

SCIENTIFIC RESEARCH LICENCE APPLICATION

Physical / Natural Sciences RESEARCH



Before completing this application form, please carefully review:

- “Obtaining a Research License under Nunavut’s Scientists Act: A Guide for Applicants” (available at <https://www.nri.nu.ca/licensing-resources>);

SECTION 1: APPLICANT INFORMATION

1a. Project Title: Carbon measurement in Taloyoak

1b. Previous Scientific Research License

Is this application to renew a multiyear research license issued to you in the previous year?

Yes ☐ No ☒

If yes, please provide your previous license number:

Has this project already been screened by the Nunavut Impact Review Board?

Yes ☐ No ☒ (under review)

If yes, please provide NIRB project number(s):

If you applying to renew a research license for a project that was previously screened by NIRB please describe below any proposed changes to the project scope.

Examples of changes in your project scope include:

- change in research field locations (addition of new field research sites)
- alteration of the timing and methods 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: Clare Wark	City, Street address: 410 Adelaide Street West, Toronto	
Affiliation: WWF-Canada	Phone: 905 912 7309; 647 362 8047	
Province: Ontario	Email: cwark@wwfcanada.org	

2	Project Supervisor's contact information (if applicable)	
Name: Jessica Currie	City, Street address: 410 Adelaide Street West, Toronto	
Affiliation: WWF-Canada	Phone: 647 264 7025	
Province: Ontario	Email: jcurrie@wwfcanada.org	

3	Other Research Field Personnel (name, position, affiliation of all field team members)
Catherine Paquette, Specialist, Freshwater Ecosystems, Restoration & Regeneration, WWF-Canada	
Cathal Doherty, Associate Specialist, Carbon & Ecosystems, Science, Knowledge, WWF-Canada	
Emina Ida, Associate Specialist, Arctic Resilient Habitats, Resilient Habitats, WWF-Canada	

SECTION 2: AUTHORIZATION NEEDED

1. Identify all known regulatory authorizations required for the project

	Regional Inuit Association: Land Use Permit/Exemption	Date applied for
x	Nunavut Planning Commission: Review and Land Use Plan	February 28, 2024
x	Nunavut Impact Review Board Screening	February 28, 2024
	Nunavut Water Board authorization to use water without a license	
	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	
	Environment Canada/Canadian Wildlife Service: Migratory Bird	
	Canada/Canadian Wildlife Service: Access to National Wildlife Area	
	Parks Canada: National Parks Research Permit	
	Community and Government Services (GN): Municipal Land Lease	
	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:

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

☒ YES

☐ NO

SECTION 3: TIMING AND LOCATION OF FIELD RESEARCH

Period of field research in current year: **June 24, 2024 to June 28, 2024**

Number of research field personnel in current Year: **4**

Number of **Person Days** of field research in current year: **20**

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, Commissioners', Inuit Owned
Study Area 1, 1	Taloyoak	69°31'0.01"N, 93°46'29.07"W	57, C, 10	Crown, Municipal
Study Area 1, 2	Taloyoak	69°29'37.28"N, 93°46'29.51"W	57, C, 10	Crown, Municipal
Study Area 1, 3	Taloyoak	69°30'30.35"N, 93°45'22.75"W	57, C, 10	Crown, Municipal
Study Area 2, 1	Taloyoak	69°32'13.28"N, 93°39'34.33"W	57, C, 10	Crown, Municipal
Study Area 2, 2	Taloyoak	69°33'16.71"N, 93°42'0.11"W	57, C, 10	Crown, Municipal
Study Area 2, 3	Taloyoak	69°33'24.23"N, 93°39'12.13"W	57, C, 10	Crown, Municipal
Study Area 3, 1	Taloyoak	69°36'16.18"N, 93°29'30.38"W	57, C, 10	Crown, Municipal
Study Area 3, 2	Taloyoak	69°35'56.60"N, 93°29'42.87"W	57, C, 10	Crown, Municipal
Study Area 3, 3	Taloyoak	69°35'0.37"N, 93°30'34.14"W	57, C, 10	Crown, Municipal

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) _____

File upload: Please upload a map showing research field location(S): Attached in email

SECTION 4: NON-TECHNICAL PROJECT PROPOSAL DESCRIPTION

Please attach a non-technical description of the project proposal, no more than 500 words, in English and Inuktitut (+Inuinnaqtun, if in the Kitikmeot). You may use the non-technical description already submitted to NIRB for your NIRB screening application. The project description should outline the following:

- Project Title
- Lead Researcher's Name and Affiliation
- What research questions does the project hope to answer?
- What are the research objectives and why is the study needed?
- Where, when, and for how long will the field research be undertaken?
- What methods will be used to conduct fieldwork?
- What impacts will the research produce impacts to the environment, wildlife, or people?
- How will the data generated by the research be stored and managed?
- How will Nunavut residents be involved in the research?

- How, when, and to whom will the research results be shared in Nunavut?

Carbon measurement in Taloyoak

Clare Wark, WWF-Canada

Healthy ecosystems provide a variety of valuable ecosystems services such as climate regulation, water purification and nutrient cycling. Their ability to absorb and store atmospheric carbon is of particular interest for further emphasizing their need for protection and thoughtful management under a changing climate. Current models of carbon stocks at national and international scales rely on a small subset of data extrapolated to the entirety of the Arctic to quantify carbon in remote areas. However, there is concern that these models may be underestimating total carbon storage in the Arctic, which could result in unintended consequences for their relative protection and management in nationwide systematic planning exercises. Moreover, assessing carbon storage and sequestration of permafrost ecosystems will provide greater understanding of the impacts on and opportunities for Indigenous communities, and support the development of long-term climate change mitigation and adaptation strategies.

WWF-Canada is looking to fill data gaps in the Arctic by conducting soil carbon measurement in Taloyoak, Nunavut. These in-field measurements will then be used to assess whether current carbon models are underestimating the carbon stored in the region. From June 24-28, 2024, we will take a total of nine soil core samples (1-2m depth) within a 25-kilometer radius of town. The Taloyoak Guardians will support the research by providing local knowledge and transportation. WWF-Canada can also provide soil sample training, if interested. A permafrost corer will be used to collect samples, which will be transported to coolers to keep samples fresh for lab analysis. Following field work, the samples will be processed in a lab to determine the total carbon stock and carbon density of the soils.

We do not anticipate impacts of the research on the environment, wildlife or people, and commit to taking every precaution to ensure a sustainable and ethical approach.

The data generated by the research will be stored and managed by WWF-Canada on secure servers. WWF-Canada has a longstanding partnership with TUA. The data and results will be shared directly with the staff and board of directors of TUA in in-person meetings for their independent use of the information for land-use planning and advancing the Aqviqtuuq Inuit Protected and Conserved Area project. The research results will also be shared with community partners in subsequent community visits that are team frequently conducts.

File upload: Attached in email

SECTION 5: TECHNICAL PROJECT PROPOSAL DESCRIPTION

Please attach a technical project proposal description including the following information:

- a) Objectives: Provide well-defined short-term and long-term objectives for the overall project
- b) Rationale: Describe the rationale for the project. This should be a detailed section that clearly lays out the scientific basis for the proposed work.
- c) Progress to Date: Describe the results of any work completed to date. This section should also include information on any progress in the areas of capacity building, communications and/or the use of Indigenous knowledge
- d) Methodology: Describe project design, field research methodology, data analysis techniques, where and when the work will be carried out over the lifetime of the project.
- e) Data management: Describe your data management plan, including where and when the data and metadata records will be stored
- f) Research outputs: Describe the major research outputs to be generated through the project (academic theses, publications, presentations, reports, etc.)

Carbon measurement in Taloyoak

Overview

Through the Carbon measurement in Taloyoak project, WWF-Canada is seeking to fill data gaps that currently exist for carbon stocks in the Canadian Arctic. In the short-term, this will involve completion of a pilot field project in the area surrounding Taloyoak, Nunavut. This field project crew will be comprised of four WWF-Canada staff and several Guardians who will guide site selection (if changes are needed), local knowledge and site access. Given that this is a pilot field project, we will not be carrying out extensive training on sediment sampling techniques for carbon measurement. Instead, based on the pilot field project's success, community priorities and the resulting carbon stock estimates, future carbon monitoring will be planned with community members. The long-term objective for this project is to assess the scientific value and community interest in completing a more comprehensive carbon measurement project in the region surrounding Taloyoak.

National and international carbon stock models are reliant on a small subset of Arctic data, that is extrapolated across broader regions to quantify carbon storage in remote areas. However, the inherent assumptions of this approach may affect the accuracy of carbon estimates for the Arctic. In particular, there is concern that the models may underestimate carbon storage, which could result in unintended consequences for the protection and management of the region. Obtaining accurate estimates of carbon stocks and sequestration of permafrost ecosystems may also support Indigenous communities in developing long-term climate change mitigation and adaptation strategies critical for an area that's warming at 3x the global rate. Thus, the in-field measurements collected from Taloyoak will be used to assess whether current carbon models are accurate and usable for remote Arctic regions.

This project is the first of its kind led by WWF-Canada in Nunavut; however, WWF-Canada will be building off our existing Carbon Monitoring program. Through this program we are developing training materials for terrestrial carbon measurement across ecosystems and have partnered with First Nations across Canada interested in carbon measurement and monitoring.

This includes a previous field project with Mushkegowuk Council's Department of Lands and Resources, McMaster University and four First Nations within the Hudson and James Bay lowlands. Through those partnerships, we coordinated carbon measurement training specific to peatlands for numerous community members. This included a certification for environmental technician skills along with standard first aid and CPR.

Following training, carbon measurement commenced in the Hudson and James Bay lowlands across four distinct study areas. WWF-Canada has been committed to sharing results back with communities, including through virtual and in-person events and written materials.

Similar carbon measurement projects are also underway in British Columbia and New Brunswick., and we are working with a number of partners in New Brunswick to offer virtual and in-person training for measuring carbon across ecosystems.

Methodology & Data Management

The pilot field project will take place between June 24 - 28th, 2024. The project is broken down into three study areas, within a 15km radius of Taloyoak. Individual site selection within the study area is based on the type of surficial deposit and vegetation cover. We focused our research scope on blanket till glacial deposits, primarily located North, and within a 15 km radius, of the town of Taloyaok. Within this area, two vegetation cover types were selected as areas of further interests, these are shrub dominant, with a groundcover of moss and lichen, and grass dominant, with a groundcover of moss and lichen. Therefore, 3 sites within each study area were chosen to capture a representative sample of the vegetation covers.

Each of the nine sites will be documented using a standardized photo series protocol, this involves taking three photos in each cardinal direction at various angles and one photo documenting any vegetation (13 photos total per site). The sites will be given a unique identifier and recorded in a GPS unit. A corer intended for use in areas with permafrost will be used to extract soil samples at depths anticipated to be up to 2m. Following this, notes will be recorded for each core, the core will be photographed and then packaged for transport to a lab in Yellowknife. Once in the lab they will be sectioned based on soil layer type, measured to obtain the volume and weighed to obtain the bulk density. When these steps are complete each subsection will be analyzed to determine the carbon content.

In-depth methods for soil core collection:

1. Before coring, find a flat area close to the coring spot, lay down a tarp, and prepare all the required equipment.
2. Once a coring site has been selected, gently push the corer into the soil, keeping it as straight as possible.
3. The depth of each core depends on each site, but should first be estimated with a soil probe.
4. With the core fully inserted, twist and jiggle the corer to release the bottom part of the core sample from the base sediment.
5. Once the core is free, remove the corer with the sample inside.
6. Keep pressure on the bottom of the core sample to prevent the sample from falling out of the bottom of the corer.
7. Once fully removed, turn the corer horizontally and place a plastic core sleeve, cut lengthwise, around it.
8. Using the core extraction tool, push the sample from the bottom of the core to reveal the sample through the top of the corer. The plastic sleeve should be adjusted to catch the sample as it releases from the top of the core.
9. Once fully removed, place labelled end caps on the top and bottom end of the core. Secure it with tape. Apply a strip of duct tape along the cut edge of the tube.
10. Measure the length of the core and the depth of the hole that was just cored, record in a notebook. The hole depth is the true depth of the core, whereas the core extracted length can be smaller due to compaction. It is important to correct for this compaction when measuring the bulk density of the core in a lab.
11. Label the sample and place it in a cooler for storage.

While in the field, data will be collected using notebooks, cameras and GPS units. This information will be compiled once the WWF-Canada staff have returned from the field into one project report file which will also include the results of the lab analysis, once available. This data will be stored and managed by WWF-Canada staff. Geospatial data will be stored and managed on secured WWF-Canada servers, available for TUA for use.

Research Outputs

It is our priority to make sure all data collected is available and accessible to the Taloyoak Umarulirigut Association (TUA), including its staff and board of directors. For that reason, a summary of the pilot field project will be developed, translated and shared. Results and project information will also be shared with the TUA in an in-person presentation, the intent being for them to use the data how they see fit during land-use planning exercises and as they work to advance the Aqviqtuuq Inuit Protected and Conserved Area project. Following the presentation to the TUA, we will share results with community partners. In addition, we will ensure that WWF-Canada staff are available to answer project related questions over email and phone and will seek out a translator as needed to support this.

We will not be publishing data collected through the pilot field project publicly through any means.

SECTION 6: FUEL, WATER, WASTE

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

☐ YES

☒ NO

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:

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
P.O. Box 1720 Iqaluit, NU, X0A 0H0 • PHONE: 867-979-7279 • FAX: 867-979-7109 • email mosha.cote@arcticcollege.ca

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

***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

SECTION 7: COMMUNITY INVOLVEMENT & REGIONAL BENEFITS

1. List 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
Taloyoak	Jimmy Ullikatalik	Taloyoak Umarulirigut Association (TUA)	March 6, 2024
Taloyoak	Abel Aqqaq	Inuit Guardians at TUA	March 4, 2024

2. Please describe the role(s) Nunavut residents will play in the project and identify any employment, contracting or training opportunities for Nunavut residents that may result from the project.

Inuit Guardians at Taloyoak Umarulirigut Association (TUA), the Hunters and Trappers Association in Taloyoak, will play crucial roles in the project. They will serve as guides and provide transportation support. Moreover, interested individuals will have the opportunity to receive training in carbon data collection, enhancing their skills and knowledge base in their current environmental monitoring projects. The project's results will be shared with TUA, supporting their efforts to establish the Aqviqtuuq Inuit Protected and Conserved Area.

3. Please identify any potential risks to the health, safety or livelihoods of Nunavut residents that may result from the project?

There is minimal risk to the health, safety, or livelihood of Nunavut residents stemming from this project. The data collection will occur in areas outside the community, where environmental exposure risks may be present. However, the Inuit Guardians, being seasoned hunters with extensive experience living on the land, possess the knowledge and skills necessary to navigate the terrain and interpret weather conditions, ensuring the safe guidance of researchers during data collection endeavors.

4. Describe and attach documentation regarding community support or concerns for the proposed project:

WWF-Canada staff maintain a longstanding partnership with TUA, which represents the community of Taloyoak's interests in wildlife and environmental matters, and regularly participate in weekly Aqviqtuuq working group meetings alongside TUA staff. Our staff have extensively consulted with Jimmy and Abel regarding the project's objectives, methodologies, and anticipated outcomes, receiving verbal confirmation and support to proceed. WWF staff will collaborate with TUA to ensure community engagement and share relevant information as required. Will you be collecting traditional knowledge or undertaking other social/health research activities in Nunavut as part of this research project?

☐ YES

☒ NO

If yes, please provide details below:

Have you submitted a social sciences and/or health research application for the above described activities?

☐ YES

☐ NO

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

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?

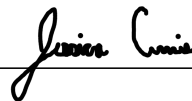
☒ YES

☐ NO

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:


Signature
Jessica Currie (on behalf of
Clare Wark)

Senior Specialist, WWF-Canada
Title

March 6, 2024
Date