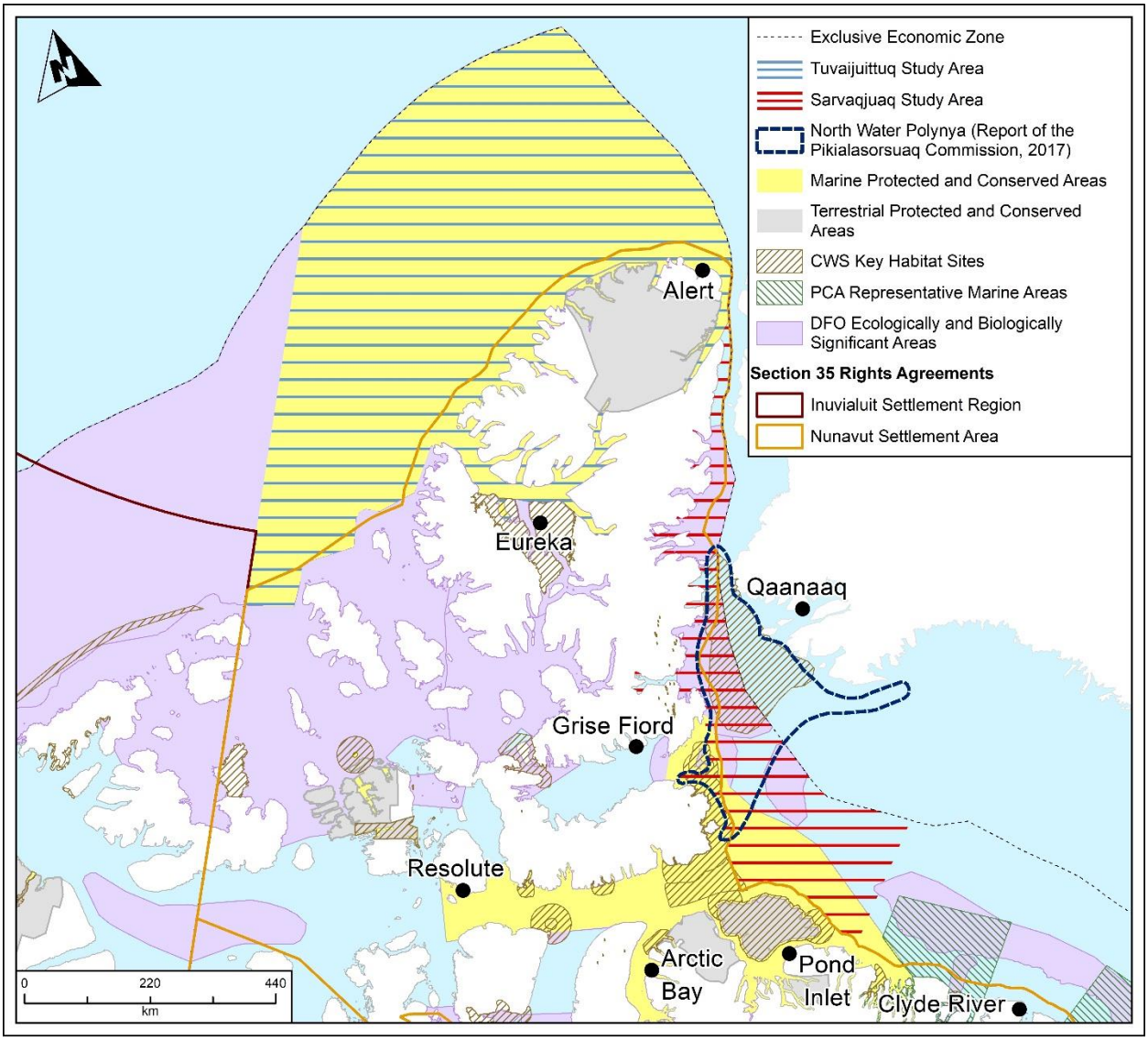
Socio-Economic Overview and Assessment for Sarvarjuaq



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Contents

Version Tracking

This report is a working draft for input and engagement by partners and stakeholders. This report will be revised and updated accordingly as additional information and input is obtained. The process to further develop this report will be iterative.

Date	Section	Description of Amendment
September 27, 2019		**Original draft**
January 9, 2020	**Sections throughout entire report**	**Report updated with current data**
August 30, 2022	**Sections throughout entire report**	**Revisions based on comments from internal review in preparation for report to be shared with Marine Conservation and Protection**
October 12, 2022	**Sections throughout entire report**	**Revisions based on feedback from Marine Conservation and Protection**
February 20, 2023	**Sections throughout entire report**	**Updating report to share with Oceans program.**
May 3, 2023	**Communities**	**Added all Qikiqtani communities**
January 10, 2024	**Communities, Community Survey Results**	**Removed communities that will not be visited, added community survey results from Pond Inlet and Clyde River**
February 13, 2024	**Community Survey Results; Sections Throughout Report**	**Added community survey results for Arctic Bay, Resolute Bay, Grise Fiord; finalized report before approvals**
March 6, 2024	**Marine mammal harvesting data**	**Added statistics and adjusted for inflation**
July 11, 2024	**Sections throughout entire report**	**Edits based on comments from the Government of Nunavut and Transport Canada**

Highlights of the Updated Socio-Economic Overview Report for Sarvarjuaq

- The current report is considered a Phase II Socio-Economic Overview & Assessment to support the consideration of a Ministerial Order Marine Protected Area (MPA) including the associated cost-benefit analysis (CBA). This report focuses on the selected geographic boundary of the AOI and provides a more in depth assessment, compared to the Phase I report, of the socio-economic activities in the region.

- This report will be updated throughout the MPA designation process as the boundaries become more fully defined and new information becomes available. It could be used as the basis for another similar report to protect Sarvarjuaq if a permanent (i.e., via Governor in Council regulation) *Oceans Act* marine protected area (MPA) is established. The updated version of this analysis will then become the foundation for the required cost-benefit analysis (CBA).

- The objective of the final the socio-economic analysis is to provide comprehensive analysis based on the most updated relevant information for the area, as well as from discussions with partners/stakeholders such as the Government of Nunavut, Qikiqtani Inuit Association, and users of the area.

- The report, as it now stands, is based on data sources that primarily came from the 2021 Census Community Profiles and the Government of Canada, and publicly available data from the Government of Nunavut, industry and corporations, boards, academic researchers and consultants, online resources, and from information received from internal and external stakeholders.

- This version of the report is limited by:
  - Lack of detailed information specific to the area of interest, including Inuit use.
  - Sufficient time to thoroughly gather views on current and potential future economic activities in the area by Government of Nunavut, Qikiqtani Inuit Association, and users of the area.

- In an effort to reduce these gaps and limitations, DFO economics personnel are planning to continue to engage partners and stakeholders such as the Government of Nunavut, Qikiqtani Inuit Association, and communities surrounding the area. The key objectives are to keep an open a dialogue that can inform the required analyses necessary to support the initiative, and to receive any additional information relevant to the assessment.

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 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 and assessment report of Sarvarjuaq was developed by the Policy and Economics Branch of the Arctic Region of DFO, in consultation with other regional sectors including Marine Planning and Conservation, Science, and Resource Management. Key aspects for future collaboration addressed were: (i) the need for further information to support the refinement of geographic boundaries, the assessment of regulatory options for cost-effectiveness, and consultations; (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 report touches on aspects of these topics while discussion continues with partners and stakeholders to further advance them to a suitable conclusion.

Ecological Rationale

Sarvarjuaq is a distinctive geographic and oceanographic region in northern Baffin Bay, characterized by one of the largest recurring polynyas in the Arctic. A polynya is the term used to describe persistent open water in an area surrounded by sea ice; it is ecologically significant because it provides important habitat for Arctic and migratory species to carry out essential activities, such as feeding, mating, and reproducing. Climate change could threaten the consistency of the polynya formation, which could put pressure on local wildlife, but could also make the area more accessible for economic activities in the future.

Objective of the Socio-Economic Overview and Assessment Report

The objective of this report is to provide a detailed scan of socio-economic activities in and around the Canadian side of Sarvarjuaq. This area is also referred to as the North Water Polynya and Pikialasorsuaq (see figure 1). This report contains general information on socio-economic activities, by sector and/or activity, within and around the area. This report also aims to aid the regional Marine Planning and Conservation program in assessing information gaps, and to inform future steps toward potential protection of Sarvarjuaq.

This report is based on information, data and maps provided by the regional Marine Planning and Conservation program, and through targeted research, and information gathering by the regional Policy and Economics Branch of Fisheries and Oceans Canada. Other sources of information and data came from the Government of Canada, Government of Nunavut, commissions, academic researchers, consultants, and credible publicly-accessible websites.

Methodology

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

The methodology adopted for the analysis is the Total Economic Valuation (TEV) technique, 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.

In order to analyse existing activities within Sarvarjuaq, activities within the last 5 years were reviewed[1]. Future potential economic activities were restricted to those for which business plans were in place, and for which evidence of intent to undertake the activity (e.g., leases, permits, submission of plans for approvals, etc.) have been established.

Data Sources

The data used to develop the community profiles around Sarvarjuaq primarily came from the 2021 Census Community Profiles. Other sources of information 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 Sarvarjuaq specifically, the report used information available at relevant publicly-accessible websites and in the literature as secondary sources of information, where appropriate. 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 Sarvarjuaq. Additionally, critical information and expert opinions were obtained from members of the Science and Fisheries Management programs at Fisheries and Oceans Canada, Ontario and Prairies Region.

[1] The timeline of five years was chosen to ensure an up-to-date baseline of information. The pace of change in the Arctic is rapid and the inclusion of older information does not aid in the determination of current activities. A five-year timeline provides an appropriate and contemporary baseline and allows for some potential trend analysis of recent activities.

Demographic Profile of the Study Area

Sarvarjuaq centres around the North Water Polynya, an area of year-round open water surrounded by sea-ice cover. The North Water Polynya is found in the Nares Strait in Northern Baffin Bay, at the entrance to Smith Sound. Sarvarjuaq extends both North and South from the North Water Polynya, and straddles the international waterline between Canada and Greenland.

The North Water Polynya is the largest polynya in the Canadian Arctic, and is one of the most biologically-productive regions north of the Arctic Circle. It is vital to a range of species, including birds, marine mammals such as walrus, beluga and bowhead whales, narwhals, ringed, bearded and harp seals and polar bears, and several species of fish. The unique characteristics of this polynya also result in a plankton explosion in the early spring, providing an important source of food for numerous species (DFO, 2019, 2021; Hornby et. al. 2021).

The North Water Polynya is under pressure from climate change, which could affect its seasonal formation and duration and its ecological functioning (Ribeiro et al. 2021). At the same time, it could also become more easily accessible, potentially leading to increased human activity, such as shipping, fisheries, tourism, and mining. These stressors could have serious implications for the marine biodiversity and communities in the area (DFO, 2019).

Communities

Grise Fiord is the closest community to Sarvarjuaq, just to the east, while other nearby communities in Nunavut include Resolute Bay, Arctic Bay, Clyde River, Pond Inlet, and Qikiqtarjuaq.[2] According to the 2021 census, the population of Grise Fiord is 144 people. About 76% of the population is age 15 or older, and about 94% of the population are Inuit. The community has an employment rate of 50%. Most of the working population is employed in trades, transport and equipment operators and related positions.

Arctic Bay is located approximately 380 km south of Grise Fiord on the northern part of the Borden Peninsula on Baffin Island. Based on the 2021 census, Arctic Bay's population is 994, of which about 59% is age 15 or over, and about 97% are Inuit. Arctic Bay has an employment rate of 37.3%. Most of the employed work in trades, transport and equipment operator and related occupations, sales and service occupations, and occupations in education, law and social, community and government services.

Clyde River is about 410 km southeast of Pond Inlet in Patricia Bay on the northeastern coast of Baffin Island. Based on the 2021 Census, Clyde River's population is 1,181, of which 63% is age 15 or over, and about 97% are Inuit. Clyde River's employment rate is 33.6%. The large majority of the labour force work in sales and service, education, law and social services, community and government services, trades, and transport and equipment operator occupations.

Pond Inlet is located just under 340 km east of Arctic Bay on the north coast of Baffin Island. As per the 2021 census, Pond Inlet's population is 1,555, of which about 63% is age 15 or over, and about 93% are Inuit. Pond Inlet has an employment rate of 40.8%. Most of the employed work in sales and service,

[2] In Greenland, nearby communities include Siorapaluk, Qaanaaq, and Moriusaq (RPC, 2017).

business, finance and administration occupations, trades, and transport and equipment operator occupations.

Resolute Bay is almost 400 km southwest of Grise Fiord on the southern end of Cornwallis Island. According to the 2021 census, Resolute's population is 183, of which about 70% is age 15 or over, and about 90% are Inuit. Resolute Bay has an employment rate of 56%. Most of the employed work in business, finance and administration, education, law and social services, community and government services, trades, and transport and equipment operator occupations.

Qikiqtarjuaq is located on the west side of Broughton Island, just east of the southern portion of Baffin Island. According to the 2021 census, Qikiqtarjuaq's population is 593, of which about 67% is age 15 or over, and about 94% are Inuit. Qikiqtarjuaq has an employment rate of 36%. Most of the employed work in sales and service, business, finance and administration, and trades, and transport and equipment operator occupations.

Community Demographics

	Grise Fiord	**Resolute Bay**	**Arctic Bay**	**Pond Inlet**	**Clyde River**	**Qikiqtarjuaq**
Population	144	183	994	1,555	1,181	593
Age 15+ (%)	76	70	59	64	64	67
Inuit (%)	94	90	97	93	97	94
Employment Rate (%)	50	56	37	41	34	36
Employed in 'Mining, Quarrying, Oil and Gas Extraction'(excludes indirect employment through contracting, IIBA negotiations, etc.)	0	0	30	15	25	0

Source: 2021 Census.

Compared to the rest of Canada, Nunavut's population is the youngest with an average age of 29.1 in 2023; the second youngest is the Northwest Territories with an average age of 36.9. In terms of employment statistics, Canada's employment rate was 57.1% in the 2021 Census, which is higher than the communities listed above. While Nunavut grew at a slower pace than the rest of the country, it is one of only two jurisdictions in Canada where population increase relies on natural growth rather than immigration.[3]

These communities have mixed economies featuring both a land-based economy (e.g., fishing, hunting and trapping, sewing, arts and crafts, informal childcare) and a wage economy (Conference Board of Canada, 2001; Vard, 2016; Ningeongan, 2017). 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 (Arriagada, 2019).

[3] https://www.rcinet.ca/eye-on-the-arctic/2022/02/10/census-2021-a-snapshot-of-arctic-canadas-population-and-dwelling-data/

While not a community in the traditional sense, Canadian Forces Station (CFS) Alert is the northernmost permanently-inhabited location in the world, and is directly North of the North Water Polynya. CFS Alert operates as a military base and research station on the northern tip of Ellesmere Island. The base is supplied weekly by air and has about 60 residents (120 residents in the summer), half are military personnel and half civilian support staff. Environment and Climate Change Canada typically staffs two positions at CFS Alert (Chung, 2017).

Eureka is a weather observation station south of CFS Alert on Ellesmere Island, which also has residence. Civilian personnel are stationed at Eureka for six-month periods, while support staff follow a two-month-on, two-month-off rotation schedule (Allemang, 2015). Eureka has a rotating staff of about eight people (about 30 personnel in the summer) and is supplied by air every three weeks (Otis, 2016).[4]

Government and Other Organizations

There are numerous levels of government, as well as governmental, non-governmental, and community organizations with potential relevance to Sarvarjuaq. Details of these relationships are highlighted in Annex 1.

It is important to note that on January 18, 2024, GN, Nunavut Tunngavik Incorporated, and the GoC 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 to the GN. Associated with this are provisions to assist with timelines, management of resources (e.g., human resources, assets, records), and funding to support the transfer. The parties involved will continue to collaborate on completing the transfer of responsibilities by April 1, 2027. On the part of GoC, Natural Resources Canada (NRCan) has provided an official map of the proposed Sarvarjuaq MPA and the proposed Qikiqtaitait MPA showing exclusion of small enclosed bays thereby fulfilling a part of the conditions specified in the recently signed Devolution Agreement.

Infrastructure

Marine infrastructure in Nunavut's population centers is minimal and designed for basic community freight needs. This infrastructure is critical as communities depend on annual marine resupply for food, diesel for power generation, vehicles, construction materials, and other commodities that are not economically feasible to be shipped by airplane (GN EDT, 2012). CFS Alert is only accessible by air and has an airport run by the Department of National Defense. Eureka has its own airstrip (Wilson, 2000).

All of the Qikiqtani communities have airports. In terms of marine infrastructure, Resolute Bay, Grise Fiord, Pond Inlet, Clyde River, and Qikiqtarjuaq all have minimal marine infrastructure, and use the open beach as a sea lift. The community of Qikiqtarjuaq received 40M in funding in 2021 through Infrastructure Canada for a deep sea port to be constructed by the Government of Nunavut. Construction on Pond Inlet's small craft harbour was recently completed.[5] The Government of Canada, through DFO Small Craft Harbours, is currently constructing a small craft harbour in Clyde River

[5] https://nunatsiaq.com/stories/article/pond-inlets-small-craft-harbour-complete/

and potentially in Arctic Bay.[6] The Government of Nunavut received federal funding in 2023 to design, construct and manage community harbours in Grise Fiord and Resolute Bay.

Typical capital assets for subsistence and commercial activities in these 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).

Baseline Management Measures

Key federal legislation and regulations with management authority over the waters of Sarvarjuaq include the Nunavut Act, Nunavut Land Claims Agreement, *Oceans Act*, the *Fisheries Act*, Marine Mammal Regulations (enabled by the *Fisheries Act*), Northwest Territories Fishery Regulations (enabled by the *Fisheries* Act), *Species at Risk Act*, *Canada Shipping Act, 2001*, *Arctic Waters Pollution Prevention Act*, Canadian Navigable Waters Act (CNWA), *Nunavut Planning and Project Assessment Act*, and the *Migratory Birds Contraventions Act*. Territorial legislation and regulations include the *Nunavut Wildlife Act*, *Scientists Act*, *Tourism Act*, and Nunavut Hunting Regulations. If small and enclosed bays had been included within the boundary of Sarvarjuaq, additional Territorial legislation and regulations would have applied post devolution.

Land use plans provide guidance and direction for the conservation, development and utilization of land within their respective planning region. They contain a policy framework that recognizes the importance of conserving natural and cultural resources. The Nunavut Planning Commission (NPC) currently implements the North Baffin Regional Land Use Plan that applies to Sarvarjuaq; however, the Nunavut Land Use Plan will apply to all of the Nunavut Settlement Area once it is approved. While the draft plan is currently in the review stage, it will replace the existing regional land use plans once implemented. The NLUP, under Part 2 of NuPPAA, will establish rules for what type of projects are permitted in a land use zone; however, it is the Nunavut Impact Review Board (NIRB) under NuPPAA Part 3 that assesses individual projects. The purpose of the NLUP is to "protect and promote the existing and future well-being of the residents and communities of the Nunavut Settlement Area, taking into account the interests of all Canadians, and to protect, and where necessary, to restore the environmental integrity of the Nunavut Settlement Area".[7] The Nunavut Agreement also states in 11.2.1: (a) people are a functional part of a dynamic biophysical environment, and land use cannot be planned and managed without reference to the human community; accordingly, social, cultural and economic endeavours of the human community must be central to land use planning and implementation. Although the NLUP will impact the outer land fast ice zone in Sarvarjuaq, the majority of the MPA would be outside of that plan's jurisdiction; however, the *Impact Assessment Act* will apply.[8]

The most relevant treaties (in an Arctic context) for Sarvarjuaq include the United Nations Convention on the Law of the Sea (UNCLOS), the Convention on Biological Diversity (CBD), 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

[6] Adele Butcher, Regional Engineer, Fisheries and Oceans Canada. Emails, 2023.
[7] https://www.nunavut.ca/sites/default/files/21-001e-2021-07-08-2021_draft_nunavut_land_use_plan-english.pdf
[8] The creation of the MPA (both the parts inside and outside the Nunavut Settlement Area) itself will likely be subject to an assessment by NIRB, e.g., NuPPAA sections 173+ and 184+. The NLUP will apply to MPAs but not NMCAs (NuPPAA s. 70).

Agreement on Cooperation on Marine Oil Pollution Preparedness and Response in the Arctic (MOSPA), and the Agreement on Enhancing International Arctic Scientific Cooperation.

The United States-Canada Joint Arctic Leaders' announced on December 20, 2016, that Canada has designated all domestic Arctic waters as indefinitely off limits to future offshore Arctic oil and gas licensing. The designation is to be re-examined every five years with due consideration of Canadian Arctic waters, climate and marine science-based life-cycle assessments, Indigenous knowledge, and the socio-economic effects of developing or further prohibiting the development of Arctic offshore resources. These restrictions prohibit a licence owner from commencing or continuing any work authorized under the *Canada Oil and Gas Operations Act* on the frontier lands that are situated in Canadian Arctic offshore waters (under Ministerial authority) until after the five-year review is complete. This moratorium applies to the area in which Sarvarjuaq is located, and is in effect until December 31, 2028. Canada's position is that the moratorium is indefinite, and until a decision has been made to repeal the moratorium, it remains in force.[9]

[9] Don Reed, Policy Analyst, CIRNAC, January 24, 2023

Overview of Current and Predicted Future Economic Activities in and Around Sarvarjuaq by Sector

This section includes a discussion on the current state of different sectors in the study area, which can be used as a baseline for future analysis.

Commercial Fishing

The Sarvarjuaq study area overlaps with the boundaries of the North Atlantic Fishing Organization fishing division 0A (the northern area off the coast of Baffin Island), which includes management units for Greenland Halibut (*Reinhardtius hippoglossoides*). The NAFO Convention regulations (in tandem with the Fisheries Act and territorial regulations) allow Nunavut offshore licence holders to harvest Greenland Halibut within the study area. Commercial Shrimp fishing is authorized in SFA0 which overlaps with the Sarvarjuaq boundaries; however, quantities fished are not known at this time. As climate change continues to impact the region, there may be increased (primary) production, productivity, habitat availability, enhanced survival, and the expansion of species distribution and range (northern cold water and southern cool water species), and extended duration of fishing seasons in certain regions (DFO, 2013c).[10]

Two commercially important fish species in the Arctic are Northern Shrimp (*Pandalus borealis*) and Greenland Halibut, yet there is limited information on their distribution and abundance in the North Water Polynya. Possible range expansion of a commercial trawl and longline fishery for these species represents both an opportunity for northern communities and a potential threat to the ecosystem (i.e., overfishing or bycatch) (DFO, 2021). Based on a scan of DFO fishing logbook data, it appears that very limited commercial fishing activities have taken place to date within Sarvarjuaq, and no known commercial fishing activities have taken place since 2007. DFO only has four years on record with harvest data in Sarvarjuaq, all between 2003 and 2007.[11] The greatest reported harvest amount by quantity in a single year accounted for less than 1 percent of the total harvest in 0A of that year. Greenland Halibut has been the only species harvested on record in Sarvarjuaq and the majority has been harvested through bottom contact gear (i.e., trawl) (FMHIS, 2022).

Subsistence Harvesting

The North Water Polynya is vital to a range of species, including birds, marine mammals such as walrus, beluga (*Delphinapterus leucasand*) and bowhead whales (*Balaena mysticetus*), narwhals (*Monodon monocerus*), ringed (*Pusa hispida*), bearded (*Erignathus barbatus*) and harp seals (*Pagophilus groenlandicus*), and polar bears (*Ursus* maritimus) (DFO, 2019, 2021; Hornby et. al. 2021). Canadian and Greenlandic Inuit have recognized the North Water Polynya as critical habitat for many migratory species which they depend on for food security (RPC, 2017). The Inuit communities of Northwest Greenland and the communities of Pond Inlet, Arctic Bay, and Grise Fjord in Nunavut have historically relied on the wealth of marine life around the North Water Polynya for their food, clothing, shelter, and essential cultural and economic well-being (WWF, 2015).

[10] The impact was projected for 10-year and 50-year in alignment with the LAB Science Risk Assessment documents.

[11] While data for other years does exist, there was no recorded harvest outside of 2003-2007.

Grise Fiord is the community closest to Sarvarjuaq and the members of this community engage in subsistence harvesting for marine fishes, sea birds, and marine mammals in the area. Some of the stocks of Narwhal, Beluga, Walrus and seals harvested by community members from Resolute, Grise Fiord, Arctic Bay, Pond Inlet and Clyde River are likely to migrate through (and spend some time within) the North Water Polynya. [12] Total estimated food replacement value of marine mammals harvested in these communities for the past 5 years of data is outlined below. These calculations are based on food replacement value for both humans and dogs based on the edible portion of each species. Based on DFO records, the mammals below were harvested for subsistence. In addition to the data below, one bowhead whale was harvested by members of the Pond Inlet community in 2019. The estimated food replacement value of a bowhead is approximately $721,000.[13]

Marine Mammal Harvests in Local Communities

	Walrus							
Location	16/17	17/18	18/19	19/20	20/21	2021/22	2022/23	Estimated Food Replacement Value
Clyde River	0	0	1	0	1	1	2	$48,241
Grise Fiord	0	NR	5	12	0	5	NR	$212,260
Arctic Bay	0	2	NR	NR	1	NR	NR	$28,945
Resolute Bay	0	NR	0	0	2	4	0	$57,889
Pond Inlet	1	10	1	0	0	NR	NR	$115,778
Qikiqtarjuaq	4	NR	3	NR	NR	0	NR	$67,537

	Beluga							
Location	2016	2017	2018	2019	2020	2021	2022	Food Replacement Value
Clyde River	0	1	0	0	0	0	14	$118,409
Grise Fiord	0	2	5	3	10	14	NR	$268,395
Arctic Bay	1	1	NR	NR	0	NR	NR	$15,788
Resolute Bay	3	6	0	8	10	8	15	$394,698
Pond Inlet	1	0	0	0	1	NR	NR	$15,788
Qikiqtarjuaq	0	NR	0	9	NR	0	NR	$71,046

[12] Clair Hornby, Research Biologist/Scientist, Science Program, DFO Ontario and Prairie Region, and Arctic Region.
[13] Based on 2024 values and assuming bowhead whale of 55,000 kgs live weight.

	Narwhal							
Location	2016	2017	2018	2019	2020	2021	2022	Food Replacement Value
Clyde River	69	13	39	82	69	44	57	$3,863,615
Grise Fiord	4	51	13	3	38	10	NR	$1,232,628
Arctic Bay	123	215	135	66	312	185	NR	$10,731,112
Resolute Bay	0	0	0	3	1	2	4	$103,582
Pond Inlet	118	159	64	184	140	162	NR	$8,566,245
Qikiqtarjuaq	91	134	209	126	98	58	83	$8,276,215

Source: Fisheries Management Harvest Information System 2024; Note: * for Narwhal data, Resolute Bay also includes Creswell Bay

Recreational Fisheries

As per Fisheries Act regulations, sport hunting licenses can only be provided for walrus; however, based on the data recorded in DFO internal records for the study area, no walrus were hunted for sport between 2016-2021. Due to the remote nature of Sarvarjuaq, lack of infrastructure, and extreme weather, the cost of recreational fishing in the area is prohibitive. That said, a sport fishing license does allow fishing in the part of Sarvarjuaq that lies within Nunavut waters, which follows the Nunavut Settlement Area boundary within the Sarvarjuaq area.

Mining and Mineral Exploration

Based on the Nunavut Mineral Exploration, Mining and Geoscience Overview 2023, and mineral tenure information from the Nunavut Map Viewer[14], there are no known active mineral claims or mineral leases in and around Sarvarjuaq. Canada Coal was considering a coal mining project on the Fosheim Peninsula of Ellesmere Island, to the west of Sarvarjuaq, but in 2013 the company withdrew all project applications submitted to the NIRB, stating that more consultation with communities and regulatory bodies was required before advancing with a project.[15] Canada Coal has since relinquished its licences, including those on Axel Heiberg Island that overlapped with a unique fossil forest.[16] There are currently no active coal licenses in Nunavut.

North Pole Mining Ltd. currently holds 10 mineral claims located adjacent to the South Fiord on the west coast of Axel Heiberg Island. The claims were issued in October 2021 and have anniversary dates ranging between October 2026 and October 2031. No exploration work has been reported on the claims since they were acquired in 2021. The only currently operating mining project in proximity to Sarvarjuaq is the Mary River Mine, which produces iron ore in the Qikiqtani Region. The mine is located on northern Baffin Island, a few hundred kilometres south of Sarvarjuaq, near Pond Inlet (Baffinland, 2017a). Current operations at Mary River consist of three key components: the mine site, the Milne Inlet Tote Road, and the Milne Port. Iron ore is mined from the Deposit 1 open pit and crushed at the mine site, and the

[14] https://services.aadnc-aandc.gc.ca/Html5Viewer/nmsViewerIndex.html?viewer=nms20.nms&locale=en-US&appAcronym=nms

[15] https://www.nirb.ca/portal/ajax/popup-pdf-viewer.php?fileid=273841

[16] https://nunatsiaq.com/stories/article/65674canada_coal_withdraws_application_for_nunavuts_ellesmere_island/

crushed ore is then transported via truck on the tote road to the Milne Inlet port. The tote road is operational year-round, and ore is stockpiled at the port for shipping to international markets during the open water shipping season (Baffinland, 2017a).

Exploration activities have also been undertaken on Baffinland's mineral tenure surrounding the mine. During the 2022 field season, Baffinland completed infill and exploration drilling in 22 holes at Deposits 1 and 3, a structural mapping program on Deposits 2 through 5 and at the Glacier Lake prospect, and surface sampling on Deposit 3 East and Deposit 5. Ground gravity surveys covering the area between Deposits 1 and 2 also occurred to follow up anomalies detected during regional airborne surveys. A multi-year slope stability study on Deposit 1 also began and will continue into future field seasons. Results from these programs were intended to contribute to an updated NI 43-101 resource estimate and feasibility study for Mary River. Core from the geotechnical drilling was logged for its geology, but no specific exploration work took place in 2023 (CIRNAC, 2023).

Baffinland's production for the Mary River mine for 2022 was 4.7 million tonnes of iron ore shipped in 62 shipments from the Milne Inlet port. In 2023, the company shipped a total of 6.075 million tonnes of iron ore in 75 shipments. In 2022, a total of 505,605 hours were worked by Inuit and Inuit employee payroll totaled more than $17.4 million.[17] Contractors' Inuit employee payroll totaled more than $6.6 million. The value of contracts awarded to Inuit firms exceeded $162 million in 2022. This included twenty-six contracts with Inuit-owned firms, all of which were based in either the North Baffin communities or Iqaluit.

Throughout 2022, Baffinland continued to employ Shipping Monitors in Pond Inlet to provide a direct liaison between the community of Pond Inlet, the Mittimatalik Hunters and Trappers Organization and Baffinland. A total of ten Shipping Monitors were hired in 2022 in order to provide local community oversight on Baffinland shipping operations over the entire length of the season, including daily tracking of vessel locations and speeds. Hires consisted of five returning Shipping Monitors from previous years and five new workers/summer students joined the shipping monitoring team between July and October 2022. In late 2021, Baffinland created a Community Environmental Coordinator position in Pond Inlet to provide a local point-of-contact throughout the year for residents and organizations (e.g., MHTO) to obtain information about Baffinland's environmental monitoring programs and provide an opportunity for residents to voice concerns/comments they may have on Baffinland's activities and the potential effects these may have on the environment (Baffinland, 2022).

In 2019, Baffinland applied for approval of its Phase 2 development proposal which included, changing marine shipping from year-round to seasonal; changes at Milne Port to maximize shipping during open water; increasing shipment of iron ore to 12 Mtpa, and installation of an enclosed ore crushing facility. The proposal was then amended to include a rail component to Milne Port. The proposal also called for work camp expansion. After conducting its most extensive assessment, and hearing from two dozen registered intervenors, the Review Board submitted its report on May 13, 2022. The Review Board recommended to the responsible Ministers that the Phase 2 development not be allowed to proceed.

On November 16, 2022, by ministerial letter, the Honourable Dan Vandal, in his role as Minister of Northern Affairs, and on behalf of the Ministers of Environment and Climate Change, Fisheries, Oceans and the Canadian Coast Guard, Natural Resources, and Transport, accepted the recommendation of the Nunavut Impact Review Board, denying Baffinland Iron Mines Corporation its approval for the Phase 2

[17] These amounts include all Inuit employees who lived in and outside of Nunavut

expansion of the Mary River Mine.[18] DFO has received an application from Baffinland to construct a railway from the Mary River Mine to Steensby Inlet, where they plan to develop a new port that will be operational year-round. Baffinland had a Sustaining Operations Proposal (SOP) approved in November, 2023, which allowed increased operations (6 mt, up to 84 vessels) until December 31, 2024, and they are expected to apply for an SOP extension until the Steensby railway and port are constructed. [19]

Oil and Gas

Based on NRCan's Geological Survey of Canada (GSC) (GSC 2017), the areas of highest potential of oil and gas lies to the east and North east of Lancaster sound. A recent study by Kalejaiye et. al. showed low potential of oil and gas in the Northern portion of Sarvajuaq, with some areas of no potential due to the underlying ancient rock (see Annex 4). The Assessment of Undiscovered Oil and Gas in the Arctic (USGS 2009) indicates that undiscovered oil in and around the North Water Polynya is between 1 and 10 billion barrels of oil (USGS 2009) (see Annex 7). According to Crown-Indigenous Relations and Northern Affairs Canada's (CIRNAC) Northern Oil and Gas GeoViewer[20] (as of February, 2024), there is one significant discovery license (SDL 077) on Ellesmere Island just to the west of Sarvarjuaq covering 4276 hectares and owned by Suncor since 1987.[21]

There is currently a moratorium on new oil and gas exploration licencing that applies to the Canadian areas in and around Sarvarjuaq. This moratorium is in effect until December 31, 2028 and Canada's position is that it is indefinite; until a decision has been made to repeal the moratorium, it remains in force.[22] The Strategic Environmental Assessment in Baffin Bay and Davis Strait (Nunavut Impact Review Board, 2019) stated that "given significant gaps in knowledge of the environment necessary to support impact assessment, and an overall lack of regulatory, industry and infrastructure readiness in Nunavut, the 2016 moratorium on oil and gas development in the Canadian Arctic should remain in place for Baffin Bay and Davis Strait until such time as the key issues set out in this report can be addressed". The report stated that at least a decade of research, planning and consultation would be required to determine if the moratorium should be lifted. Additionally, the report noted that there is currently little interest from oil and gas companies to undertake development in the region; oil and gas activities appear to be at least 30-35 years away, should the moratorium be lifted. Given the current moratorium, the proposed new protections will not generate incremental costs in this area.

No production licences were recently issued (Gavrilchuk and Lesage, 2014), and high costs, difficult logistics, and dominance of natural gas made development of fields in the Arctic Islands uneconomic for the past decades. Regardless of the rate of ice loss, projects within the proposed MPA would continue to face many financing, regulatory, environmental, and social challenges, and would continue to be in competition with other onshore and offshore oil and gas discoveries across the globe, which would also see cost improvements due to advancing technology and where infrastructure might be more accessible

[18] https://www.tdslaw.com/resource/federal-ministers-back-nunavut-impact-review-board-in-refusing-baffinland-expansion/?utm_source=mondaq&utm_medium=syndication&utm_term=Environment&utm_content=articleoriginal&utm_campaign=article

[19] Paul Harper, FFHPP Biologist, Fisheries and Oceans, February 12, 2024.

[20] The Northern Oil and Gas Geoviewer can be viewed at: http://geo.aadnc-aandc.gc.ca/geoviewer-geovisualiseur/index-eng.html?context=NOG

[21] While the moratorium suspends the issuance of new oil and gas licences in the Arctic offshore, it does not affect the rights of licence holders to explore for or develop oil and gas resources in relation to the 80 existing oil and gas licences in the western and eastern Arctic offshore.

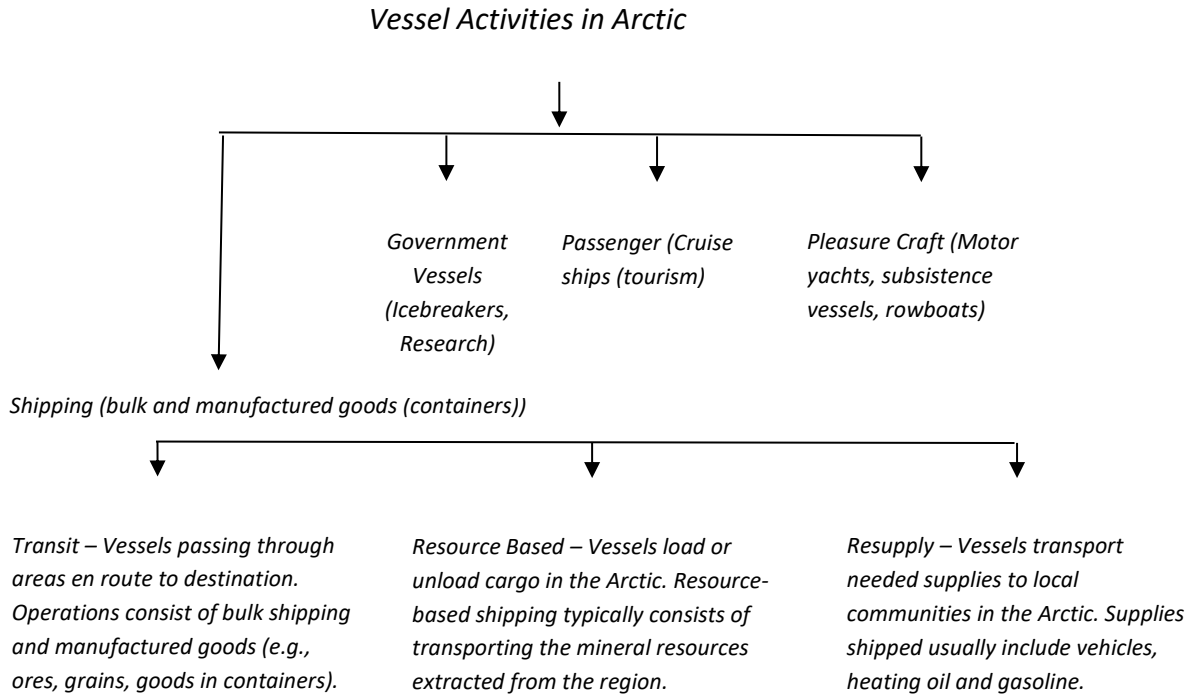
[22] Don Reed, Policy Analyst, CIRNAC, January 24, 2023

The Stockholm Environmental Institute have estimated breakeven prices for not-yet-leased offshore fields in the Alaskan Arctic (Beaufort and Chukchi Seas) that may be comparable to potential projects in Sarvarjuaq in excess of $200/barrel; however it is important to note that these areas are not an exact proxy for Sarvarjuaq. External projections (e.g., from the Canada Energy Regulator and Wood Mackenzie) point to a lack of oil and gas development in the Canadian Arctic over the next 20-30 years (NRCan, 2022). Although an economic assessment has not yet been completed for Sarvarjuaq, in general, given the remoteness, harsh weather conditions, and lack of infrastructure in the study area, resource extraction would be logistically and financially challenging. Full quantification of oil and gas in this region also remains largely unavailable, and as such exploration is unlikely to proceed in the foreseeable future. Further evaluations from NRCan on the oil and gas potential in Baffin Bay are expected in the future.

As stated in Kalejaiye, et. al. 2024, in addition to the low hydrocarbon potential, there are no upcoming calls for bids, or proposed project activities in the study area. There is very limited seismic data, no offshore wells have been drilled in the study area and there is a drilling moratorium in place. The operating conditions for oil and gas exploration in the study area are among the most extreme on the planet due to severe ice conditions, limited operating season, and geographic remoteness. Furthermore, there is a risk that the age of the sediments could have caused a migration or loss of previously generated hydrocarbons in the area.

Commercial Shipping and Other Vessel Activities

Flowchart 1: Vessel Activity Type[23]



Grise Fiord is resupplied by vessels from the South, which requires vessels to track through the southern portions of Sarvarjuaq. In 2021, there was some vessel traffic in the region, mostly through Lancaster Sound and going to and from Grise Fiord and Resolute. A few tracks went through the North Water Polynya itself.[24] Vessel tracks show general cargo, fishing, tanker, passenger ship and pleasure craft vessel traffic, government and icebreaker vessel activities in and around the Sarvarjuaq boundaries (Dawson et. al., 2017). Based on vessel data from Maerospace from 2017 to 2019, fishing, cargo, military, passenger, pleasure craft, search and rescue, icebreaker, towing, tanker, tug and sailing vessels have been observed within the Sarvarjuaq boundaries.[25] Based on vessel data from terrestrial and

[23] Right of Transit is defined in the UNCLOS (Article 38) as:
1. In straits referred to in article 37, all ships and aircraft enjoy the right of transit passage, which shall not be impeded; except that, if the strait is formed by an island of a State bordering the strait and its mainland, transit passage shall not apply if there exists seaward of the island a route through the high seas or through an exclusive economic zone of similar convenience with respect to navigational and hydrographical characteristics.
2. Transit passage means the exercise in accordance with this Part of the freedom of navigation and overflight solely for the purpose of continuous and expeditious transit of the strait between one part of the high seas or an exclusive economic zone and another part of the high seas or an exclusive economic zone. However, the requirement of continuous and expeditious transit does not preclude passage through the strait for the purpose of entering, leaving or returning from a State bordering the strait, subject to the conditions of entry to that State.
3. Any activity which is not an exercise of the right of transit passage through a strait remains subject to the other applicable provisions of this Convention.
[24] As demonstrated by vessel traffic density maps from: https://www.marinetraffic.com/
[25] Vessel data for the Sarvarjuaq study area were provided through two datasets that contain processed Automatic Identification System (AIS) data via Maerospace based on Tuvaijuittuq MPA and a previous North Water Polynya study area. The combination of these datasets comprises most of the Sarvarjuaq study area with a notable gap of AIS data in the

satellite sources (CCG access), 253 vessels have tracked through the Sarvarjuaq boundaries from 2021 to 2023 (see Annex 6 for further details). These vessels represent a variety of uses including, but not limited to, cargo, container, dry bulk, ferry, fishing, government research, passenger, pleasure crafts, tankers and tugs.

Based on AIS vessel data that has been processed and analyzed by Maerospace from 2017 to 2019, vessels determined[26] to be transporting material from the Mary River iron ore mine have been observed[27] traveling through, as well as just south of the Sarvarjuaq study area. The number of vessels has not been determined. In 2022, 4.7 million tonnes of iron ore was shipped from the Milne Inlet port between July and October. Sixty-two voyages were completed, with each carrying an average of 75,800 tonnes of iron ore (Baffinland, 2022). Iron ore market prices in 2022 averaged $121 (US)[28] per tonne. Using this average, multiplied by 75,800 tonnes, it can be estimated that the average vessel carried approximately $9.2M (US) worth of iron ore in 2022. At the very least, it is reasonable to assume that, even at various levels of market prices for iron ore[29], an average ore-carrying vessel contains millions of dollars worth of this commodity per shipment from the Mary River mine.

Aside from vessel traffic from the Mary River mine, there is likely no mining or oil traffic moving through the region (Dawson et. al., 2017); however, there is future potential for mining, and oil and gas activities in and around Sarvarjuaq. Vessel traffic in the area would likely increase if resource projects were developed. There could also be increased shipping traffic in the southern portion of the area near Lancaster Sound through the Northwest Passage.

Re-supply ("sealift") shipping activities include the transportation of supplies needed by local communities in the Arctic. Supplies usually include items such as non-perishable food items, vehicles, heating oil, fuel for power generating stations, 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). Re-supply activities are critical to numerous communities in the Canadian Arctic that have no or very limited road access and no or limited infrastructure to handle heavy aircraft (AC, 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 tugs boats and barges to unload cargo onto a beach ramp (Guy and Lasserre, 2016).

Sealift vessels can carry hundreds of twenty two foot equivalent (TEU) containers. According to ArcticSealift.com, one sealift vessel can carry up to 665 TEUs. Commodity groups per TEU container can range in value from $3,500 (CAD) 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 shipped per vessel

Nares Strait region. This gap does not indicate a lack of vessel activity, but a geographic gap between the multiple datasets used for this Sarvarjuaq study area vessel activity analysis. This will result in missing AIS vessel pings and potentially missing AIS vessels and vessel types for the Sarvarjuaq study area for the time span indicated.

[26] Based on reports from Baffinland that contained information on shipping vessels.

[27] Based on DFO's Geographic Information System (GIS) mapping analysis.

[28] Based on statistical price data from statista.com.

[29] Iron ore average price was $108.9 USD/mt in 2020, $161.7 USD/mt in 2021, $121 USD/mt in 2021, and are projected to be $85 USD/mt in 2023.

can be even higher. Generally, sealift vessels are likely to carry millions of dollars worth of commodities per vessel per shipment. Furthermore, in general, sealift volumes have increased considerably over the past decade due to construction projects, increased demand, and natural resource projects.

Recreational and Tourism Activities

There are eight different licensed outfitters and ten different licensed tour operators in the communities of Grise Fiord, Pond Inlet, Clyde River, Resolute, and Arctic Bay. These offer recreational activities to tourists including: arts and culture, ATV/snowmobiling, wildlife viewing/birdwatching, eco-tourism, camping, hiking, boating, hunting, fishing, dogsledding, park visits, floe edge tours, and general tours (Nunami Stantec, 2018).

Cruise ships enter into the area from the South to reach Grise Fiord.[30] Based on the most recent data available, in 2023, 10 different cruise ships made 12 trips through the Sarvarjuaq area; in total, the carries 1364 passengers.[31] Based on 2017 data, two (2) different cruise ships made three (3) different stops in Grise Fiord, carrying a combined total estimated count of 382 passengers and nine (9) different cruise ships made 13 different landings in Pond Inlet, carrying a combined estimated total count of 2,979 passengers. A total of 3 different cruise ships made three (3) landings at Clyde River carrying an estimated total of 489 passengers, and 4 different cruise ships made nine (9) different landings in Resolute Bay carrying an estimated total of 902 passengers.[32]

Cruise ship landings include activities such as anchoring and the use of zodiacs to transfer crew and passengers from the cruise ship to land. Decreasing sea ice and a longer ice-free season have led to an increase in cruise vessel visits in Nunavut and the Qikiqtani region (Nunami Stantec, 2018). Cruise ship traffic in Nunavut generally routes through Lancaster Sound in the southern portion of Sarvarjuaq (Nunami Stantec, 2011). The cruise ship Hanseatic Inspiration received a positive conformity review from the Nunavut Planning Commission for its 2023 itinerary, which included a northward route through Sarvarjuaq. Similarly, the National Geographic vessel Endurance[33] received a positive conformity determination from the Nunavut Planning Commission for the upcoming 2024 season for a similar northward route.

Scientific Research and Other Activities

Scientific expeditions also occur within Sarvarjuaq (WWF, 2015). Some fishing companies execute scientific research surveys in the area that provide information used by government organizations (RPC, 2017). Both Eureka and CFS Alert are relatively near to Sarvarjuaq. The Government of Canada is also funding a number of remediation projects at contaminated sites in the area.

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[30] https://o.canada.com/travel/a-visit-to-grise-fiord-canadas-most-northerly-community

[31] Troels Jacobsen, Association of Arctic Expedition Cruise Operators, Field Operations Manager, September 13, 2024.

[32] Vessels stopping in Grise Fiord were: the Ocean Endeavour (Adventure Canada), and the Akademik Sergey Vavilov (One Ocean Expeditions Inc.). Vessels stopping in Pond Inlet were: the Ocean Endeavour (Adventure Canada), MV Hanseatic (Hapag-Lloyd), National Geographic Explorer (Lindblad Expeditions), Le Boreal (Compagnie Du Ponant), Akademik Sergey Vavilov (One Ocean Expeditions Inc.), Crystal Serenity (Crystal Cruises), Le Boreal (Ambercrombie & Kent), Canada 150 C3 Expedition, and Ocean Endeavour (Students on Ice). Vessels stopping in Clyde River were: the MV Hanseatic (Hapag-Lloyd), Le Boreal (Compagnie Du Ponant), and Canada 150 C3 Expedition (Nunami Stantec, 2011).

[33] Through Lindblad Expeditions: https://www.expeditions.com/expeditions/gateway-to-the-northwest-passage-greenland-canada

Overview of Ecosystem Services, Option and Non-Use Values

Ecosystem Services

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

The unique features of the area greatly increase its non-use value from a scientific perspective. The North Water is characterized as an area of high regional biodiversity; it provides habitat to the Arctic Cod (*Boreogadus saida)*, Endemic Arctic whales, Walrus (*Odobenus* rosmarus), Ringed Seals (*Pusa* hispida), Bearded Seals (*Erignathus* barbatus), and Polar Bear (*Ursus* maritmus). It also provides vital feeding and nesting sites for millions of migratory sea birds. Climate change presents a significant challenge to the formation of the polynya, and the associated species that rely on this unique ecosystem (DFO, 2021). It is believed that Sarvarjuaq provides invaluable direct and indirect services to society by maintaining these ecosystems and biodiversity.

It should be noted that widespread knowledge gaps exist for all ecosystem components within Sarvarjuaq (e.g., precipitation data, bathymetric data, species diversity of primary producers, migration patterns of Greenland Halibut, distribution and quantity of marine mammals and seabirds) . Very little is known about the potential impacts climate change may have on the formation of the polynya and the impacts any changes might have on the biodiversity and survival of species that rely on the area.

It is harder to define the indirect services of ecosystems and biodiversity because they are more intangible (Krantzberg and de Boer, 2008, 2006). For example, Sarvarjuaq 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:[34] gas regulation; local climate regulation; water regulation; disturbance prevention; soil formation/retention; waste treatment; nutrient cycling; and habitat, refugium and nursery (Hayder, 2014).[35]

There is economic value in 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 in the billions of dollars. The annual per capita value to global beneficiaries (outside of Arctic communities)[36] is $29.27 (2016 $US) (O'Garra, 2017).

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

[35] 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).

[36] The study referenced does not include the population of the Arctic communities to avoid double counting. The study assumed that climate regulation is partially accounted for in final goods such as subsistence and commercial fisheries, polar bear hunting, existence values for beluga whales and polar bears. The study assumed 50% of the full economic value of these

Measuring these ecosystem services is difficult; thus far there has not been sufficient guidance on how to measure such intrinsic benefits.

Option Value[37]

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

Non-Use Value

Non-use value is the value people derive from a good or resource, independent of any use people might make from that good or resource. This includes the conservation of the ecosystem for future generations (e.g., future biodiversity), also known as bequest value. Existence value occurs when people intrinsically value the ecosystem regardless of its use, and includes the benefits from knowing that the resources are being used by others, and has cultural values for an economy. [38] The communities nearest to Sarvarjuaq, as well as people residing elsewhere in Canada, are expected to derive non-use value from the services provided by the area.

The North Water is critical habitat for many migratory and resident species, such as Beluga Whales (*Delphinapterus leucas*), Narwhals (*Monodon monoceros*), Bowhead Whales (*Balaena mysticetus*), and several pinniped (seal) species, such as Ringed (*Pusa hispida*), Bearded (*Erignathus barbatus*), Hooded (*Cystophora cristata*), and Harp Seals (*Pagophilus groenlandicus*). Atlantic Walrus (Odobenus rosmarus) use the North Water as a migratory route between Greenland and Canada, and the region provides several important winter and summer haul-out sites (DFO 2011a, 2015a, QIA 2018). Polar Bears (*Ursus maritimus*), from at least two subpopulations, depend on the fast ice adjacent to the polynya during winter and spring for feeding. Several large colonies of seabirds, including an estimated 80% of the world's population of Dovekie/Little Auk (*Alle alle*) and most of the Canadian population of the endangered Ivory Gull (*Pagophila eburnea*), nest within or adjacent to the North Water in Canada and/or Greenland, and feed extensively within its waters. Thick-billed Murre (*Uria lomvia*), Black Guillemot (*Cepphus grylle*), Black-legged Kittiwake (*Rissa tridactyla*), Glaucous Gull (*Larus hyperboreus*), and Northern Fulmar (*Fulmarus glacialis*) also nest and/or stage in the North Water (Horby, et. al., 2021). Arctic Cod (*Boreogadus saida*) is a key species for the entire food web and potential changes in its abundance and/or distribution would result in cascading effects on the energetics of higher trophic levels (DFO, 2021).

Inuit communities surrounding the North Water and researchers have described the North Water as an ecosystem currently in a state of rapid change, primarily due to climatic influences (Mosbech and Kyhn, 2019). It is expected that there will be increases in pollutants and other anthropogenic impacts to the system, contributed by localized shipping, mining activity, oil and gas exploration, and commercial

final services has been provided by climate regulation services provided by Arctic snow, ice and permafrost, and this amount has been deducted from the climate regulation value.

[37] Option value: 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).

[38] 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).

development (ICCC, 2017). As such, there is fear that climate change and future anthropogenic disturbances could result in a reduction or displacement of valued subsistence species and resources (Hornby et. al., 2021).

The examples below provide some context on non-use values for marine mammals. It should be noted that these examples are for geographical areas much larger than Sarvarjuaq. The values attributed to this area would be a proportion of these examples. O'Garra (2017) estimated the annual per capita existence value for Beluga whale populations at $96.30 (2016 $US), for Arctic nations with Beluga populations. The same study also estimated the annual per capita existence value for Polar bear populations as $316.80 (2016 $US) for Canadian residents. Whitford (2006) examined Loomis and White's (1996) meta-analysis of U.S. households' willingness-to-pay (WTP) for Pacific endangered species and whales. Whitford argued that the Loomis and White estimate of US$42.85 per household represented an acceptable value of the average WTP for conservation of some whale species, and suggested that the Canadian WTP for Bowhead whales would be approximately CDN$495 million.

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 Sarvarjuaq has not been studied. Neither has there been any study that could produce 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 attributes within Sarvarjuaq are insignificant at the individual level, aggregated values for an entire economy are likely significant.

Community Survey Results

Community	Location	Do you harvest or hunt for country food? (%YES)	Do you fish for your food? (%YES)	Do you commercially fish? (%YES)	Do you use the water for transportation, boating, canoeing or qajaq? (%YES)	Do you use the Ice for transportation, snowmobiling or dog sledding? (%YES)	Do you use area for recreation, camping, whale or bird watching? (%YES)	Do you bring tourists to the area for outfitting, guiding or other types of tourism? (%YES)	Do you use the area for other activities?
Pond Inlet	Inside Sarvarjuaq and Inside NSA	33	67	0	83	83	83	17	Day Trips
	Inside Savarjuaq but Outside NSA	17	17	0	17	17	17	17	Nil
Clyde River	Inside Sarvarjuaq and Inside NSA	60	60	20	40	80	60	20	Nil
	Inside Savarjuaq but Outside NSA	20	20	0	20	20	20	0	Nil
Resolute Bay	Inside Sarvarjuaq and Inside NSA	86	86	0	86	86	71	0	Camping

	Inside Savarjuaq but Outside NSA	71	71	0	14	17	0	0	Nil
Arctic Bay	Inside Sarvarjuaq and Inside NSA	60	60	20	70	60	70	30	Film Production, Scientific Expeditions
	Inside Savarjuaq but Outside NSA	10	10	0	10	20	10	0	Nil
Grise Fiord	Inside Sarvarjuaq and Inside NSA	33	33	0	33	33	33	0	Nil
	Inside Savarjuaq but Outside NSA	33	33	0	33	33	33	0	Nil

Based on the results[39] received from surveys conducted during community consultations in Pond Inlet and Clyde River in 2023, residents of these two communities use the area in and around Sarvarjuaq in similar fashion. The only significant differences include: using the waters inside Sarvarjuaq and inside the NSA for harvesting country food (60% confirmed in Clyde River and only 33% in Pond Inlet); and using the waters inside Sarvarjuaq and inside the NSA for transportation (83% confirmed in Pond Inlet and only 40% confirmed in Clyde River).

It appears that most of these respondents use the waters inside Sarvarjuaq and inside the NSA to a far greater extent than those inside Sarvarjuaq, but outside of the NSA. The most common activities for these two communities (inside Sarvarjuaq and inside the NSA) were subsistence fishing, water-based transportation, ice-based transportation, and recreational use. The results found that there was little to no commercial fishing in the area and less popular uses of these waters included hunting and tourism. The only other use of the area identified was 'day trips'.

Based on the results of the same survey conducted in Resolute Bay, Arctic Bay and Grise Fiord in January 2024, Resolute Bay appears to be the community that most uses the waters in and around Sarvarjuaq (both inside and outside of the NSA). Resolute Bay residents indicated extensive use of the waters within and without the NSA for hunting and fishing for food (86% inside the NSA and 71% outside the NSA). They also rated the use of the area inside the NSA for water-based and on-ice transportation, and recreational use as high (86%, 86% and 71%).

Arctic Bay residents also indicated significant use of the area inside Sarvarjuaq and inside of the NSA for fishing and hunting (for food), water-based and on-ice transportation, and recreational use. None of these three communities showed significant use of the area for commercial fishing or tourism. Grise Fiord residents showed limited use of the area for the same categories as Arctic Bay; however, there were only 3 respondents from Grise Fiord, so results may not be a good indicator of community sentiment.

The same survey also included three questions regarding the Conservation Objectives of the proposed Sarvarjuaq MPA by Ministerial Order:

1) Does this conservation objective describe a priority or a reason for you to support conservation in the area?
2) Are there other words that could help you connect more to this conservation objective?
3) Is there anything else you would like to tell us?

For the first question, respondents generally provided comments that were supportive of the Conservation Objectives, and also shared concerns about increased industrial activity in an area that was flagged as important for hunting and wildlife. In responding to the second question, communities expressed interest in more communications about the protections; others were supportive of a cruise ship ban so that people could connect more to the area. Members in Resolute Bay mentioned that more studies are required to generate additional support. For the final question, community members asked if there was an inventory of marine mammals in Sarvarjuaq; they also stated concern that their rights be protected and highlighted camping use in the area. Members from Grise Fiord also mentioned that CCG research vessels and ice breakers many impact the local wildlife and climate change.

[39] Note: the 'no' results included nil responses; total participants – Pond Inlet 6, Clyde River 5, Resolute Bay 7, Arctic Bay 10, Grise Fiord 3

Based on in-person community engagements in May and June, 2024, there was broad support for the proposed marine protections in Sarvarjuaq. These visits included representatives from DFO, Qikiqtani Inuit Association, and the Government of Nunavut who travelled to Pond Inlet, Clyde River, Qikiqtarjuaq, Arctic Bay, Resolute Bay and Grise Fiord. The communities had questions about: the process for Ministerial Order designation, potential benefits accruing from an IIBA, the possibility for additional protected areas south of Sarvarjuaq, how to increase communications throughout this process, and how to include Greenland in conversations about protecting the polynya. There were many comments highlighting the importance of Sarvarjuaq and the need to protect the area, as well as concerns about the potential negative impacts of industrial activity, but also about the possible loss of economic opportunity due to protections. Communities also expressed interest in their involvement in the long-term management of the area.

Overview of Social and Cultural Values

Inuit recognize the North Water Polynya within the Sarvarjuaq region as a vital resource and habitat for the key marine mammals, fish, and sea birds upon which communities depend. Given its biological diversity, the polynya has been an important hunting ground sustaining Inuit with food and resources for making clothing and tools; it also contributes significantly to cultural and spiritual well-being. Communities in the Qikiqtani and Avanersuaq regions continue to rely directly on the polynya's biological productivity (RPC, 2017). People have been living in the coastal zones surrounding Pikialasorsuaq for at least the last 4500 years, and as such it has significant social and cultural value. As stated in the Pikialaorsuaq Commission report *People of the Ice Bridge: The Future of the Pikialasorsuaq*, "This polynya…remains an enduring cultural and spiritual cornerstone linking Inuit across borders to each other and to their shared history. Inuit are one people divided by four political boundaries both terrestrial and marine between Canada, Greenland, Alaska and Chukotka" (2017).

Future Economic Activities and Trends

There is little economic activity occurring within Sarvarjuaq, and the region is relatively untouched by modern human development due to the harsh environment, deep water, limited access, and lack of infrastructure. Given the isolation of the area, few industries are capable of operating in such a harsh environment, and it is unlikely there will be significant new economic development within the next five years.

One variable in future economic development is climate change. Scientific studies in the Arctic have shown a reduction in ice thickness and age; including changes to sea ice composition that impacts all components of the ecosystem at various scales (DFO, 2020). Should future conditions allow, there could be the potential for increased shipping and tourism traffic through Sarvarjuaq. While this could lead to greater accessibility of the Sarvarjuaq region, it could also present challenges to the health and sustainability of the myriad species that use the polynya and surrounding area in this region as a refugium. In order to study the impacts climate change may have on the region, a baseline of knowledge needs to be developed in greater detail. This lack of existing scientific data also contributes to uncertainties within the socioeconomic analysis of climate change (DFO, 2013c).[40]

In terms of opportunities, climate change could lead to changes in the development of commercial fisheries. There may be increased (primary) production, productivity, habitat availability, enhanced survival, and the expansion of species distribution and range (northern cold water and southern cool water species, and extended duration of fishing seasons in certain regions (DFO, 2013c).[41] While reduced ice cover could make the area more accessible for a potential commercial fishery, such a significant shift in the ecosystem could also make the area more vulnerable to parasites and invasive species. Costs of fishing may also be negatively effected by climate change, as fish harvesters have to travel further to access thriving populations, and may face greater unpredictability in weather and ice conditions.

In general oil and gas resources in the area may become more accessible due to reduced ice cover caused by climate change, but these potential extraction operations would face challenges including the remoteness of the site, lack of infrastructure in the surrounding area, and possible volatility in weather and ice conditions. These considerations could render any potential extraction operations economically unsustainable. Based on data limitations, it is difficult to quantify the value of existing resources, the expected cost of extraction, and the specific impacts climate change might have on the unique ecosystem in Sarvarjuaq.[42] Although this information is based on other locations within the Arctic, it can still be considered as a suitable proxy for Sarvarjuaq based on shared characteristics; as additional information becomes available, this report and future reports will be updated.

[40] The uncertainty of the secondary socioeconomic analysis is inherently greater than, or equal to, the uncertainties of the primary science-based analysis (DFO, 2013c).
[41] The impact was projected for 10-year and 50-year in alignment with the LAB Science Risk Assessment documents.
[42] The major gaps identified by the study are: (i) incomplete data; (ii) absence of data by sub-LAB or by community in the Large Aquatic Basin (LAB)/sub-LABs; and (iii) data taken from diversified sources and, in some cases, not from recent literature (DFO 2013c).

Conclusion

The goal of this report was to provide a brief socio-economic analysis of Sarvarjuaq. Specifically, the paper included i) an overview, and ii) an assessment of the current and future economic activities linked to the area.

Baseline values (by sector) or magnitude of economic activities linked to Sarvarjuaq 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 Sarvarjuaq.

The report found that Sarvarjuaq provides indirect services to society by maintaining ecosystems, non-use values, and biodiversity. Sarvarjuaq is expected to provide some economic, subsistence, social, and cultural benefits to the closest communities, and to Canada as a whole. Specifically, the area is important to locals for transportation (on ice and in water), fishing and hunting. It is also traversed by several types of vessels, including shipping vessels from the nearby Mary River Mine and sealift operations.

While obtaining and analyzing information for the purpose of this report, the most notable limitations identified are:

i. Our current knowledge of Sarvarjuaq is based on sparse observations rather than dedicated ecosystem-based surveys and sustained ecosystem monitoring. The uniqueness and diversity of habitats within Sarvarjuaq suggests potential high biodiversity; however, these unique habitats or ecosystem types are not yet inventoried or adequately characterized.

ii. The ecosystem services and non-use values in the report are illustrative examples to show that these benefits do exist and are greater than zero. No existing studies specifically estimate these values for Sarvarjuaq, and no existing studies are suitable for a valuation proxy through the use of benefits transfer. More information on benefits specific to this area is needed.

iii. Including detailed subsistence harvest figures (if any) from solely within Sarvarjuaq was not possible due to a lack of specific information available. There is also a data gap for the presence of marine mammals, and additional information is required. Correspondence with all High Arctic communities would greatly aid the development of a more precise report.

These limitations have been mitigated to some extent through qualitative discussions that illustrate the expected economic and social outcomes. The appropriate remedy for these limitations would be to conduct further research and discussions with communities. Despite data limitations and uncertainties associated with the report, it provides information which may be found useful for decision making, including the development of regulatory intent.

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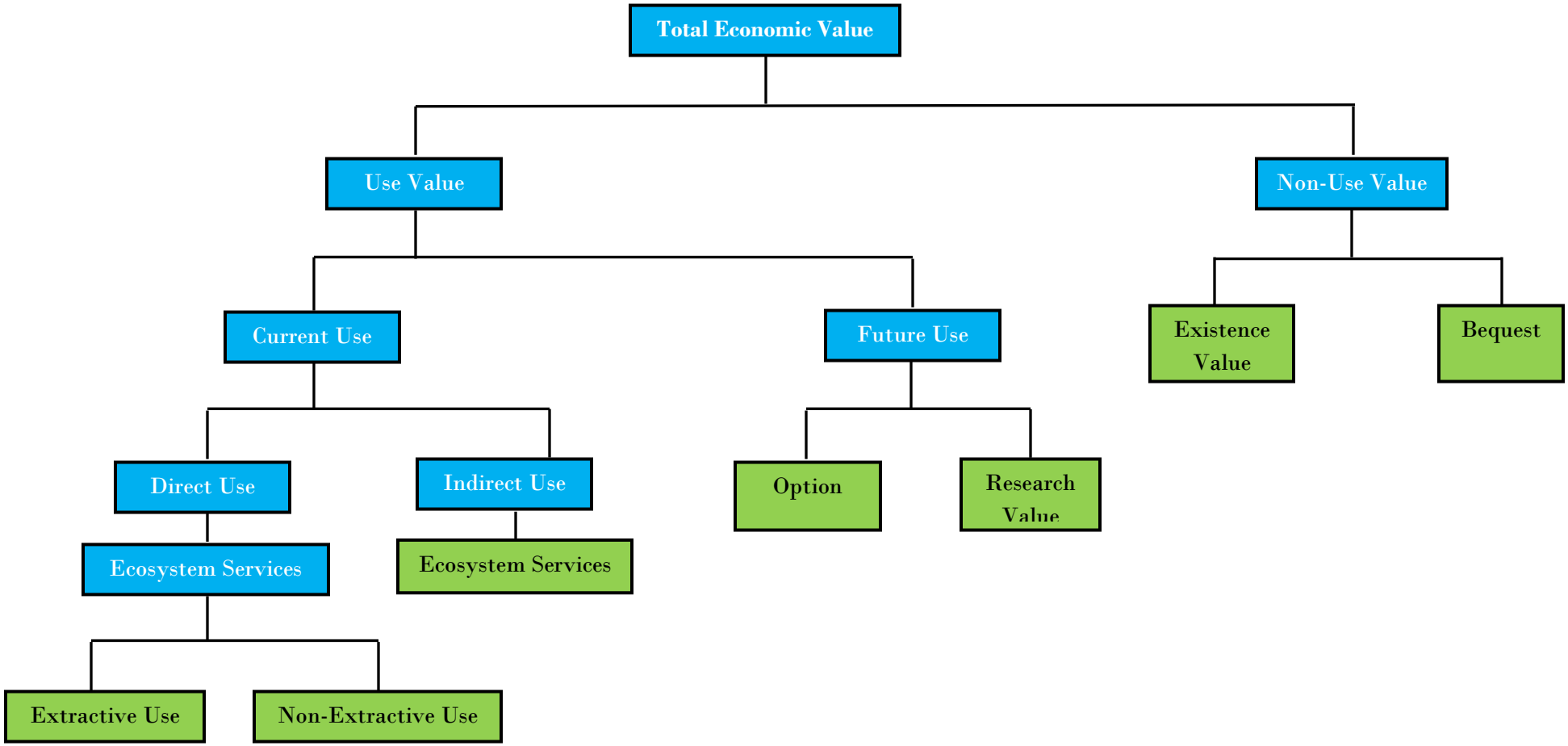
Matrix 1: Total Economic Valuation Flowchart (developed by Hayder (2014)



Matrix 2: Socio-Economic Activities/Values – At a Glance

Socio-economic activity/value	
Level of Activity	
Commercial harvesting – Greenland Halibut	Past harvesting has occurred.
Landings (Metric Tonne)	Currently Unknown
Value ($M)	Currently Unknown
Subsistence harvesting	Occurring, but extent is unknown.
Mining	Nil, but vessel traffic through study are is likely.
Oil and gas	Nil, but potential.
Vessel activity	Occurring, but specific data is needed.
Tanker	Vessel traffic is occurring, but specific data is needed.
Cargo	Vessel traffic is occurring, but specific data is needed.
Military	Vessel traffic is occurring, but specific data is needed.
Tug	Vessel traffic is occurring, but specific data is needed.
Commercial fishing	Vessel traffic is occurring, but specific data is needed.
Government and icebreaker vessels	Vessel traffic is occurring, but specific data is needed.
Passenger	Vessel traffic is occurring, but specific data is needed.
Pleasure craft	Vessel traffic is occurring, but specific data is needed.
Search and rescue	Vessel traffic is occurring, but specific data is needed.
Towing	Vessel traffic is occurring, but specific data is needed.
Sailing	Vessel traffic is occurring, but specific data is needed.
Recreation/tourism (visiting islands, cruise ships)	Vessel traffic is occurring, but specific data is needed.
Scientific research	Occurring, but specific data is needed.

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)[43] 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)[44] is responsible for safe harbours, waters and waterways, and manages and regulates marine transportation.

Environment and Climate Change Canada (ECCC)[45] offers protection through National Wildlife Areas and Migratory Bird Sanctuaries. ECCC legislation of relevance is the *Canada Wildlife Act, Migratory Birds Convention Act* and *Species at Risk Act*.

Parks Canada Agency (PCA)[46] offers protection through National Parks, National Historic Sites and National Marine Conservation Areas. Key PCA legislation includes the *National Marine Conservation Areas Act* and *National Parks Act*.

Transport Canada[47] is responsible for transportation policies and programs. The department promotes safe, secure, efficient and environmentally responsible transportation.

Natural Resources Canada[48] is responsible for the regulating and researching development and use of Canada's natural resources and the competitiveness of Canada's natural resources products. The Geological Survey of Canada is part of Natural Resources Canada.

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

Government of Nunavut

The Government of Nunavut has shared responsibility for management of wildlife, tourism, and marine infrastructure. There are also forthcoming responsibilities from the Devolution Agreement that is bringing an administrative role to the Government of Nunavut including coastal areas such as small and enclosed bays.

[43] https://www.dfo-mpo.gc.ca/about-notre-sujet/mandate-mandat-eng.htm
[44] https://www.ccg-gcc.gc.ca/corporation-information-organisation/mandate-mandat-eng.html
[45] https://www.canada.ca/en/environment-climate-change/corporate/mandate.html
[46] https://www.pc.gc.ca/en/agence-agency/mandat-mandate
[47] https://tc.canada.ca/en/corporate-services/about-transport-canada-corporate-information
[48] https://www.nrcan.gc.ca/nrcan/about-us/10838

Key Government of Nunavut departments include the Department of Environment and Department of Economic Development and Transportation (including Fisheries and Sealing).

Nunavut's Department of Environment[49] 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*.

Nunavut's Department of Economic Development and Transportation[50] has a mission of working in partnership to support Nunavummiut in stimulating and strengthening the economy, and to ensure the safe and effective movement of people, goods, and knowledge.

Additionally, Nunavut's Department of Culture and Heritage promotes Inuit Societal Values through the application of Inuit Qaujimajatuqangit; promoting the use of Inuit language in the workplace and throughout the territory; promoting access to information and resource materials in Nunavut's official languages in all communities; assisting non-profit, community-based individuals and organizations in cultural, language, and heritage activities; enhancing public library services across Nunavut; and encouraging on-going dialogue between elders and youth and the government.

Nunavut Institution of Public Government

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

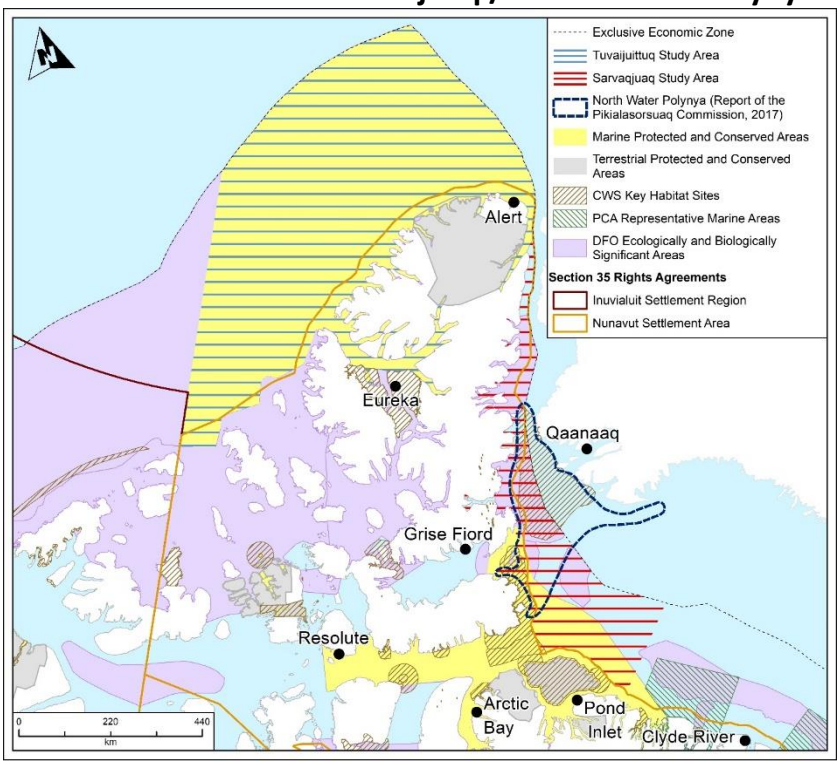
The Nunavut Marine Council (NMC) advises and makes recommendations regarding marine areas in the Nunavut Settlement Area through the coordination of shared knowledge from NIRB, NPC, NWB, and NWMB Boards.

Community

Community organizations include Hunters and Trappers Organizations (HTO) and hamlet councils. Community-based HTOs manage harvesting among their members, which are all Inuit in the local Nunavut community.[51] Hamlet councils are elected as the governing bodies of the municipal corporations and have custody over its administrative and legislative powers (MTO, 2005).

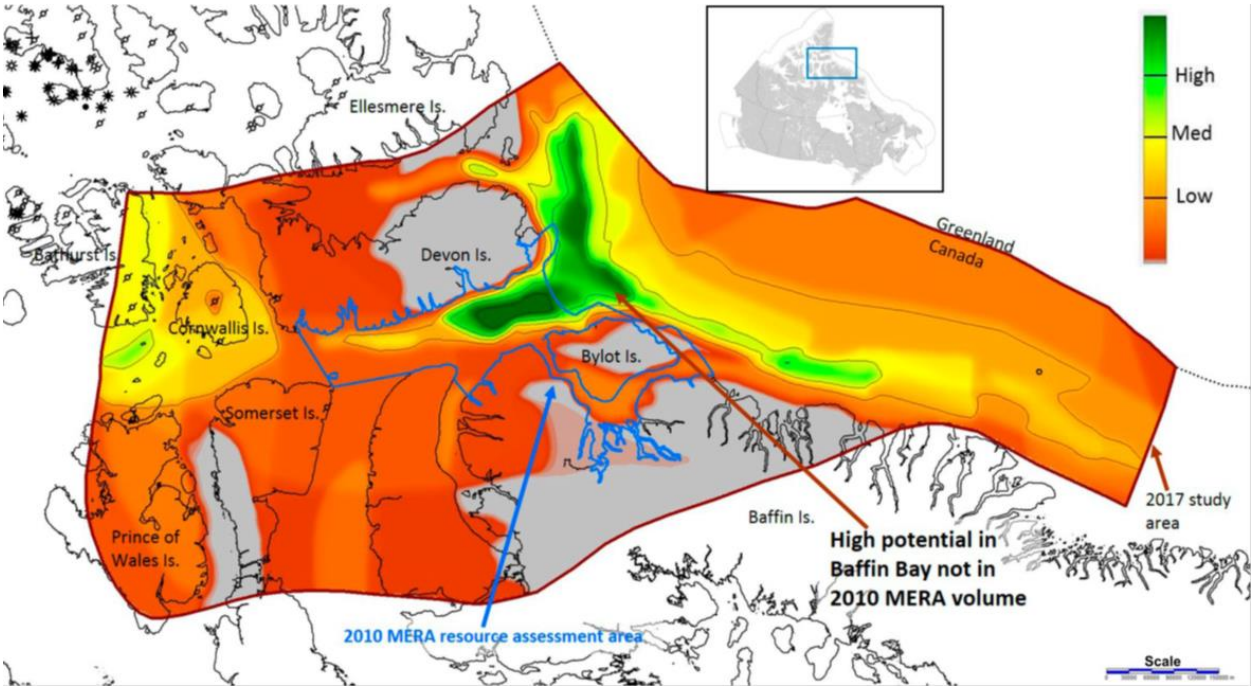
[49] https://www.gov.nu.ca/environment/information/vision-and-mandate
[50] https://www.gov.nu.ca/edt/vision-and-mandate-1
[51] http://www.tunngavik.com/wp-content/uploads/2009/02/nti-org-chart-english.pdf

Annex 2: Area of the Sarvarjuaq / North Water Polynya



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

Annex 3: Natural Resources Canada 2017 Assessment



Source: Natural Resources Canada 2017 Assessment.

Annex 4: Oil and Gas Potential

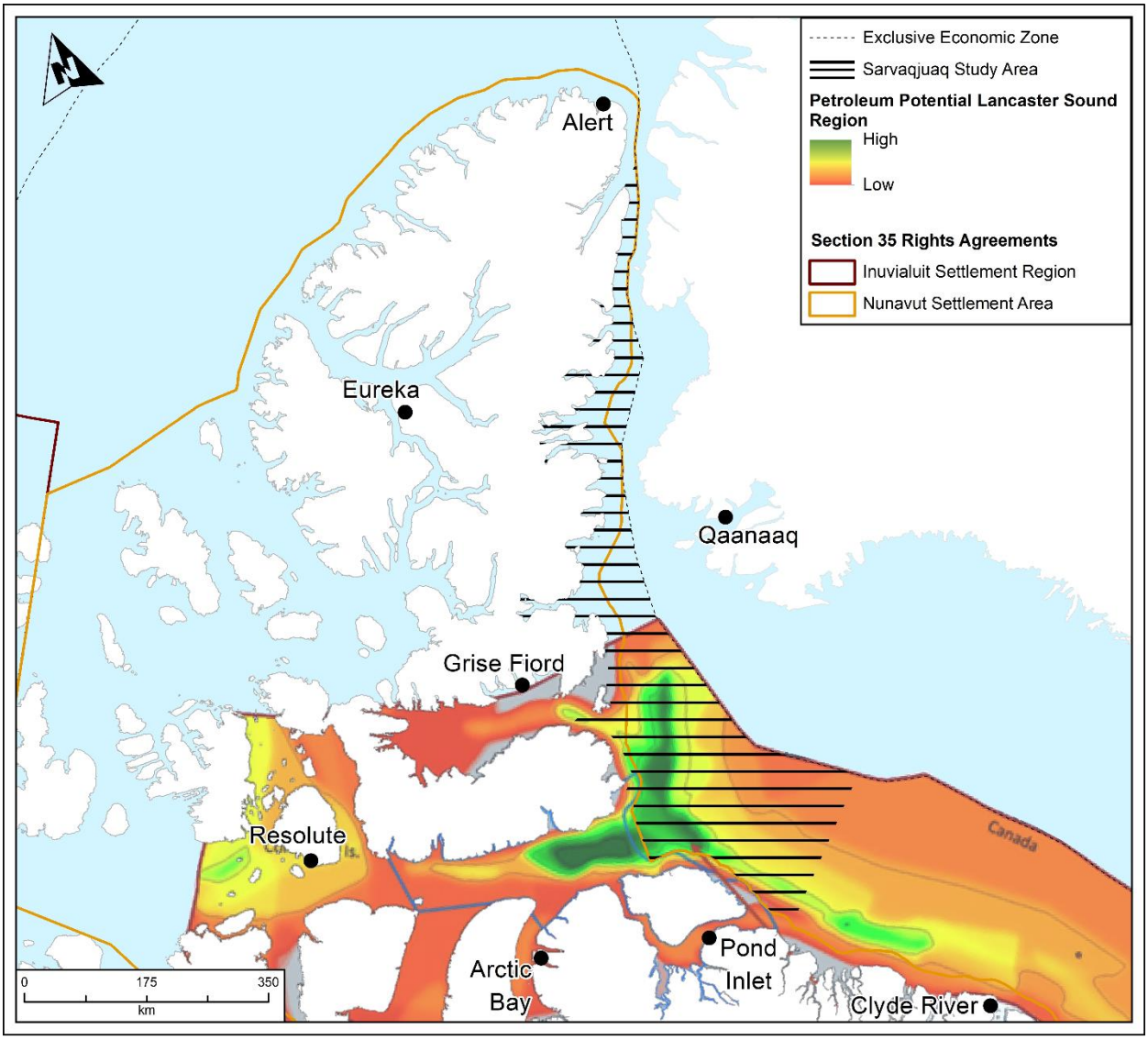


Figure 1 Source: Map produced by Marine Planning and Conservation Program, Arctic Region.

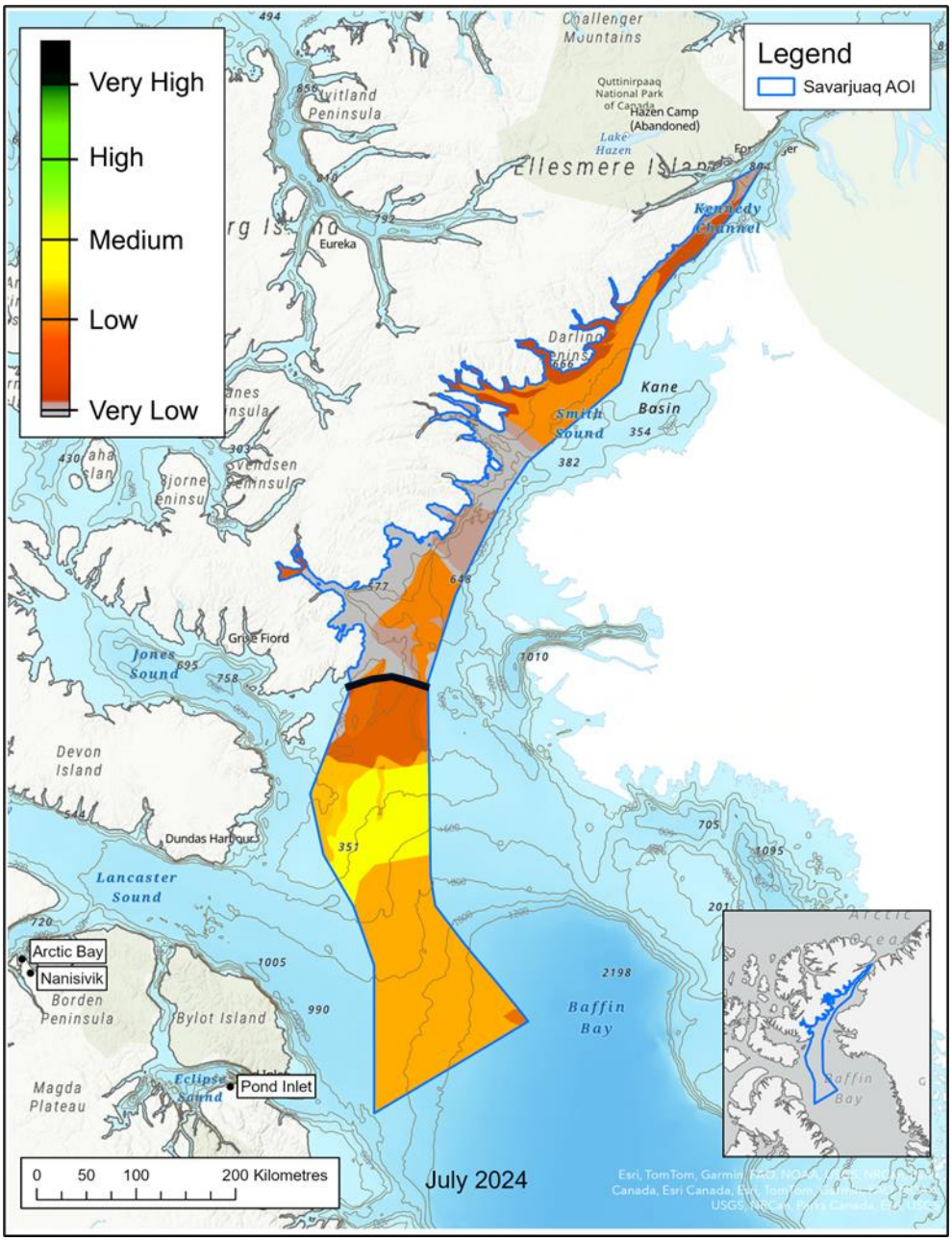
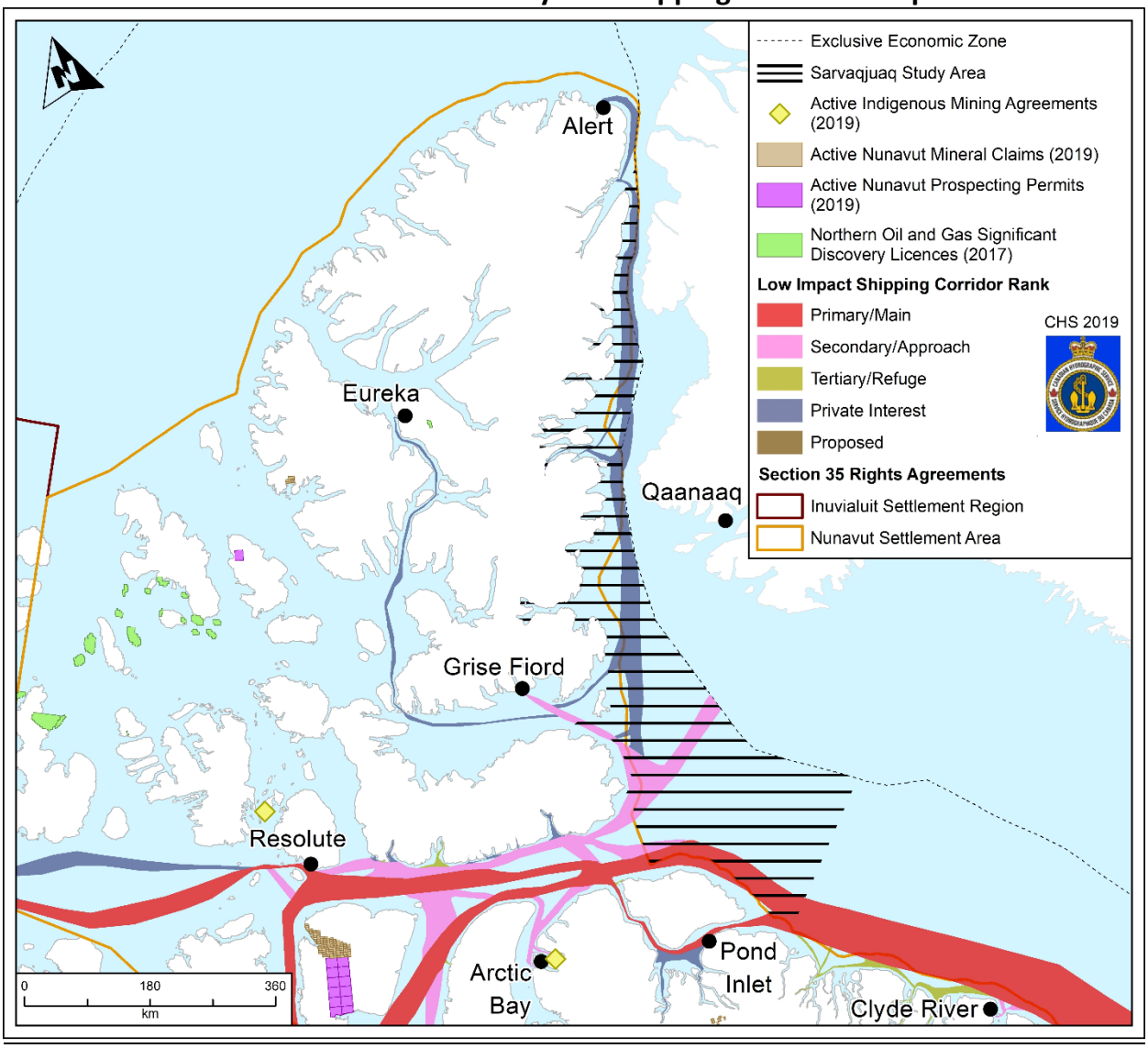


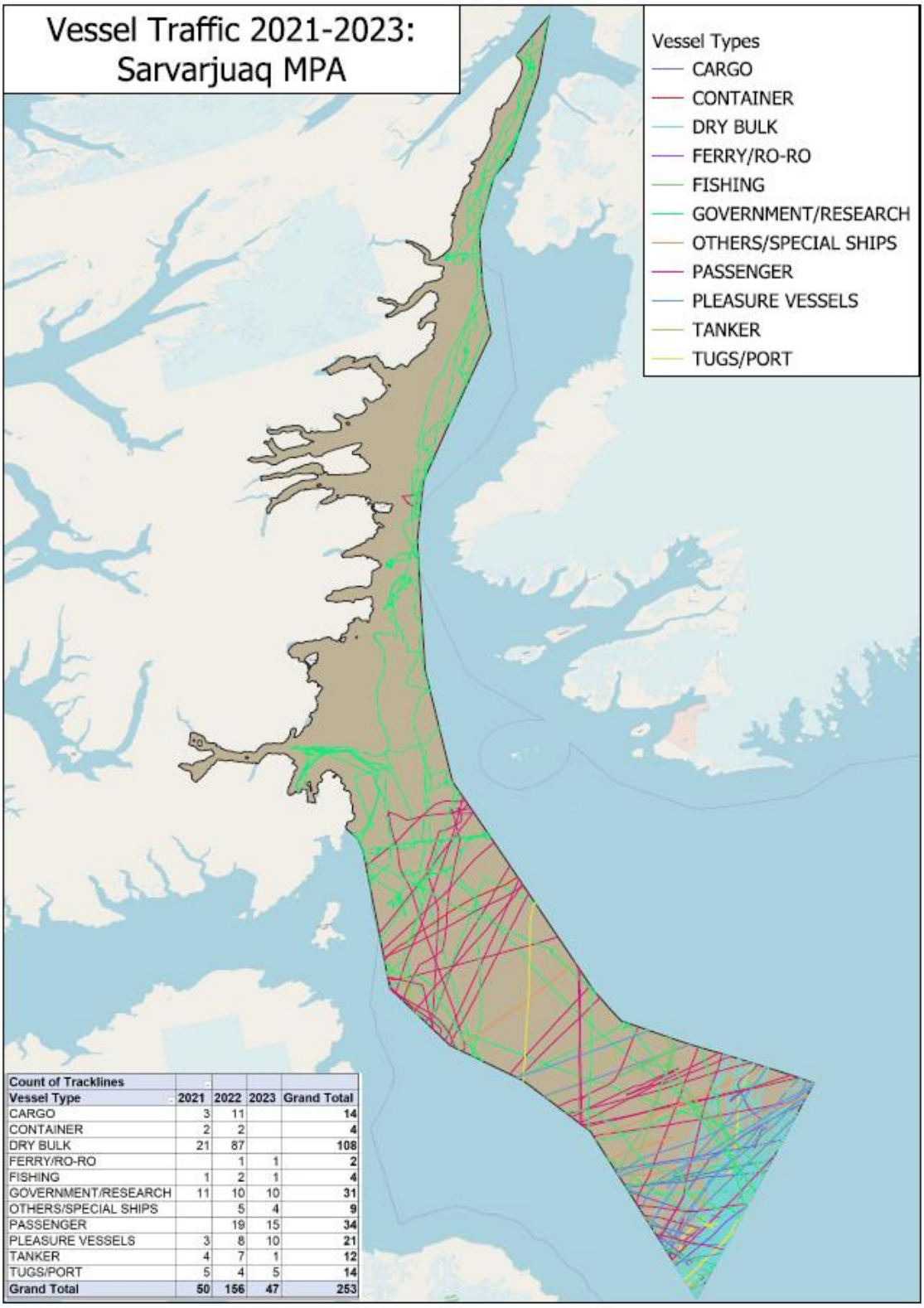
Figure 2: Hydrocarbon potential of proposed Sarvajuaq Marine Protected Area, from Kalejaiye et al. (2023) and 2024 reassessment of Baffin Bay. Grey area on the map is underlain by ancient rock of the Canadian Shield and has no hydrocarbon potential. The hydrocarbon potential of the areas in red are Very Low to Low while areas in orange and yellow have medium hydrocarbon potentials. Black line on map shows the two open files boundaries in the Sarvajuaq AOI.

Annex 5: Mineral Activity and Shipping Corridors Map



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

Annex 6: Vessel Traffic 2021-2023: Sarvarjuaq MPA



Count of Tracklines				
Vessel Type	2021	2022	2023	Grand Total
CARGO	3	11		14
CONTAINER	2	2		4
DRY BULK	21	87		108
FERRY/RO-RO		1	1	2
FISHING	1	2	1	4
GOVERNMENT/RESEARCH	11	10	10	31
OTHERS/SPECIAL SHIPS		5	4	9
PASSENGER		19	15	34
PLEASURE VESSELS	3	8	10	21
TANKER	4	7	1	12
TUGS/PORT	5	4	5	14
Grand Total	50	156	47	253

Source : Map produced by Chris Boothe, Sr Analyst, Marine Navigation Programs, CCG

Annex 7 : USGS Arctic Resource Appraisal

Table 1. Summary of Results of the Circum-Arctic Resource Appraisal

[MMBO, million barrels of oil; BCFG, billion cubic feet of natural gas; MMBNGL, million barrels of natural gas liquids; NQA, not quantitatively assessed. Results shown are fully risked mean estimates. For gas accumulations, all liquids are included as NGL (natural gas liquids). Provinces are listed in ranked order of total barrels of oil and oil-equivalent natural gas (BOE).]

Province Code	Province	Oil (MMBO)	Total Gas (BCFG)	NGL (MMBNGL)	BOE (MMBOE)
WSB	West Siberian Basin	3,659.88	651,498.56	20,328.69	132,571.66
AA	Arctic Alaska	29,960.94	221,397.60	5,904.97	72,765.52
EBB	East Barents Basin	7,406.49	317,557.97	1,422.28	61,755.10
EGR	East Greenland Rift Basins	8,902.13	86,180.06	8,121.57	31,387.04
YK	Yenisey-Khatanga Basin	5,583.74	99,964.26	2,675.15	24,919.61
AM	Amerasia Basin	9,723.58	56,891.21	541.69	19,747.14
WGEC	West Greenland-East Canada	7,274.40	51,818.16	1,152.59	17,063.35
LSS	Laptev Sea Shelf	3,115.57	32,562.84	867.16	9,409.87
NM	Norwegian Margin	1,437.29	32,281.01	504.73	7,322.19
BP	Barents Platform	2,055.51	26,218.67	278.71	6,704.00
EB	Eurasia Basin	1,342.15	19,475.43	520.26	5,108.31
NKB	North Kara Basins and Platforms	1,807.26	14,973.58	390.22	4,693.07
TPB	Timan-Pechora Basin	1,667.21	9,062.59	202.80	3,380.44
NGS	North Greenland Sheared Margin	1,349.80	10,207.24	273.09	3,324.09
LM	Lomonosov-Makarov	1,106.78	7,156.25	191.55	2,491.04
SB	Sverdrup Basin	851.11	8,596.36	191.20	2,475.04
LA	Lena-Anabar Basin	1,912.89	2,106.75	56.41	2,320.43
NCWF	North Chukchi-Wrangel Foreland Basin	85.99	6,065.76	106.57	1,203.52
VLK	Vilkitskii Basin	98.03	5,741.87	101.63	1,156.63
NWLS	Northwest Laptev Sea Shelf	172.24	4,488.12	119.63	1,039.90
LV	Lena-Vilyui Basin	376.86	1,335.20	35.66	635.06
ZB	Zyryanka Basin	47.82	1,505.99	40.14	338.95
ESS	East Siberian Sea Basin	19.73	618.83	10.91	133.78
HB	Hope Basin	2.47	648.17	11.37	121.87
NWC	Northwest Canada Interior Basins	23.34	305.34	15.24	89.47
MZB	Mezen' Basin	NQA	NQA	NQA	NQA
NZAA	Novaya Zemlya Basins and Admiralty Arch	NQA	NQA	NQA	NQA
TUN	Tunguska Basin	NQA	NQA	NQA	NQA
CB	Chuckhi Borderland	NQA	NQA	NQA	NQA
YF	Yukon Flats (part of Central Alaska Province)	NQA	NQA	NQA	NQA
LS	Long Strait	NQA	NQA	NQA	NQA
JMM	Jan Mayen Microcontinent	NQA	NQA	NQA	NQA
FS	Franklinian Shelf	NQA	NQA	NQA	NQA
Total		**89,983.21**	**1,668,657.84**	**44,064.24**	**412,157.09**

Source : United States Geological Survey (USGS). (2009). Assessment of Undiscovered Oil and Gas in the Arctic.