Atlantic Walrus for the Integrated Fisheries Management. Prepared by Policy and Economics Branch, Arctic Region.

Fisheries and Oceans Canada. (2016a). Framework for Integrating Socio-Economic Analysis in the Marine Protected Areas Designation Process. Economic Policy and Research. Economics Analysis and Statistics Directorate. Ottawa.

Fisheries and Oceans Canada. (2016b). Estimates of abundance and total allowable removals for Hudson Bay-Davis Strait and South and East Hudson Bay Atlantic walrus (*Odobenus rosmarus rosmarus*) stocks. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2015/063.

Fisheries and Oceans Canada (DFO). (2017a). Socio-economic Analysis of Narwhal in Admiralty Inlet, Eclipse Sound. Prepared by Policy and Economics Branch, Arctic Region.

Fisheries and Oceans Canada. (2017b). Integrated Fisheries Management Plan for Atlantic Walrus (Odobenus rosmarus) in the Nunavut Settlement Area.

Fisheries and Oceans Canada. (2023). Estimates of abundance and total allowable removals for the Hudson Bay-Davis Strait Atlantic Walrus (*Odobenus rosmarus rosmarus*) stock. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2023/030.

Gilchrist, H.G., and Robertson, G.J. (2000). Observations of Marine Birds and Mammals Wintering at Polynyas and Ice Edges in the Belcher Islands, Nunavut, Canada. Arctic. Volume 53, Issue 1.

Government of Nunavut. (2007). Department of Education, C&SS, Inuit Qaujimajatuqangit Education Framework. https://www.gov.nu.ca/sites/default/files/files/Inuit%20Qaujimajatuqangit%20ENG.pdf

Government of Nunavut. (2012). Department of Economic Development and Transportation. Infrastructure in Nunavut. What we have and what we need. Nunavut Mining Symposium. April 17, 2012.

Government of Nunavut. (2016). Nunavut Fisheries Strategy: 2016-2020. Department of Environment, Fisheries and Sealing Division.

Government of Nunavut, Parks Canada and Qikiqtani Inuit Association (GN PC QIA). (2017). A National Marine Conservation Area Proposal for Lancaster Sound: Feasibility Assessment Report. Submitted by the Lancaster Sound National Marine Conservation Area Feasibility Assessment Steering Committee.

Government of Nunavut. (2021). Nunavut Airports, 20-Year Capital Needs Assessment Update, 2020 - 2024. Department of Economic Development and Transportation. Government of Nunavut. EDT_2021_Airports 20-Year_Capital_Needs_2020-2040_Final_231221.pdf (assembly.nu.ca)

Guy, E., and Lasserre, F. (2016). Commercial shipping in the arctic: new perspectives, challenges and regulations. *Polar Record*, online version.

Hanna, M.C., King, H.M., and Lister, C.J., 2018. Qualitative petroleum resource assessment of eastern Hudson Bay and James Bay, Nunavut, Ontario, and Quebec; Geological Survey of Canada, Open File 8344, 21 p. https://doi.org/10.4095/308326

Hayder, S. (2014). Socio-Economic Impact of the Presence of Asian Carp in the Great Lakes Basin. DFO/2014-1919, Cat No. Fs23-600/2014E-PDF, ISBN 978-1-100-23178-5.

Hemlo Explorers. Website. Overview | Hemlo Explorers Inc. Accessed March 2024.

Hoover, C., Bailey, M., Higdon, J., Ferguson, S., and Sumaila, R. (2013). Estimating the Economic Value of Narwhal and Beluga Hunts in Hudson Bay, Nunavut. Arctic (Journal), Vol 66, 1 P. 1-16. DOI: 10.14430/arctic4261

Hoover, C., Ostertag, S., Hornby, C., Parker, C., Hansen-Craik, K., Loseto, L.L., and Pearce, T. (2016). The importance of Hunting for Hunting for Future Inuit Food Security. Solutions 7(4): 40-51.

IHS Markit. (2017). Vessel Accumulation and Cargo Value Estimation.

Insignia Marketing Research Inc. (2016). Nunavut Visitor Exit Survey 2015 Final Report. Prepared for Nunavut Tourism.

Kennedy, J. (2010). Social, Economic and Cultural Overview. Foxe Basin Area of Interest (AOI).

Krantzberg, G., and de Boer, C. (2008). A Valuation of Ecological Services in the Laurentian Great Lakes Basin with an Emphasis in Canada. Climate Change/Environmental Issue. Journal AWWA 100:6.

Lavoie, D. and Dewing, K. (ed.). (2022). Sedimentary basins of northern Canada: contributions to a 1000 Ma geological journey and insight on resource potential; Geological Survey of Canada, Bulletin 609, 322 p. https://doi.org/10.4095/326074

Lesage, V., Doidge, D.W. and Fibich, R. (2001). Harvest statistics for Beluga Whales in Nunavik, 1974–2000. DFO Can. Sci. Advis. Sec. Res. Doc. 2001/022. 35 p.

Loring, E. (1996). The Cost-Benefit Relations of Modern Inuit Hunting: The Kapuivmiut of Foxe Basin, N.W.T. Canada. MA Thesis, Department of Geography, McGill University, Montreal, Quebec, Canada. 98pp.

Marbek. (2010). Assessing the Economic Value of Protecting the Great Lakes – Literature Review Report. Prepared for Ontario Ministry of the Environment.

Mitchell, M.G.E., Schuster, R., Jacob, A.L., Hanna, D.E.L., Dallaire, C.M., Raudsepp-Hearne, C., Bennett, E.M., Lehner, and B., Chan, K.M.A. (2021) Environmental Research Letters. Volume 16, Number 1.

Morse, M., McCauley, D., Orofino, S., Stears, K., Mladjoy, S., Caselle, J., Clavelle, T., Freedman, R. (2024). Preferential selection of marine protected areas by the recreational scuba diving industry. Marine Policy, 2024; 159:105908 DOI:10.1016/j.marpol.2023.105908

Natural Resources Canada. (2018). Qualitative assessment of petroleum potential of eastern Hudson Bay and James Bay, Nunavut, Ontario and Quebec. Geological Survey of Canada open file 8344.

Natural Resources Canada. (2024). Qualitative Economic Resource Assessment: Qikiqtait Area of Interest.

NEAS. Website. Accessed 2020. Neas.ca

Nordicity Group and Uqsiq Communications. (2010). Economic Impact Study: Nunavut Arts and Crafts, Final Reports, Submitted to: Government of Nunavut – Department of Economic Development and Transportation.

Northern Images. Website. Webpage, Sanikiluaq, NU. Accessed December 2023. https://northernimages.ca/community/sanikiluaq-nu/

NRCAN.gc.ca. Sanikiluaq High Displacement Renewable Energy (nrcan.gc.ca). Accessed September 2022.

Nunavut DEIA (Department of Executive and Intergovernmental Affairs). Website. Accessed 2021, Nunavut Economy. https://www.gov.nu.ca/eia/documents/nunavut-economy.

Nunavut Impact Review Board (NIRB). (2019). Final Report for the Strategic Environmental Assessment in Baffin Bay and Davis Strait. NIRB File No. 17SN034.

Nunavut News. (2023). Community on the Rise, Nunavut News. https://www.nunavutnews.com/news/community-on-the-rise-7282578

Nunavut Planning Commission. (2013). Summary of Community Meetings on the Draft Nunavut Land Use Plan, Sanikiluaq, May 7-8, 2013.

Nunavut Planning Commission. (2021). Draft Nunavut Land Use Plan. nunavut.ca/sites/default/files/21-001e-2021-07-08-2021_draft_nunavut_land_use_plan-english_0.pdf

Oakes, J. (1992). Eider Skin Garments Used by the Ungava Inuit from the Belcher Islands, Northwest Territories: Construction and Context. Clothing and Textiles Research Journal. Volume 10, Issue 2.

O'Garra, T. (2017). Economic value of ecosystem services, minerals and oil in a melting Arctic: A preliminary assessment. Ecosystem Services, Volume 24, pages 180-186.

Parent, G.J, Mosnier, A., Montana, L., Cortial, G., St-Pierre, A.P., Bordeleau, X., Lesage, V., Watt, C., Postma, L., and Hammill, M.O. (2023). Re-examining populations of beluga in the Hudson Bay-Strait

Complex and assessing the impact on harvests in Nunavik and Sanikiluaq management units. DFO Can. Sci. Advis. Sec. Res. Doc. 2023/004. iv + 31 p.

Parks Canada, National Marine Conservation Areas, Use of Inuit traditional knowledge (Qaujimajatuqangit). (2018). Retrieved from https://www.pc.gc.ca/en/amnc-nmca/cnamnc-cnnmca/tallurutiup-imanga/connaissances-knowledge

Postma, L.D. (2017). Genetic diversity, population structure and phylogeography among Belugas (*Delphinapterus leucas*) in Canadian waters: broad to fine-scale approaches to inform conservation and management strategies (PhD Thesis). University of Manitoba, Winnipeg

Priest, H., & Usher, P. J. (2004). The Nunavut wildlife harvest study. . Nunavut Wildlife Management Board, Iqaluit, Nunavut, Canada, p. 822.

Procter, R.M., Taylor, G.C., and Wade, J.A. (1984). Oil and Natural Gas Resources of Canada. Geological Survey of Canada, Paper 83-31, 59 p.

Qikiqtaaluk Corporation. Website. Accessed January 8, 2020. https://www.qcorp.ca/en/group-of-companies/transportation-and-communication/nunavut-sealink-and-supply-inc-mssi

Qikiqtaaluk Business Development Corporation (QBDC). 2021. Qikiqtaaluk Business Development Corporation Receives $6.5M from Natural Resources Canada to Support Wind Energy Development in Sanikiluaq. News Release, April 13, 2021.

Qikiqtani Inuit Association. (2014). Qikiqtani Truth Commission, Community Histories 1950-1975, Sanikiluaq. ISBN 978-1-927095-62-1

Sanikiluaq.ca. (website). Accessed August 2023. Welcome to Sanikiluaq

Sea Duck Joint Venture. (2018). Species Status Summary and Information Needs. https://seaduckjv.org/wp-content/uploads/2014/08/HCOEI-status-summary-Jan-2018-FINAL.pdf

SOR/2022-274. Order Prohibiting Certain Activities in Arctic Offshore Waters, 2022. CANADA PETROLEUM RESOURCES ACT. P.C. 2022-1317 2022-12-15.

Statistics Canada. (2021). Census Profile, 2021 Census. http://www12.statcan.gc.ca/census-recensement/2021/dp-pd/prof/index.cfm?Lang=E

Steenkamp, H.M., Timlick, L., Elgin, R.A., and Akavak, M. (2016). Geological Mapping and Petrogenesis of Carving Stone in the Belcher Islands, Nunavut. Canada-Nunavut Geoscience Office.

Stewart, R.E.A. (2008). Redefining Walrus Stocks in Canada. Arctic 61:292-398.

Symbion Consultants. (2009). Socio-Economic Analysis for Cumberland Sound Beluga. Prepared For Fisheries and Oceans Canada.

Travel Nunavut. https://www.travelnunavut.ca/regions-of-nunavut/communities/sanikiluaq/

Treasury Board of Canada Secretariat. (2007). Canadian Cost-Benefit Analysis Guide - Regulatory Proposals. Catalogue No. BT58-5/2007. Ottawa.

Turgeon, J., Duchesne, P., Colbeck, G.J.C., Postma, L. and Hammill, M.O. (2012). Spatiotemporal segregation among summer stocks of Beluga (*Delphinapterus leucas*) despite nuclear gene flow: implication for an endangered population in eastern Hudson Bay (Canada). Conserv. Genet. 13(2) : 419–433. doi:10.1007/s10592-011-0294-x

Vail, S., and Graeme, C. (2001). Examination of the Nunavut Economy. Nunavut Economic Outlook. Conference Board of Canada.

Vard Marine Inc. (2016). Protection of Critically Sensitive Nunavut Marine Habitats – Final Report. Prepared for WWF-Canada.

Whitford, J. (2008). Socioeconomic Analysis for Atlantic Walrus. Prepared for Fisheries and Oceans Canada, Arctic Region.

Yurkowski, D.J., Johnson, K.F., Carvalho, P.C., Capelle, D.W., Johnson, M.W., Prodaehl, A.W., Mackey, T., Dawson, K., Candlish, L., Capelle, D., Dunmall, K., Harris, L.N., Ferguson, S.H., Marcoux, M., McNicholl, D., Mosnier, A., Niemi, A., O'Brien, J., Pierrejean, M., Watt, C. (2023). Biophysical and Ecological Overview Summary of the Qikiqtait Study Area and Adjacent Waters. Can. Tech. Rep. Fish. Aquat. Sci. 3565: ix + 148 p.

Personal Communications

Hunters and Trappers Association (Sanikiluaq), 2023.

Arctic Gateway Group - Various representatives from Arctic Gateway Group. Virtual meetings and email correspondence, 2023.

Bethany Schroeder, Senior Oceans Biologist, Marine Planning and Conservation Program, Fisheries and Oceans, 2020.

Les Harris, Arctic Fisheries Research Biologist, Fisheries and Oceans Canada. Email, 2022.

Annex 1: Government and Other Organizations

Federal Government

Federal government departments and agencies include Fisheries and Oceans Canada/Canadian Coast Guard, Environment and Climate Change Canada, Parks Canada Agency, Transport Canada, Natural Resources Canada and Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC) and Indigenous Services Canada (ISC).

Fisheries and Oceans Canada (DFO)[26] has the lead federal role in managing Canada's fisheries and safeguarding its waters. It conserves and protects fishery resources, marine mammals and their habitat, endangered or threatened marine species and their habitat, unique habitats, and areas of high biodiversity or biological productivity. DFO establishes MPAs under the *Oceans Act* (Section 35, Marine Protected Areas). Additional key DFO legislation includes the *Fisheries Act* and *Species at Risk Act*.

The Canadian Coast Guard (CCG)[27] is responsible for safe harbours, waters and waterways and manages and regulates marine transportation.

Environment and Climate Change Canada (ECCC)[28] conserves the country's natural heritage, protects habitat, and ensures a clean, safe and sustainable environment. ECCC legislation of relevance is the *Canada Wildlife Act*, *Species at Risk Act* and *Migratory Birds Convention Act, 1994*.

Parks Canada Agency (PCA)[29] protects places such as national parks, national historic sites and national marine conservation areas. Key PCA legislation includes the *National Marine Conservation Areas Act*.

Transport Canada (TC)[30] is responsible for transportation policies and programs. The department promotes safe, secure, efficient and environmentally responsible transportation.

Natural Resources Canada (NRCAN)[31] is responsible for the development and use of Canada's natural resources and the competitiveness of Canada's natural resources products.

Indigenous Services Canada (ISC) supports Indigenous peoples (First Nations, Inuit and Métis) to support social programs, health, housing, and community infrastructure.

Government of Nunavut

Key Government of Nunavut departments include the Department of Environment and Department of Economic Development and Transportation.

Nunavut's Department of Environment[32] is responsible for program areas such as Wildlife Management, Parks and Special Places, and Environmental Protection . Key legislation includes the *Nunavut Wildlife Act* and the *Environmental Protection Act*.

[26] http://www.dfo-mpo.gc.ca/index-eng.htm
[27] http://www.ccg-gcc.gc.ca/eng/CCG/Home
[28] https://www.ec.gc.ca/?lang=en
[29] https://www.pc.gc.ca/en/index
[30] http://www.tc.gc.ca/eng/menu.htm
[31] https://www.nrcan.gc.ca/home
[32] https://www.gov.nu.ca/environment

Nunavut's Department of Economic Development and Transportation[33] has a primary goal of ensuring Nunavummiut participate in the benefits of economic growth. This department is responsible for ensuring sustainable economic growth, helping build healthy communities, essential infrastructure and for fisheries and sealing programs.

Nunavut Institutions of Public Government

Nunavut Institutions of Public Government consist of the Nunavut Impact Review Board (NIRB), Nunavut Planning Commission (NPC), Nunavut Water Board (NWB) and Nunavut Wildlife Management Board (NWMB).

The Nunavut Marine Council (NMC) advises and makes recommendations regarding marine areas in the Nunavut Settlement Area through the coordination of shared knowledge from NIRB, NPC, NWB, and NWMB Boards.

Community

Community organizations include Hunters and Trappers Organization (HTO) and hamlet councils. Community-based HTOs are led by an elected board and they manage harvesting among their members, which include all Inuit in the community.[34] The *Nunavut Agreement* stipulates that HTOs along with RWOs (see below) oversee the exercise of harvesting by Inuit, and sets out powers and functions of HTOs. Hamlet councils are elected as the governing bodies of the municipal corporations and have custody over its administrative and legislative powers (MTO, 2005).

Inuit Organizations

The three Inuit organizations of relevance to the Qikiqtait area are Nunavut Tunngavik Incorporated (NTI), Regional Inuit Associations (RIA), and Regional Wildlife Organizations (RWO). The Qikiqtani Inuit Association (QIA) and Qikiqtani Wildlife Board (QWB) are, respectively, the RIA and RWO for the Qikiqtani region.

NTI[35] represents Inuit under the Nunavut Agreement and ensures that the agreement is implemented. It coordinates and manages Inuit responsibilities set out in the *Nunavut Agreement* and ensures that the federal and territorial governments fulfill their obligations.

The *Nunavut Agreement* stipulates that RWOs along with HTOs oversee the exercise of harvesting by Inuit, and sets out powers and functions of RWOs. The KWB has the following four main obligations: regulating harvesting practices and techniques among members of HTOs, allocating regional basic needs levels among HTOs in the region, assigning regional basic needs levels to any person or body other than an HTO, and managing harvesting among the members of HTOs in the region.

[33] https://www.gov.nu.ca/edt
[34] http://www.tunngavik.com/wp-content/uploads/2009/02/nti-org-chart-english.pdf
[35] http://www.tunngavik.com/about/

Annex 2: Sanikiluaq Subsistence Harvest Statistics

Sanikiluaq Marine Mammal Subsistence Harvests

	2017	*2018*	*2019*	*2020*	*2021*	Total	Average
Beluga	30	50	28	46	30	184	37
Walrus	1	3	0	0	5	9	2

Sources: DFO, Ontario and Prairie Region Policy and Economics and Arctic Region Fisheries Management staff.

Notes:

1) The harvest statistics are reported above are by community, not by the geographical boarders of the AOI. Therefore, the harvest statistics reports are likely an overestimation of the harvests that take place within the AOI.
2) Zero (0), represents zero animal harvests as reported by the community.
3) Averages are calculated by rounding to complete animal values.
4) 2020-2022 data is believed to have potentially been impacted by COVID-19 restrictions in some fashion.
5) At the time of writing, 2022 data was not available.

Sanikiluaq Historic Harvests for Arctic Char and Seals

	1996-97	**1997-98**	**1998-99**	**1999-00**	**2000-01**	**Total**	**Average**
Arctic Char	9024	10,451	10,243	10,297	8,832	48,847	9,769
Seal	811	1,241	964	789	654	3,359	892

Source: Priest and Usher, 2004.

Notes:

1) Seal species considered are ringed seal, bearded seal, harp seal, harbour seal, hooded seal, and seals (unspecified).
2) Averages are calculated by rounding to complete animal values.

Matrix 1: Total Economic Valuation Flowchart (developed by Hayder (2014))