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QIKIQTAALUK CORPORATION
& Group of Companies

Qikiqtaaluk Corporation

**SCIENTIFIC RESEARCH LICENCE APPLICATION Physical
/ Natural Sciences RESEARCH**

Science and Indigenous partnerships in action: mobilizing Indigenous knowledge and building capacity to participate in research during the implementation of an ecosystem approach to fisheries resource assessments

April 12 2021



SECTION 1: APPLICANT INFORMATION

Previous Scientific Research License

Please indicate if you have submitted any previous application(s) related to this project proposal? Yes No

If yes, please provide the previous scientific license number:

Please indicate if this project already been screened by the NIRB Yes No

If yes, please provide NIRB project number(s): It is in review now by NPC.
Project No 149510

Are you applying to renew a research license for a project that was previously screened by NIRB?

Yes No

If yes, please describe below any proposed changes to the project scope. Examples of changes in research scope include:

- addition of new field research sites
- alteration of the timing of field research
- an increase in the total number of person days of field research
- an increase in the amount of water to be used and/or waste to be generated



1	Primary Applicant's contact information	
Name: Jesslene Jawanda	City, Street address: 922 Niaqunngusiaruaq, Iqaluit	
Affiliation: QC Fisheries Division	Phone: 867-222-5585	
Province: Nunavut	Email: jjawanda@qcorp.ca	

2	Project Supervisor's contact information (if applicable)	
Name: Jerry Ward	City, Street address: 1121 Kenmount Road, Paradise	
Affiliation: Director of Fisheries for QC	Phone: 1-709-325-0822	
Province: NFLD	Email: jward@qcorp.ca	

3	Other Research Field Personnel (name, position, affiliation of all field team members)	
Dr. Scott Grant, Science Lead	Marine Institute	
<u>Philip Walsh, Researcher</u>	Marine Institute	

SECTION 2: AUTHORIZATION NEEDED

1. Identify all known regulatory authorizations required for the project

	Regional Inuit Association: Land Use Permit/Exemption	Date applied for
	Nunavut Planning Commission: Review and Land Use Plan	2021-04-07
	Nunavut Impact Review Board Screening	
	Nunavut Water Board authorization to use water without a	
	Aboriginal Affairs, Northern Development Canada (GOC): Land Use Permit / Fuel Cache Notification	
	Department of Fisheries and Oceans (GOC): Fisheries Research License, Marine Mammal transport license	Internal review pending, submission to follow
	Environment Canada/Canadian Wildlife Service: Migratory	
	Canada/Canadian Wildlife Service: Access to National Wildlife	
	Parks Canada: National Parks Research Permit	
	Community and Government Services (GN): Municipal Land	
	Culture and Heritage (GN): Archeology/Paleontology Research	
	Department of Environment (GN): Wildlife Research Permit	

2. List the active permits, licences, or other rights related to the project proposal and their expiry date:

Animal Use Protocol, Approval date: July 07 2020, Ethics Clearance expires: July 07 2023, Animal Care File: 20-01-SG. Applied with the Animal Care Committee at Memorial University.



3. Have you applied for all authorizations required to conduct the project proposal

activities? **YES** **NO**

Total number of personnel = 8 per community
Total number of days on site = 23 days

8 personnel X 23 days = 184

Period of field research in current year: July 15 to September 30 2021

Proposed term of

License (for multi-year applications:

June 1, 2021 to September 30, 2025



Locations of Fieldwork in Nunavut

Location Name	Region North Baffin, South Baffin, Kivalliq, Kitikmeot	Co-ordinates Lat (degree / minute), Long (degree / minute)	NTS Map Sheet #	Land Status Crown, Commissioner s', Inuit Owned
Kinngait (Cape Dorset – Topo Map)	North Baffin	64.230278N, -76.524722W	036C	Inuit Owned
Sanikiluaq (Tukarak Island – Topo Map)	South Baffin	56.536944N, -79.25W	034D	Inuit Owned
Sanirajak (Hall Lake – Topo Map)	North Baffin	68.775556N, -81.244444W	047A	Inuit Owned
Igloolik (Igloolik - Topo Map)	North Baffin	69.364722N, -81.816111W	047D	Inuit Owned

If the project proposal includes a **camp**, please provide the coordinates of the camp location
 Lat (degree/minute) _____ Long (degree/minute) _____

NTS Map Sheet # (if different from above) _____

SECTION 4: NON-TECHNICAL PROJECT PROPOSAL DESCRIPTION

Title:

Science and Indigenous partnerships in action: mobilizing Indigenous knowledge and building capacity to participate in research during the implementation of an ecosystem approach to fisheries resource assessments

Lead Researcher's Name and Affiliation: Dr. Scott Grant, Marine Institute

Research Questions

During this study, the *RV Ludy Pudluk*, a newly constructed purpose-built fisheries research vessel owned by the Qikiqtaaluk Corporation, and community supplied support vessels from the four study communities of Kinngait, Sanikiluaq, Sanirajak, and Igloolik will work in concert in waters adjacent to each community to determine the fishery potential of marine resources. Sharing of knowledge and capacity building among Indigenous community members and researchers from the Fisheries and Marine Institute of Memorial University will occur during data collection associated with ecosystem-based resource assessments and development of a variety of fishing gears designed to meet the needs of Nunavut small boat harvesters. Specific questions that this study will seek to answer:



1. What is the inshore fisheries potential around the four study communities?
2. Where are benthic invertebrates such as shellfish, clams, and whelks located around these communities?
3. What are the life-history characteristics of species of interest that occur in waters adjacent to these communities?
4. What are the conditions of the seafloor and seafloor bottom type around these communities?
5. Can the surveyed areas potentially support increased subsistence harvest of species of interest or do they have the potential to be commercially harvested areas?
6. Are there any new edible species present that can be harvested?
7. How can Inuit, academia and Inuit Organizations work together to develop inshore fisheries in Nunavut?

Objectives and Rationale

There is increasing pressure to utilize Arctic marine resources to minimize food insecurity through increased subsistence harvesting of new and existing species and where suitable numbers of harvestable species occur there is interest in commercial development. To contribute to sustainable Arctic marine ecosystems, exploratory fisheries need to consider a comprehensive research strategy that includes Indigenous traditional ecological knowledge (TEK) and building capacity to participate in research activities that foster community-based management of renewable resources. Lack of community capacity to participate in Nunavut research activities limits community partnerships in new emerging fishery initiatives and reduces the ability to extend scientific research.

Timeline and Location

The first study will take place over a 7 to 8-week period between July and October 2021 in Kinngait and Sanikiluaq. The second study will take place over a 7 to 8-week between July to October 2022 in Sanirajak and Igloodik. Timing of the studies will depend on ice-out.

Annually as data is analyzed, underwater video of the seabed and animals that occur there will be delivered to HTOs within each year of the study.

Meetings/presentations outlining results of the previous year's research will take place every second year in each community (i.e., two communities will be studied for 3.5 weeks in each year and we will return to those communities to continue studies every second year. Specifically, communities studied in 2021-2022 will be returned to in 2023-2024 and communities studied in 2022/2023 will be returned to in 2024 and 2025 with financial assistance from QC and different funding programs.

Methods

This project utilizes state-of-the-art technologies (e.g., multibeam echosounder, acoustic Doppler current profiler, multiparameter sonde [records water depth, temperature, salinity, conductivity, pH, dissolved oxygen, dissolved organic matter, turbidity, and chlorophyll a], georeferenced 4K high-definition underwater video, fishing gear designed to meet the needs Nunavut small boat harvesters, and an ecosystem approach to resource assessments.



Impacts

Our project will not involve human or animal experimentation, tissue or data. The project activities will include monitoring the inshore marine environment with various types of equipment. This equipment will interact with the environment such as towed video sled and scallop, clam, and sea cucumber dredges. It is notable, that the lower component of the towed video sled has an arched design that allows vertical structures that extend up to 30 cm above the seabed to pass under the sled with no or minimal damage. This also allows the sled to easily pass over large rocks. The sample area of bottom contact gear will remain small and the impact to the environment limited. We will also be using remote monitoring equipment wherever possible to avoid any physical impact on the marine environment. We will also use underwater video to determine the effects of towed fishing gear on the seabed and animals that live there.

Data Management

The project is expected to generate new intellectual property. The data gathered from this research will be shared through presentations and reports with the communities impacted as well as at conferences and meetings. The data sets will remain property of the Marine Institute and Qikiqtaaluk Corporation. There are no patents involved in the project so far and QC has a corporate lawyer to ensure all practices are beneficial.

Nunavut Residents

A total of five Inuit from each of the study communities will actively join the research efforts and be trained on the equipment and research operations. Two Inuit from Kinngait and Sanikiluaq will fly to Newfoundland and Labrador to join the *RV Ludy Pudluk* while it transits North. In addition, two community vessels will work in tandem with the *RV Ludy Pudluk* to increase efficiency. In addition, the Hunters and Trappers Organizations (HTOs) in each of the four communities have been consulted with by Qikiqtaaluk Corporation and the Marine Institute. The HTAs decide the community members who will be involved in this research project based on experience.

Information Dissemination

The first study will take place between July to October 2021 in Kinngait and Sanikiluaq. The second study will take place between July to October 2022 in Sanirajak and Igloolik. Reports and information dissemination will follow immediately following the studies. The results from the studies will be shared through publications in 2022 to 2025. Presentations at conferences will take place starting in 2022 as well. Annually as data is analyzed, underwater video will be delivered to HTOs within each year of the study. Meetings/presentations will take place every second year in each community (i.e., two communities will be studied for three weeks in each year and we will return to those communities to continue studies every second year. Specifically, communities studied in 2021-2022 will be returned to in 2023-2024 and communities studied in 2022/2023 will be returned to in 2024 and 2025.

The results of this work will impact many issues such as food security and climate change. For this reason, information will be made available upon request to the Government of Nunavut and the Government of Canada, Inuit organizations and community members as required.



SECTION 5: TECHNICAL PROJECT PROPOSAL DESCRIPTION

Objectives

To demonstrate utility and cost-savings of small vessel dedicated to scientific work to support fishery development in Nunavut. It is anticipated that this model can be extended to other areas within Nunavut.

With assistance from local community members, carry-out science based multi-species marine fisheries resource assessments in coastal and inshore areas adjacent to communities.

Provide community training in the use of conservation minded fishing gears, best handling practices to maximize product quality, biological sampling methodologies, and collection of data to support science and management of marine fisheries resources.

Determine whether coastal and inshore fishery resources merit commercial scale, subsistence, or recreational fisheries development. This will help with regard to future community-based resource harvest plans and management.

Rationale

Fisheries Development

Fishery development is a priority for governments, Inuit organizations, and communities. Small commercial enterprise development through fisheries diversification and building community capacity to participate in research activities to foster community-based management of renewable resources are key components of the Nunavut Fisheries Strategy. Over the past decade there has been considerable interest with regard to obtaining a better understanding of available marine fisheries resources in coastal and inshore areas of several Nunavut communities. Species of interest include shrimps, crabs, clams, mussels, scallops, whelk, sea urchins, edible seaweeds, capelin, Arctic cod, Atlantic cod, Greenland cod, Arctic charr, lumpfish, starry flounder, and Greenland halibut. Exploratory surveys of marine fishery resources have been carried-out in several communities over the years but can suffer from poor seasonal timing, limited or 'make-do' capture gear, ill-equipped fishing vessels, difficulty coordinating local vessels, limited biological/ science focus, and in some cases lack of a well-organized approach to exploratory surveys.

Further, once a potential fishery resource has been identified more focused assessments with regard to extent of geographic distribution and local abundance to direct fishing capacity (i.e., number of fishing enterprises) are generally lacking for new species and areas. It is important to establish from a quantitative and biological basis the status of renewable marine resources and from this determine whether harvests can sustain recreational/ subsistence or commercial fishery interests. Equally important is accessing local traditional ecological knowledge (e.g., Coastal Resource Inventories) and providing for direct involvement through training of community members.

This includes training in the use of conservation minded fishing gears that maximize product quality and avoid adverse effects on the Arctic marine environment and training in scientific data



collection on their local marine resources. Commonly the goal is to develop commercial fisheries for export (e.g., Greenland halibut). However, identification of new resources for subsistence fishing are also important and from a food security or food replacement value perspective have been estimated at up to \$50 million for all country foods harvested in Nunavut (see Nunavut Fisheries Strategy).

Climate Change

There are now many reports indicating that climate change is driving hundreds of fish and invertebrate species north from their original habitats. It is predicted that even if climate change is kept under two degrees, species will move by an average of more than 200 kilometers. This means there will be changes to the types of fish and invertebrate species and changes in their abundance in Arctic waters. In order to better understand the impacts to Nunavut, there must be more research conducted to understand the types of fish and invertebrate species present, the habitats they are found in, and if there are any new species present. As climate change progresses, there is a possibility of the introduction of new species which poses a risk to native species, but there is also potential for increased subsistence hunting or even exploratory commercial fisheries. Moreover, it is also possible that species that Inuit communities depend on for subsistence hunting and commercially will be changing their habitat and will not be as reliably found. Through the use of georeferenced underwater video observations, this study will provide baseline information on species richness, diversity, and density (number/m²) as well as bio-physical habitat preferences over 13° of latitude (from Sanikiluaq to Igloolik). This information can be compared to future conditions and current latitudinal differences in species assemblages can help to predict effects of climate change (i.e., species assemblages in southern locations can be used to predict what future assemblages will look like in northern locations).

Climate change is also expected to influence the life-history characteristics of fish and invertebrate species occurring in Arctic waters. For example, warming temperatures can lead to changes in spawning season, age/length at attainment of sexual maturity, growth, and longevity. This study will be collecting and examining marine invertebrate species of interest over 13° of latitude to determine current geographic differences in life-history characteristics, providing a baseline, and where differences currently exist, insights into how more northern populations will respond to climate change. These analyses will take place at the Marine Institute under the supervision of Dr. Grant and we will seek opportunities for graduate students conducting the analyses to visit the Nunavut Arctic College in Iqaluit (and other NAC locations if there is interest) to provide interpretation sessions that will introduce students to the methodologies involved.

As climate change progresses the level of acidity and turbidity in marine environments will change and the level of oxygen and the temperature will also change. These environmental factors must be increasingly monitored to understand how far along climate change has progressed, and how it continues to progress in the future. Georeferenced multiparameter sonde surveys carried out in waters adjacent to the study communities will provide a baseline to compare to future conditions. The multiparameter sonde that will be used in this study has sensors to record depth, temperature, salinity, pH, turbidity, dissolved oxygen concentration, and chlorophyll a.

Food Security

There is increasing pressure to utilize Arctic marine resources to minimize food insecurity



through increased subsistence harvesting and where suitable numbers of harvestable species occur there is interest in commercial development. To contribute to sustainable Arctic marine ecosystems, exploratory fisheries need to consider a comprehensive research strategy that includes Indigenous traditional ecological knowledge (TEK) and building capacity to participate in research activities that foster community-based management of renewable resources. Identification of new resources for subsistence fishing are important and from a food security or food replacement value perspective have been estimated at up to \$50 million for all country foods harvested in Nunavut (see Nunavut Fisheries Strategy).

Progress to Date and Next Steps

In 2018/2019, the *RV Ludy Pudluk* was built by Kanter Marine. This vessel is equipped with boom and hydraulic hauler for hauling pots, removable A-frame for scallop dredge/ mussel rake, navigation and communication equipment, multibeam echosounder, and Olex seabed mapping system.

Qikiqtaaluk Corporation secured multi-species fishing gear, which include various shrimp, whelk, and crab pot designs and small scallop/mussel and sea cucumber dredges.

There are many different pot designs for shrimp, whelk, and crab and testing 2-3 varieties of each are preferred for harvester feedback on most satisfactory gear for operational and capture efficiency on small inshore vessels in the Arctic.

The underwater video camera system was secured. This system allows for umbilical drop camera deployments for real-time transect or grid surveys and static mount overnight camera frame deployments or deployments on fishing gear (e.g., scallop dredge).

Moreover, scientific field sampling equipment was secured. This equipment which will include various measuring devices (multi-parameter sonde, weigh scales, calipers, measuring boards, etc.) preservatives, field laptops and printers, and personal safety equipment (e.g., emersion suits).

The training plan and the research plans have been developed. Equipment has been installed on the vessel with the help of technicians from Kongsberg and testing will take place in Newfoundland and Labrador prior to the transit north. Sea-Keeping trials are scheduled to take place in the spring of 2021 as soon as COVID-19 restrictions allow. These trials will be conducted with the National Research Council of Canada to measure the stability of the vessel and install long-term monitoring equipment to ensure stability of the vessel through various wave forms is ensured.

On February 17 2020 staff from Qikiqtaaluk Corporation (QC) departed for Kinngait, Sanikiluaq, Igloodik and Sanirajak. Unfortunately, due to weather, the charter was unable to land in Sanikiluaq. During this trip, Qikiqtaaluk Corporation staff met with members of the local Hunters and Trappers Associations (HTAs) to discuss the research vessel and operations and plan for potential survey locations. During this meeting, Indigenous knowledge was shared, specifically, HTO members pointed out locations that have historical been well known areas to find marine invertebrates and other fish species. Members were compensated with honoraria.



In addition, Qikiqtaaluk Corporation staff and researchers from the Marine Institute plan to meet with HTA members in Kinngait and Sanikiluaq to discuss research operations and logistics in the first week of June 2021. The researchers from Newfoundland and Labrador will join the meetings digitally but a representative from Qikiqtaaluk Corporation will join the HTA members in-person while following all COVID-19 protocols as designated by the Chief Medical Officer of Nunavut. During these meetings, the projects that will be undertaken aboard the *RV Ludy Pudluk* and the community support vessels will be discussed, with the objective to gain feedback and requests from the community members.

HTA members of the study communities will be consulted at every step of this multi-year project to ensure their needs are reflected in the project scope. Once a study is complete in the community, QC staff and Marine Institute researchers will return to the community to present findings and discuss next steps.

Methods

This study introduces of a 40-foot (11.99 m) aluminum hull catamaran research vessel (*RV Ludy Pudluk*) that is capable of working in coastal (i.e., directly from shore) and inshore environments of the Nunavut Settlement Area at a reduced cost. For example, similar to the cost structure for the *MV Nuliajuk*, only operational costs will be requested.

The proposed research vessel will be equipped with 1) a boom and hydraulic hauler system suitable for multi-species surveys with baited pots for shrimp, crab, whelk, Atlantic cod, and Greenland cod, 2) removable A-frame for mobile fishing gear surveys with a scallop and sea cucumber dredge/ mussel rake, mini-bottom trawl, or for plankton research surveys, 3) underwater camera systems suitable for drop camera and towed video surveys, baited camera surveys, and static mounts on fishing gear, and 4) unmanned aerial vehicles (UAVs; a.k.a., drones) suitable for estuarine and shoreline surveys (e.g., edible seaweeds and fish habitat). Further, longlines and experimental bottom and pelagic gillnets (e.g., 1", 2", 3", 4", and 5" panels in one net) can also be set. Given the aluminum construction and vessel size it can also land on beaches to carry-out beach seine surveys (i.e., large 16 m seine) of capelin and with UAVs contribute to baseline environmental studies of intertidal and subtidal zones. The size of the proposed vessel would also allow for greater access and maneuverability in coastal environments where the *RV Nuliajuk* and *MV Kiviuq I* cannot operate.

The research vessel will serve as a multi-species research survey platform providing baseline information on the fishery potential of marine species by utilizing a variety of gear types and video camera systems to assess their distribution and abundance in the Arctic, thereby contributing to an ecosystem approach to fisheries resource assessments. The vessel will also be equipped with a multibeam echosounder system and a multi-parameter sonde for oceanographic data collection (i.e., pH, dissolved oxygen, salinity, temperature, depth, turbidity, chlorophyll a). Together this equipment will be used for ocean mapping to not only provide seabed habitat information for the fishery resource assessments but also to aid in navigation by providing bathymetric data suitable for use by the Canadian Hydrographic Service (CHS) in development of accurate nautical charts for Arctic waters. The proposed research vessel can also act as a support vessel to the *RV Nuliajuk* and *MV Kiviuq I* by working in coordination with these vessels during resource assessments or related tasks such as nearshore deployments of acoustic receiver arrays for the Ocean Tracking Network (OTN).



Depending on ice conditions, the *RV Ludy Pudluk* will be able to operate for 10-12 weeks in the Qikiqtani Region (i.e., July-October). For the remainder of the year the vessel will be moved to the Marine Institute's Holyrood marine facility located in Conception Bay, Newfoundland. This would be similar to the current arrangement that has been made for the *RV Nuliajuk*. Moving the *RV Ludy Pudluk* to a southern location will not only provide access by the research team to maintain scientific equipment but also provide a means of offsetting annual costs of operation in Arctic waters. Specifically, when not working in the Arctic the research vessel can be chartered for scientific research and bottom mapping in southern waters.

Data Management

In the contractual Agreement between the Marine Institute and Qikiqtaaluk Corporation:

(i) "Intellectual Property" means all data, information, materials, concepts, know-how, formulae, inventions, improvements, industrial designs, processes, patterns, machines, manufactures, compositions of matter, compilations of information or data, technology, technical information, software, code of all types, layouts, interfaces, applications, tools, databases and database layouts, works (including without limitation all literary, artistic, pictorial, graphic, musical, dramatic and audio-visual works) and all compilations thereof, developments, trade secrets, integrated circuit topographies and integrated circuit topography products, plant varieties, domain names, prototypes, specifications and all other intellectual and industrial property, whether or not registrable or the subject of applications for registration; and

(ii) "Intellectual Property Rights" means all common law and statutory rights, copyrights, moral rights, patent rights, trade-mark rights, license and contractual rights and all other proprietary or intellectual property rights in or to Intellectual Property everywhere in the world, including without limitation all registrations, pending applications for registration and rights to file applications for any of the foregoing

All Intellectual Property conceived, created, developed, produced or reduced to practice in the course of any research or activities undertaken pursuant to this Project and all Intellectual Property Rights therein (collectively, "Foreground IP") shall be owned by the Marine Institute. The Marine Institute hereby grants Qikiqtaaluk Corporation the royalty-free, fully paid-up, perpetual, non-exclusive, non-transferrable, non-sub-licensable right to use the Foreground IP for its internal business purposes, subject to the obligations of confidentiality set out in the contractual Agreement. In no event shall any Foreground IP constitute Confidential Information of the Qikiqtaaluk Corporation.

Publication and Public Disclosure

Where a Party (the "Publishing Party") wishes to publish or publicly present or disclose any Foreground IP, it shall first provide to the other Party (the "Reviewing Party") a draft of such proposed publication, presentation or disclosure (each, a "Draft") for review, whereupon the Reviewing Party shall have thirty (30) days from the date of receipt of the Draft within which to review it (the "Review Period"). If the Reviewing Party is the Qikiqtaaluk Corporation, it may object to the Draft within the Review Period solely on the grounds that the Draft contains Confidential Information of the Qikiqtaaluk Corporation, as the case may be. If the Reviewing Party is the Marine Institute or any of



its Personnel, it/they may object to the Draft within the Review Period either on the grounds that the Draft contains Confidential Information of the Marine Institute or its Personnel or on the grounds that the Draft contains Foreground IP for which the Marine Institute or its Personnel wish to seek patent or other protection.

Where a Reviewing Party objects to the Draft as set out above on the basis it contains Confidential Information of the Reviewing Party, then the Publishing Party shall remove all such Confidential Information from the Draft before publishing or publicly presenting or disclosing it. Subject to the next paragraph, the Publishing Party may then proceed with the publication or disclosure of the Draft.

Where the Marine Institute or its Personnel are the Reviewing Party and they object to the Draft as set out above on the basis it contains Foreground IP for which they wish to seek patent or other protection, then the Qikiqtaaluk Corporation shall delay publication or public presentation or disclosure of the Draft for a period of ninety (90) days commencing on the last day of the Review Period (the “Patenting Period”) to enable the Marine Institute or its Personnel to apply for such protection. Upon the expiration of the Patenting Period, and provided all objections made pursuant to the preceding paragraph have been satisfied, the Publishing Party may then proceed with the publication or disclosure of the Draft.

If no objection is made by the Reviewing Party to the Draft during the Review Period, the Publishing Party may proceed with the publication or disclosure of the Draft upon the expiration of the Review Period.

Research Outputs

This project has three main research output objectives: 1) assess capacity of *MV Ludy Pudluk* with regard to fisheries resource assessments in harsh and unpredictable Arctic and sub-Arctic environments, 2) develop collaborative research strategy for Nunavut communities that maximizes Inuit engagement and know-how transfer by utilizing Inuit owned support vessels, and 3) begin multi-species resource assessments in four Qikiqtani communities.

This project seeks to determine whether a 39’11” aluminum dual hulled catamaran equipped with innovative components and innovative state-of-the-art research equipment that are new to the Arctic Theater, can not only meet, but also expedite the marine fisheries resource assessment demands in Canada’s harsh and unpredictable Arctic and sub-Arctic environments. This will be achieved by utilizing the *RV Ludy Pudluk* during multi-species resources assessments over a four-year period (2021-25) in four QFA communities that encompass 13° of latitude (i.e., Sanikiluaq, Kinngait, Sanirajak, and Igloolik). By pushing innovation at multiple levels, the QC is taking a significant financial risk based on the need to improve and expedite the fisheries resource assessment process in a region hampered by a limited ice-free season and great distances between communities. The QCs vision of an inshore fisheries development plan for the Qikiqtani Region that introduces the *RV Ludy Pudluk* and a comprehensive research program that seeks to establish what can be achieved as well as the pros and cons of the current vessel design and equipment demonstrates strong leadership in the Nunavut fishing industry.



1) Assess capacity of *RV Ludy Pudluk* with regard to fisheries resource assessments in harsh and unpredictable Arctic and sub-Arctic environments.

Assessments of the ability of the *RV Ludy Pudluk* to meet demands of working in Canada's Arctic will be achieved by determining whether the vessel and equipment perform at or above expectations with regard to:

- 1) capacity of dual hull catamaran and vessel equipment (i.e., steel cable winch, bow thruster, counter rotating engine propellers) to maintain vessel on course at slow tow speeds of 0.5-0.75 knots and ability to maintain newly designed towed video system in upright orientation over varying substrate types, meteorological conditions, and sea states,
- 2) ability of the tilting A-frame to safely and efficiently deploy and retrieve equipment from stern of vessel,
- 3) ability of the retractable arm to safely and reliably extend and retrieve multibeam echosounder (MBES) and ultrashort baseline (USBL) positioning systems to a depth below the hull of the vessel that provides high quality data,
- 4) ability to use MBES and USBL positioning system in sea-ice conditions,
- 5) ability of Cummins diesel engines with retractable stern drives to facilitate production of high quality MBES survey data (i.e., do they create unacceptable vibration and noise?),
- 6) ability of increased stability of dual hull catamaran and MBES system to obtain high quality data at vessel speeds of 10-12 knots (i.e., approximately 2× the speed that the MBES system on mono-hull *MV Nuliajuk* is capable of achieving),
- 7) ability to interface MBES data, USBL derived georeferenced positioning data of towed video system, and navigation software onto video monitor in wheelhouse for real time generation of information and verification of intended sampling/-survey sites (i.e., there is no off the shelf method for interfacing these technologies),
- 8) ability of living conditions to support 4-5 crew for 3-4 days during transit between communities and during 24-hour seabed mapping surveys, and
- 9) ability to meet storage demands with regard to fuel, research equipment, and supplies for general vessel maintenance and repairs.

2) Collaborative Research Strategy Involving Community Support Vessels

This project seeks to build upon a collaborative science-indigenous partnership and multi-vessel research model involving community supplied vessels that has been operating between the Marine Institute's Centre for Sustainable Aquatic Resources (CSAR) and HTAs from Kimmirut and Iqaluit over the past 2-3 years. This project will improve upon the model by including up to two vessels from each study community, each equipped with a hydraulic hauler, depth sounder, and GPS system provided by this project as well as a comprehensive set of mutually agreed upon research tasks that have not been fully integrated in past Nunavut fisheries resource assessment studies.

This novel approach will help to expedite the resource assessment process by utilizing TEK knowledge to help establish survey sites and includes utilizing Inuit owned vessels and Inuit participation when it comes to data collection. In addition, Inuit will receive on the job training on the *RV Ludy Pudluk*. This project will demonstrate a collaborative ecosystem based approach to fisheries resource assessments in the Arctic and develop a research model that is transferable among Nunavut communities. Marine Institute science and technical staff and graduate students will supervise data



collection on board community vessels and the *RV Ludy Pudluk* and train Inuit community members in the use of equipment and data collection. Specifically, community vessels will be tasked with carrying out drop video camera surveys, surveys with oceanographic equipment (e.g., CTD and multi-parameter sonde), physical sampling of seabed (e.g., Ponar grabs), deploying and testing static and mobile bottom contact fishing gear (e.g., pots and dredges), and assist in collecting animals for community interpretive sessions designed to engage youth in fisheries research via live animals held in land based “touch tanks”.

3) Multi-species Resource Assessments

In collaboration with the four Qikiqtani Fisheries Alliance communities of Kinngait, Sanikiluaq, Sanirajak, and Igloodik, this project seeks to assess the distribution and abundance/biomass of species of commercial potential within the Nunavut Settlement Area in order to provide spawning stock biomass estimates that can be used to direct fishing capacity (i.e., number of jobs for Inuit fishers) and infrastructure development. The innovative design features of the *RV Ludy Pudluk* and state-of-the-art scientific equipment were carefully considered as a means of facilitating a new approach to fisheries resource assessments in Canada’s Arctic and sub-Arctic environments. Specifically, this project will utilize sub-decimeter georeferenced underwater video surveys to estimate density of targeted species by habitat type (e.g., depth, substrate, bathymetric features) to determine preferred habitat and overlay this data on MBES generated seabed maps of the area of each habitat type to provide estimates of the spawning stock biomass.

The following dissemination activities will be undertaken:

- Provide presentation and printed summaries to the Government of Nunavut (GN) Department of Environment, Fisheries and Sealing Division.
- Provide presentations at scientific conferences and publication of research in peer reviewed scientific journals.
- Presentations and virtual discussions at conferences and workshops.
- Plain language printed summaries in English and Inuktitut of project activities and partnerships will be developed to share in communities and throughout Nunavut.
- Underwater video will be delivered to HTAs within each year of the study.
- Meetings/presentations will take place every second year in each community.
- Inform policy makers at the regional, territorial, and national levels (i.e., to contribute to New Emerging Fisheries Policy, ‘Strengthening Our Relationship: The Aboriginal Fishing Strategy and Beyond’ and ‘Commercial Fisheries Licensing Policy for Arctic Region’.

During this project, contributions by HTAs and individual participants will be acknowledged in publications, presentations, and project summaries provided at scientific conferences (e.g., ArcticNet) and annual Government of Nunavut Department of Environment science workshops which are attended by HTAs from across Canada's Arctic, the Indigenous fishing industry, federal and territorial officials, academia, and NGOs. First 1-2 publications expected in 2023 and a total of 6-10. Presentations at conferences will take place from 2022-2025 and beyond.

SECTION 6: FUEL, WATER, WASTE

Will you cache fuel on Crown or Inuit Owned Lands to undertake field research activity



YES No (circle one)

If YES, please complete the table below; provide details for each planned fuel cache

Cache Size (amount of fuel in litres)	Fuel Type	Cache Location (UTM or Lat/Long)	Container Type/Size	Proposed Removal Date

***You must notify the Lands Division of INAC in advance if you intend to cache fuel on Federal Crown Lands in Nunavut! Notification is required within 30 days of establishing the cache. You must also apply in advance to the appropriate Regional Inuit Association for permission to cache fuel on Inuit Owned Lands in Nunavut.**

Will you be accessing surface waters for potable use or research purposes? If Yes please provide the following details:

YES No (circle one)

The RV *Ludy Pudluk* is equipped with a freshwater maker (i.e., saltwater desalinator)

Daily amount of water to be used (in Litres)	Proposed water retrieval methods	Proposed water retrieval (source) location

Please note: You are permitted use up to 50 cubic meters of water per day in Nunavut without obtaining a licence from the Nunavut Water Board; however, you must apply to The Nunavut Water Board for authorization to use water without a license.

Any water use in excess of 50 cubic meters of water may require a Class A license from the Water Board

1. Will you deposit sewage to a sump?

YES No (circle one)

***If yes, have you applied to the Nunavut Water Board for approval to deposit waste without a license (required for any deposit of sewage to a sump in Nunavut)**

YES NO (Circle One)

SECTION 7: COMMUNITY INVOLVEMENT AND REGIONAL BENEFIT



The community representatives that have been contacted in relation to this project and attach a summary of consultations if available:

Community	Name	Organization	Date Contacted
Kinngait	Simiga Suvega	Aiviq HTO	February 17-20 2020
Sanikiluaq	Lucassie Arragutainaq	Sanikiluaq HTO	February 17-20 2020
Igloodik	Michelline Ammaq	Igloodik HTO	February 17-20 2020
Sanirajak	Sam Arnardjuaq	Hall Beach HTO	February 17-20 2020

The role(s) of Nunavut Residents

This project represents a collaborative fisheries research program between the Qikiqtaaluk Corporation (QC), Hunters and Trappers Organizations (HTOs) from four Qikiqtani Fisheries Alliance communities of Kinngait, Sanikiluaq, Sanirajak, and Igloodik, and the Fisheries and Marine Institute of Memorial University of Newfoundland (MI). This Project involves a recently constructed (i.e., 2020) purpose-built research vessel (*RV Ludy Pudluk*) owned by QC that is dedicated to fisheries research within the Nunavut Settlement Area.

During this project, MI will manage the field operations of the QC research vessel and guide research carried-out with vessels supplied by Inuit from each community. The QC has had meetings with HTOs from the four communities and they are eager to begin resources assessments.

In addition, in spring 2021, members of QC and the MI research team will participate in virtual meetings with members of the study communities to develop research plans that meet community expectations. The community resource assessments will include part-time employment, training, and capacity building of no less than 20 Indigenous highly qualified people (i.e., five from each of the four study communities).

Two Inuit supplied vessels from each community will serve as research platforms, each with two crew members and an MI researcher. Inuit crew members aboard these vessels will provide input in the development of fishing gears designed for use on small vessels (e.g., 7-9 m), safe navigation, and development of surveys. In addition, a member of each community will be involved in studies carried out on board the QC research vessel.

Inuit training and capacity building on board the QC research vessel and community vessels will include data acquisition associated with a variety of fishing gears, species identification and collection biological samples, use of underwater video equipment (drop cameras and ROVs), towed bottom sampling equipment, CTD, and multiparameter sonde. Inuit with SVOP certification received from the Nunavut Fisheries and Marine Training Consortium will receive at-sea training on the operations of the QC research vessel during the resource



assessments.

This at-sea training component will also be provided annually to three Inuit during the transit of the QC research vessel from Newfoundland to Nunavut during the summer and during the return trip to Newfoundland in the fall at the end of the field season. Community members, including youth within each community will also be engaged through onshore introduction on the identification and measurement techniques of the various species captured. Further, in each community MI will use ‘touch tanks’ for interpretive sessions of species captured during the project (e.g., 27 different species were captured during studies in Kimmirut in 2017).

A principal objective of our community engagement program is to promote information exchange and support the development of Indigenous skills required to not only participate in but also lead future programs to assess the status of marine resources and in the operation of research vessels. During this project, contributions by HTOs and individual participants will be acknowledged in publications, presentations, and project summaries provided at scientific conferences (e.g., ArcticNet) and annual Government of Nunavut Department of Environment science workshops which are attended by HTOs from across Canada's Arctic, the Indigenous fishing industry, federal and territorial officials, academia, and NGOs.

In addition, through the collaboration with Hunters and Trappers Associated within the survey communities, Inuit have been and will continue to be consulted at every stage of this project to ensure their needs and vision are used as a guide to inform project objectives and research questions.

Risks

For residents who are not conducting research on the vessels, there are no risks to health, safety or livelihoods of Nunavut residents resulting from this project.

For Nunavut residents who are joining the *RV Ludy Pudluk* to conduct research, or the community support vessels there are safety risks that are associated with working on a vessel in the marine environment. Safety training and plans will be conducted and executed prior to field work. In addition, all Nunavut residents who conduct research on any vessel for this project will need to have experience with safety procedures in the marine environment.

Initially, the surveys were planned to take place during the summer of 2020. However, due to COVID-19, the work was delayed by one year. The Letters of Support were obtained in 2020 for this reason. Updated letters of support are currently pending. The 2020 letters of support are attached.



Will you be collecting traditional knowledge or undertaking other social/health research activities in Nunavut as part of this research project?

YES No (circle one)

If yes, please provide details below:

Have you submitted a social sciences and/or health research application for the above described activities? Yes No (Circle one)

SECTION 8: GENERAL QUESTIONS

1. Do you give NRI permission to publish project information in the Nunavut Research Institute Annual Compendium of Research Undertaken in Nunavut?

Yes No (Circle one)

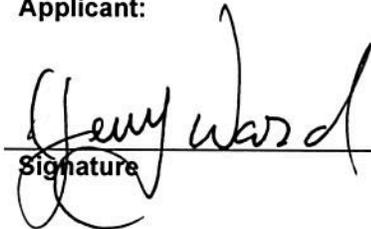
2. If your research is related to climate change, do you agree to share your annual summary report with the Nunavut Climate Change Centre at climatechange@gov.nu.ca?

Yes No (Circle one)

3. In addition to the application form, please check that the following have been submitted to NRI:

- Project Summary -in English and Inuktitut (+Inuinnaqtun, if in the Kitikmeot)
- NTS Maps of the project

Applicant:


Director of Fisheries
April 12- 2021

Signature
Title
Date

Qikiqtaaluk Corporation
922 Niaqunngusiaq Road
PO Box 1228
Iqaluit, Nunavut, Canada
X0A 0H0

June 9 2020

To whom it may concern,

On behalf of the Aiviq Hunters and Trappers Association, this letter of support serves as approval from the Association for Qikiqtaaluk Corporation (QC) to conduct inshore fisheries research around Kinngait

We are aware that Qikiqtaaluk Corporation has considered the health and safety of this community through implementation of mitigation strategies such as limiting contact between crew members and the community and arranging no-contact drop offs for supplies.

We look forward to working with QC this summer and in the future.

Sincerely,



Adamie Nuna, Chairman
P.O. Box 300
Aiviq Hunters & Trappers Association
Kinngait, Nunavut
X0A 0W0

**Sanikiluaq Hunters &
Trappers Association**

P.O. Box 174
SANIKILUAQ, NUNAVUT
X0A 0W0

Telephone: (867) 266-8709 Fax (867) 266-8131
Email – sani@baffinhto.ca

Qikiqtaaluk Corporation
922 Niaqunngusiaq Road
PO Box 1228
Iqaluit, Nunavut, Canada
X0A 0H0

June 9 2020

To whom it may concern,

On behalf of the Sanikiluaq Hunters and Trappers Association, this letter of support serves as approval from the Association for Qikiqtaaluk Corporation (QC) to conduct inshore fisheries research around Sanikiluaq.

We are aware that Qikiqtaaluk Corporation has considered the health and safety of this community through implementation of mitigation strategies such as limiting contact between crew members and the community and arranging no-contact drop offs for supplies.

We look forward to working with QC this summer and in the future.

Sincerely,



Eli Kavik, Chairman
Sanikiluaq Hunters and Trappers Association
P.O. Box 174
Sanikiluaq, Nunavut
X0A 0W0
Telephone 867-266-8709
Fax: 867-266-8131

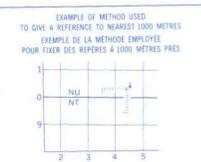
Military users, refer to this map as: Réference de cette carte pour usage militaire: SERIES A 501 SERIE MAP 47 D CARTE EDITION 3 MCE ÉDITION

THE LIMITS OF THE LAND PARCELS WITHIN THE LAND CLAIM SETTLEMENT AREA ARE DEPICTED IN APPROXIMATE LOCATIONS. THE TERRITORIAL LIMITS OF NUNAVUT WILL COME INTO FORCE APRIL 1, 1999.
LES LIMITES DES PARCELLES DE TERRAIN SITUÉES À L'INTÉRIEUR DE LA ZONE DE RÈGLEMENT DES REVENDEMENTS TERRITORIAUX SONT APPROXIMATIVES. LES LIMITES DÉFINISSANT LE TERRITOIRE DU NUNAVUT SERONT OFFICIELLEMENT ADOPTÉES LE 1^{er} AVRIL 1999.



ALL ISLANDS WITHIN THE BOUNDED AREA ARE PART OF THE LAND SETTLEMENT PARCEL.
TOUTES LES ÎLES SITUÉES À L'INTÉRIEUR DE LA ZONE DÉLIMITÉE FONT PARTIE DE LA PARCELLE AVANT FAIT L'OBJET D'UNE ENTENTE.

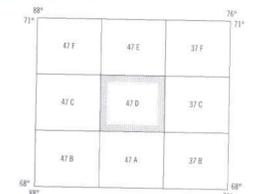
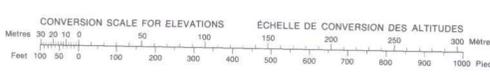
TEN THOUSAND METRE
UNIVERSAL TRANSVERSE MERCATOR GRID
ZONE 17
QUADRILLAGE UNIVERSEL TRANSVERSE DE MERCATOR
DE DIX MILLE MÈTRES

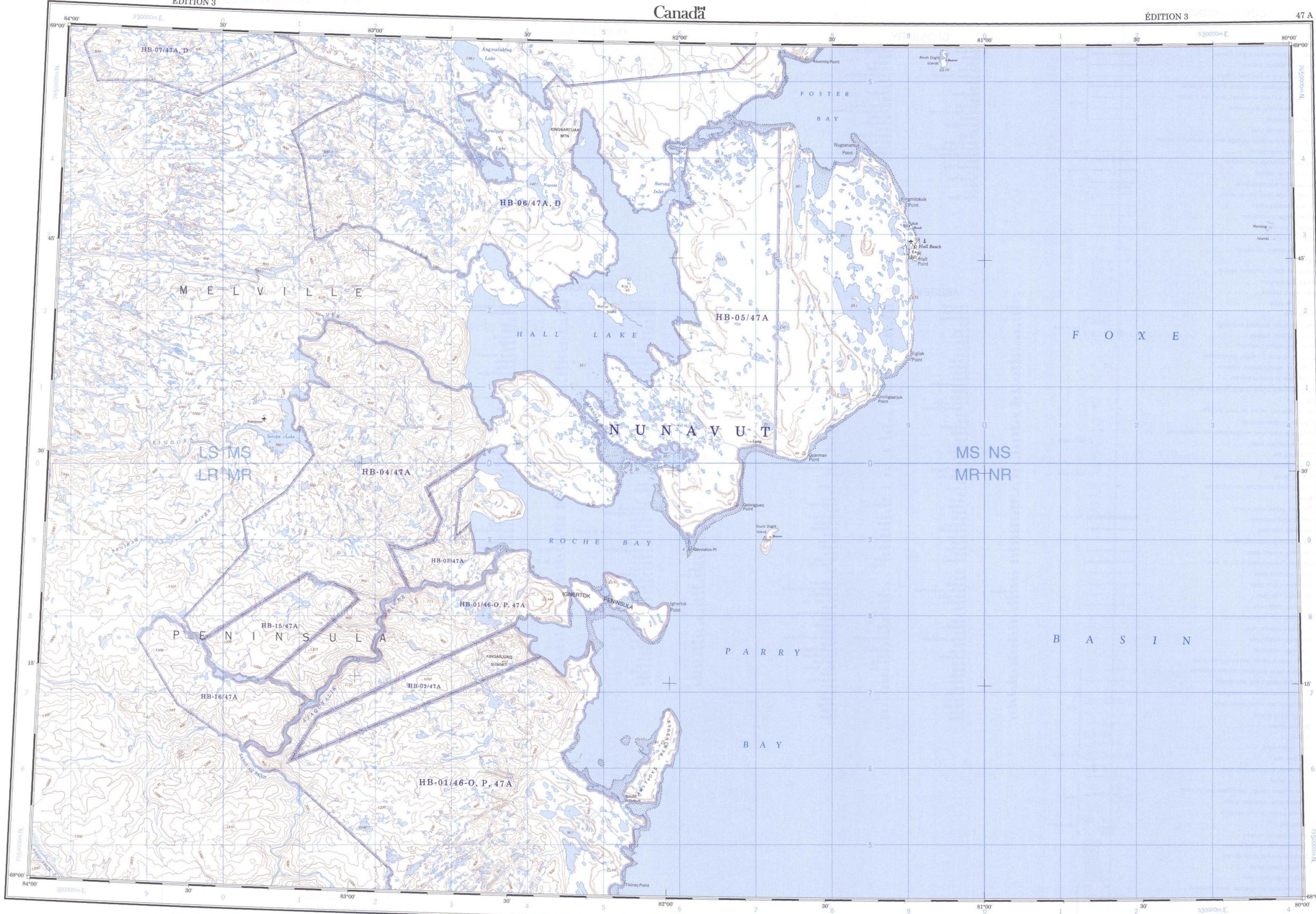


REFERENCE POINT CHURCH - EGLISE
SOURCE: Road letters of 100 000m square
EASTING: Read number on grid line immediately to left of point.
NORTHING: Read number on grid line immediately below point.
GRID REFERENCE: CHURCH - EGLISE

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IGLOOLIK
DISTRICT OF FRANKLIN DISTRICT DE FRANKLIN
NORTHWEST TERRITORIES TERRITOIRES DU NORD-OUEST



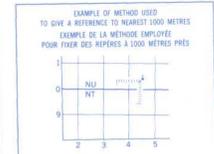


Military users, refer to this map as: **SERIES A 501**
 Références de cette carte pour usage militaire: **MAP 47 A**
EDITION 3 **MCE** **EDITION**

THE LIMITS OF THE LAND PARCELS WITHIN THE LAND CLAIM SETTLEMENT AREA ARE SHOWN IN APPROXIMATE LOCATIONS. THE TERRITORIAL LIMITS OF NUNAVUT WILL COME INTO FORCE APRIL 1, 1999.
 LES LIMITES DES PARCELLES DE TERRAIN SITUÉES À L'INTÉRIEUR DE LA ZONE DE RÉGLEMENT DES REVENDICATIONS TERRITORIALES SONT APPROXIMATIVES. LES LIMITES DÉFINISSANT LE TERRITOIRE DU NUNAVUT SERONT OFFICIELLEMENT ADOPTÉES LE 1^{ER} AVRIL 1999.

TEN THOUSAND METRE
 UNIVERSAL TRANSVERSE MERCATOR GRID
ZONE 17
 QUADRILAGE UNIVERSEL TRANSVERSE DE MERCATOR
 DE DIX MILLE MÈTRES

GRID ZONE DESIGNATION DESIGNATION DE LA ZONE DU QUADRILAGE	100 000 m SQUARE IDENTIFICATION IDENTIFICATION DU CARRÉ DE 100 000 m ²												
17 W	<table border="1"> <tr> <td>LS</td> <td>MS</td> <td>NS</td> <td>TS</td> </tr> <tr> <td>LR</td> <td>MR</td> <td>NR</td> <td>TR</td> </tr> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table>	LS	MS	NS	TS	LR	MR	NR	TR	1	2	3	4
LS	MS	NS	TS										
LR	MR	NR	TR										
1	2	3	4										



REFERENCE POINT CHURCH - EGLISE (as above)
 POINT DE REPÈRE (ci-dessus)

SQUARE: Read letters of 100 000m square
 CARRÉ: Lire les lettres du carré de 100 000m

EASTING: Read number on grid line immediately to left of point.
 ABSCISSE: Note le chiffre de la ligne de quadrillage immédiatement à gauche du repère.
 Estimate tenth of a square from this line eastward to point.
 Estimer le nombre de dixièmes de carré entre cette ligne et le repère en direction est.

NORTHING: Read number on grid line immediately below point.
 ORDONNÉE: Note le chiffre de la ligne de quadrillage immédiatement en dessous du repère.
 Estimate tenth of a square from this line northward to point.
 Estimer le nombre de dixièmes de carré entre cette ligne et le repère en direction nord.

GRID REFERENCE: REFERENCE AU QUADRILAGE: NU4504

If reporting beyond 18° in any direction, prefix Grid Zone designator as: L49VJ4504
 Si vous faites connaître votre position à quelque fin qui se trouve à plus de 18°, préfixez la direction, indiquant également la zone de quadrillage: 18L que L49VJ4504

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 INTERNET CORRECTIONS 1995.

Information concerning bench marks and horizontal survey monuments can be obtained from Geodetic Survey, Canada Centre for Surveying, Ottawa.

HALL LAKE
 DISTRICT OF FRANKLIN DISTRICT DE FRANKLIN
 NORTHWEST TERRITORIES TERRITOIRES DU NORD-OUEST

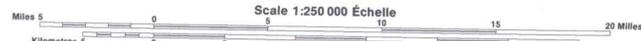
Pour tout renseignement concernant les repères de nivellement et les bornes géodésiques, s'adresser à l'Agence ou le Bureau des levés géodésiques, Centre canadien des levés, Ottawa.

ÉTABLI PAR LE CENTRE CANADIEN DE CARTOGRAPHIE, RESSOURCES NATURELLES CANADA, RÉVISIONNEMENTS À JOUR TELS QU'INDIQUÉS DANS LE DIAGRAMME, PUBLIÉE EN 1995.
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 CORRECTIONS PROVISOIRES 1995.

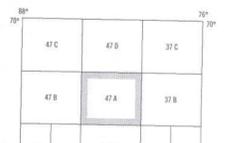
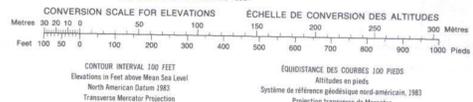


Roads: Routes
 cart track: sentier, percée ou portage
 trail, cut line or portage: sentier, percée ou portage

FOR COMPLETE REFERENCE SEE REVERSE SIDE POUR UNE LISTE COMPLÈTE DES SIGNES, VOIR AU VERSO



THE MAGNETIC COMPASS MAY BE ERRATIC IN THIS AREA.
 LA BOUSSEILLE SERA PEUT-ÊTRE INSTABLE DANS CETTE RÉGION.
 Magnetic declination 1995 varies from 39°12' westerly at centre of west edge to 43°02' westerly at centre of east edge. Mean annual change decreasing 13.1'.
 En 1995, la déclinaison magnétique varie de 39°12' vers l'ouest au centre du bord ouest à 43°02' vers l'ouest au centre du bord est. La variation annuelle moyenne décroît de 13,1'.



82° 18' 15" W to 81° 45' 00" W
 70° 00' 00" N to 69° 45' 00" N
 Refer to adjoining Maps of the National Topographic System
 Tablier d'assemblage du Système national de cartographie

ALL ISLANDS WITHIN THE BOUNDED AREA ARE PART OF THE LAND SETTLEMENT PARCEL.
TOUTES LES ÎLES SITUÉES À L'INTÉRIEUR DE LA ZONE DÉLIMITÉE FONT PARTIE DE LA PARCELLE AYANT FAIT L'OBJET D'UNE ENTENTE.

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TOUTES LES ÎLES SITUÉES À L'INTÉRIEUR DE LA ZONE DÉLIMITÉE FONT PARTIE DE LA PARCELLE AYANT FAIT L'OBJET D'UNE ENTENTE.

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TOUTES LES ÎLES SITUÉES À L'INTÉRIEUR DE LA ZONE DÉLIMITÉE FONT PARTIE DE LA PARCELLE AYANT FAIT L'OBJET D'UNE ENTENTE.

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Information concerning bench marks and horizontal survey monuments can be obtained from Geomatics Survey, Surveys and Mapping Branch, Ottawa.

Pour tout renseignement concernant les repères et bornes altimétriques, s'adresser aux levés géodésiques, Direction des levés et de la cartographie, Ottawa.

ÉTABLI PAR LA DIRECTION DES LEVÉS ET DE LA CARTOGRAPHIE, MINISTÈRE DE L'ÉNERGIE, DES MINES ET DES RESSOURCES, RENDUEMENT À JOUR TELS QU'INDIQUÉS AU DIAGRAMME, PUBLIÉE EN 1986.

CES CARTES SONT EN VENTE AU BUREAU DES CARTES DU CANADA, MINISTÈRE DE L'ÉNERGIE, DES MINES ET DES RESSOURCES, OTTAWA, OU CHEZ LE VENDEUR LE PLUS PRÈS.

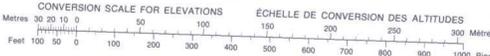
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CAPE DORSET DISTRICT OF FRANKLIN DISTRICT DE FRANKLIN NORTHWEST TERRITORIES TERRITOIRES DU NORD-OUEST



THE MAGNETIC COMPASS MAY BE ERRATIC IN THIS AREA.
Magnetic declination 1986 varies from 37°13' westerly at centre of west edge to 39°01' westerly at centre of east edge. Mean annual change decreasing 0.8°.

LA BOUSSOLE SERA PEUT-ÊTRE INSTABLE DANS CETTE RÉGION.
En 1986, la déclinaison magnétique varie vers l'ouest de 37°13' au centre du bord ouest à 39°01' au centre du bord est. La variation annuelle moyenne décroît de 0,8°.



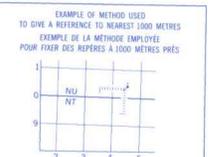
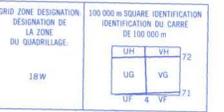
CONTOUR INTERVAL 100 FEET
Elevations in Feet above Mean Sea Level
North American Datum 1927
Transverse Mercator Projection

ÉCHELLE DE CONVERSION DES ALTITUDES
Altitudes en mètres
Système de référence géodésique nord-américain, 1927
Projection transverse de Mercator

Military users, refer to this map as: SÉRIE A 501 SÉRIE MAP 36 C & 36 D CARTE ÉDITION 3 MCE ÉDITION
Référence de cette carte pour usage militaire.

THE LIMITS OF THE LAND PARCELS WITHIN THE LAND CLAIM SETTLEMENT AREA ARE DEPICTED IN APPROXIMATE LOCATIONS. THE TERRITORIAL LIMITS OF NUNAVUT WILL COME INTO FORCE APRIL 1, 1999.
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TEN THOUSAND METRE
UNIVERSAL TRANSVERSE MERCATOR GRID
ZONE 18
QUADRILLAGE UNIVERSAL, TRANSVERSE DE MERCATOR DE DIX MILLE MÈTRES



REFERENCE POINT CHURCH - EGLISE (as above) (ci-dessus)

SQUARE: Read letters of 100 000m square CARRE: Lire les lettres du carré de 100 000m
EASTING: Read number on grid line immediately to left of point. ABSCISSE: Lire le chiffre de la ligne de quadrillage immédiatement à gauche du repère.
Estimate tenths of a square from this line eastward to point. Estimer le nombre de dixièmes du carré entre cette ligne et le repère en direction est.
NORTHING: Read number on grid line immediately below point. ORDONNÉE: Lire le chiffre de la ligne de quadrillage immédiatement en dessous du repère.
Estimate tenths of a square from this line northward to point. Estimer le nombre de dixièmes du carré entre cette ligne et le repère en direction nord.

GRID REFERENCE: RÉFÉRENCE AU QUADRILLAGE: NU4504

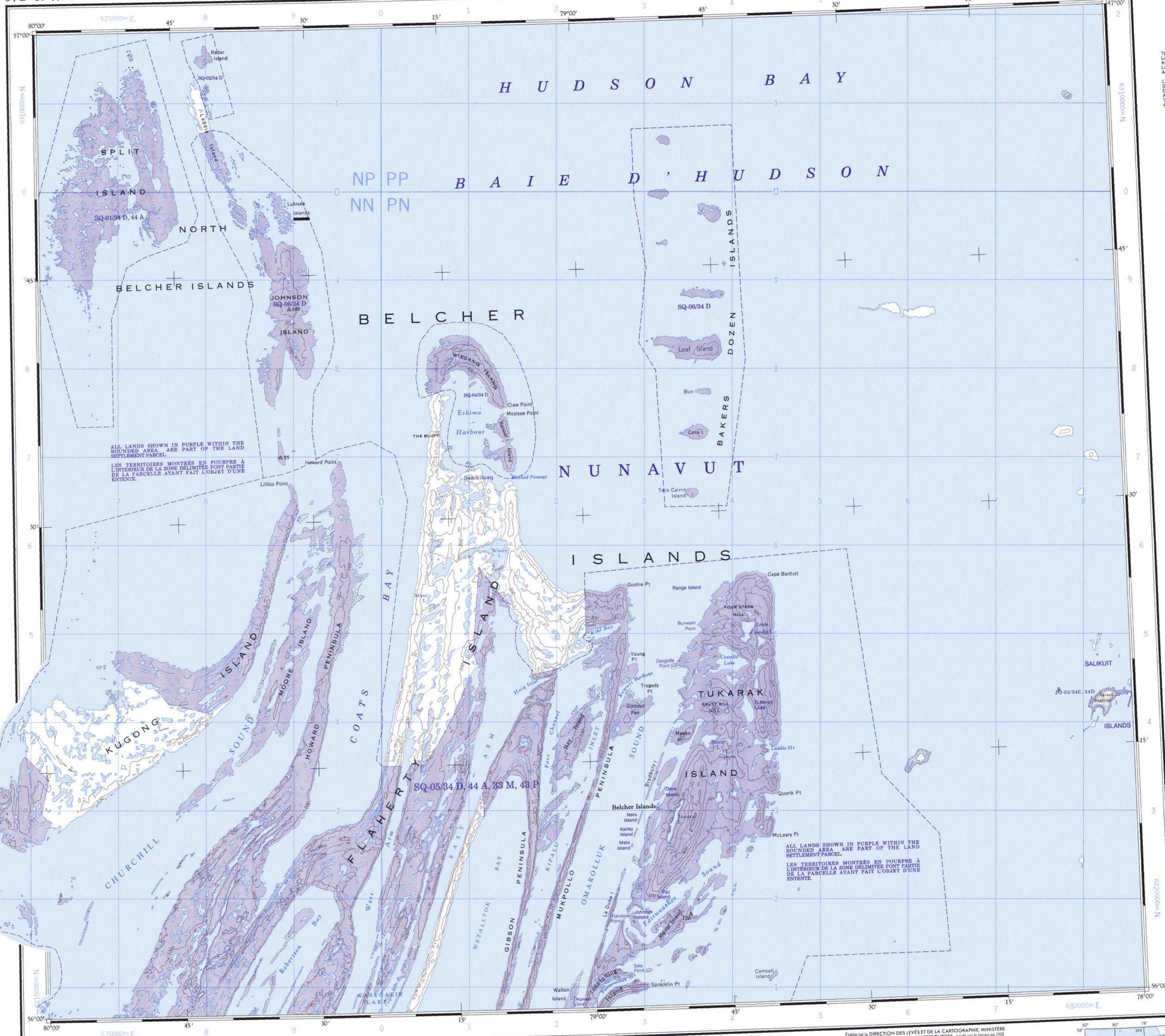
If reporting beyond 18° in any direction, prefix Grid Zone designation as 14NUN4504. Si vous faites connaître votre position à quelque angle qui se trouve à plus de 18°, plus importe la direction, indiquez également la zone du quadrillage tel que 14NUN4504.



Refer to this map as: 34 D - 44 A EDITION 4 ASE SERIES A 901

THE LIMITS OF THE LAND PARCELS WITHIN THE LAND CLAIM SETTLEMENT AREA ARE DEPICTED IN APPROXIMATE LOCATIONS. THE TERRITORIAL LIMITS OF NUNAVUT WILL COME INTO FORCE APRIL 1, 1999.

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ALL LANDS SHOWN IN PURPLE WITHIN THE BOUNDED AREA ARE PART OF THE LAND SETTLEMENT PARCEL.
LES TERRITOIRES MONTRES EN POURPRE À L'INTÉRIEUR DE LA ZONE DÉLIMITÉE FONT PARTIE DE LA PARCELLE AYANT FAIT L'OBJET D'UNE ENTENTE.

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LES TERRITOIRES MONTRES EN POURPRE À L'INTÉRIEUR DE LA ZONE DÉLIMITÉE FONT PARTIE DE LA PARCELLE AYANT FAIT L'OBJET D'UNE ENTENTE.

100,000 M. SQUARE IDENTIFICATION

GRID ZONE DESIGNATION	17V
TO GIVE A REFERENCE TO NEAREST 1000 METRES	EXAMPLE: STREAM JUNCTION
SQUARE: Read letters of 100,000 m. square	PN
EASTING: Read number on grid line immediately to left of point	1
Estimate tenths of a square from this line eastward to point.	14
NORTHING: Read number on grid line immediately below point	61
Estimate tenths of a square from this line northward to point.	62
MILITARY GRID REFERENCE (to nearest 1,000 metres)	PN1462
If reporting beyond 18° in any direction prefix Grid Zone Designation as: 17VFN1462	

TEN THOUSAND METRE UNIVERSAL TRANSVERSE MERCATOR GRID ZONE 17

TUKARAK ISLAND

DISTRICT OF KEEWATIN DISTRICT DE KEEWATIN
NORTHWEST TERRITORIES TERRITOIRES DU NORD-OUEST

Scale 1:250,000 Échelle

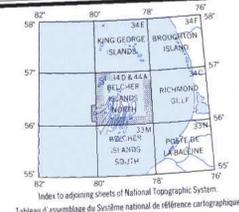


Transverse Mercator Projection
North American Datum 1927
Contour Interval 100 feet
Elevations in feet above Mean Sea Level
Copies may be obtained from the Map Distribution Office, Department of Energy, Mines and Resources, Ottawa.

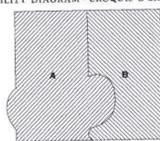
Projection Transverse de Mercator
Réseau géodésique nord-américain unifié (1927)
Équidistance des courbes: 100 pieds
Élévations en pieds au-dessus du niveau moyen de la mer
Ces cartes sont en vente au Bureau de distribution des cartes, ministère de l'Énergie, des Mines et des Ressources, Ottawa.

Établi par la DIRECTION DES LÈVES ET DE LA CARTOGRAPHIE, MINISTÈRE DE L'ÉNERGIE DES MINES ET DES RESSOURCES. Levés sur le terrain en 1958. Imprimé en 1967.

La déflexion magnétique pour 1967 varie de 20'44" Ouest au centre de la limite Ouest à 22'45" Ouest au centre de la limite Est. Variation moyenne annuelle: 7.6 Est.
Pour une liste complète de signes, voir au verso.
CORRECTIONS PROVISOIRES 1996.



RELIABILITY DIAGRAM - CROQUIS D'EXACTITUDE



A - Large scale maps, photogrammetric, 1961-63.
B - Compiled, photogrammetrically from 1963-64 aerial photography.
A - Cartes à grande échelle, photogrammétriques, 1961-63.
B - Médigie photogrammétriquement d'après des photographies aériennes prises en 1963-64.

Produced by the SURVEYS AND MAPPING BRANCH, DEPARTMENT OF ENERGY, MINES AND RESOURCES. Field surveys 1958. Printed 1967.

Magnetic declination 1967 varies from 20'44" westerly at centre of west edge to 22'45" westerly at centre of east edge. Mean annual change: 7.6 easterly.
For complete reference see reverse side.
INTERN CORRECTIONS 1996.