



NIRB Uuktuutinga Ihivriughikhamut #125806

Rapid assessment of tundra plant diversity using small bits of genetic code found in the soil

Uuktuutinga Qanurittuq: New

Havaap Qanurittunia: Scientific Research

Uuktuutinga Ublua: 5/2/2023 1:20:21 PM

Period of operation: from 0001-01-01 to 0001-01-01

Piumayaat Angirutinga: from 0001-01-01 to 0001-01-01

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Inuinnaqtun: Qilamik ilituqhainiq maniqami nautianik aalatqiiik atuqlugit mikiyut iliturijutauyut nahautit naniyauyut nunainaqmi. Ilituqhaiyiluaq: Jakob J. Assmann, University of Zurich, Switzerland. Hilap aalaguqniga havakviuyunilu hulijutit aalaguqpaliajutiyut Ukiuqtaqtumi maniqamik. Manirainaqmi nautiat mikigaluaqtilugit naunaqhutiklu hunauniginik, ayuqnaqataqtuq qauyimayaagani kitut aalatqiit naniyauniginik maniqami. Qauyimaginiganik kitut nautiaq talvaniiniginik ayuqnaqhitiyuq ikayuqturiagani hilami ilipkamajutininik akhuurutinik nalunairutiniklu aalaguqniginik nautiat hivunikhami. Pijutauluaqtuq ilituqhautiptikni nalunaiyariagani nutaamik havauhikhamik nanihijutaayunik aalatqiinik nautianik maniqami ayuqnaitqiyauliriagani. Havauhiq atuqtuq mikiyunik ilanuaiginik nautiat hunauniginik nalunairutinik nunainaqmi ilituripkalaaqniginik kitut nautiat naniyauniginik qanitumi maniqami. Ilituqhariagani havauhiq, katitiriniaqtugut nunainaqmik nau-naiyagakhanik pigahunit 3-hanat miitamit 3-hanat miitamut maniqami inigiyaayuni haniani lqaluktuutiap piyaaganilu nau-tiat hunaqaqniginik naunaiyautimik ilituqhaivikmi Kanatamiut Qutiktumik Ilituqhaiyinit Havakviani. Nalunaiyaqniaqtavulu nautiaq takulugit atuqlugilu tikmijutinuut inuitut nunaiyiuriami humiiniginik. Nautianik naunaiyautit ikayuqniaqmatigut ilituqhariagani aulaniqatiaqnigan havauhiuyup nunaayalu takuupkainiaqmat qanuq ilituqhaqtauyut ilauniginik manirainaqmi. Katitiqtauhimayut nunainait hivuniqhijutikhaqagtut kitunik nauvaalirutinik kitulu uumayunuit talvaniiniginik. Ilagiarut ilituqhaqniganik havauhiq, naunaiyainiaqtugut qanuq nunainaqmi nauvaalirugit uumayunuilu qanuriliurutiqaqmaga qanuritinik nautianik naniyaulaaqtunik ilagani manirainaup. Upalugaiqtugut iniqtiriagani maniqami ilituqhainiqmik akungani Taaqhivaliavia1-mit Niqiliqivik 12-mut 2023-mi. Naunaiyautini ilituqhautit nalunaiyaqniganiklu havauhiq havaariyauniaqt Ilihaqpaaliqviki Zurich-mi Switzerland-mi. Iniqtirumayaqut havaa auyami 2024-mi. Tamaita naunaipkutit qanurilijutulu qahakhiniaqtut tamainit qaritauyakut naunaipkutinit naunaiyautiniklu takuupkaijutimit. Ilagiarutauyuq, atuqtiniaqtavut tamaita naunaiyautit takuyavulu ihumagiyait nunagiyaayuni ilaayut, ataniqtuiyut, ilituqhaiyulu Ukiuqtaqtumi Qauyimayaayunik Kanatami hivuagut. Inuknut uqaqniaqtugut qauyipkaqtitiyaaptikni havaamik atuqtilugu Ukiuqtaqtumi Qauyimayaayunik Kanatami "Uqaqtit Ilagiyainiitut" lqaluktuutiami talvani auyami utirumayugulu nuguligaat 2023-mit 2024-mut ukiuq uqariami naluhuiqtaptiknik. Ayuqnaitqiyauliriagani upitaaptikni ilituqhautiptikni, uqaqniaqtavut ikayuqtigiyavut ihauqtumi Facebook-mi ilaayuni tikitinata lqaluktuutiamut. Ihuaqhaiqatiriikniaqtavulu Ukiuqtaqtumi Qauyimayaayunik Kanatami upalugaiyariagani ayuiqhavikhamik ilihavikmit iliharuiqhimalaktilugit ilaayut ihumagiyaupkat una nunagiyaayumit. Aktuqniga avatauyumik, uumayunik, inukniklu mikiniaqtuq. Katitiriniaqtugut mikiyunik nunainaqnik (nalautagaayumi 162-nik ilituqhagakhanik 50-milaliitanik atuni) talimaniklu nauninuaginik 150 nautiat hatqiqhiyaaptikni ilipqamayakhanik nunami nautiat qanurinigini naunairutini. Atuqaarumayaqtiknik piniaqugut nunagiyaayuni tikmipkaigupta tikmianuanik inuqagitunik. Taimainigani, tikmilimaqitugut iluani 150-miitamik inuknit,

maniqamiuviknik, igluniklu. Piniagtugut tamainik aturiaqaqtunik piyunautinik.

Personnel

Personnel on site: 2

Days on site: 43

Total Person days: 86

Operations Phase: from 2023-07-01 to 2023-08-12

Hulilukaarutit

Inigiya	Hulilukaarut Qanurittuq	Nunannga Qanurittaakhaanik	Initurlinga qanuritpa	Initurlinga utuqqarnitat unaluuniit Ingilraaqnitat Uyarannguqtut akhuurninnga	Qanitqiyauyuq qanitqiamut nunallaat kitulluuniit ahiruqtaiiyainnit nuna
Canadian High Arctic Research Station - Laboratory and Lodging.	Scientific/International Polar Year Research	Crown	Recently established research station run by Polar Knowledge Canada.	Not applicable.	The research station is in the community of Cambridge Bay.
Target area for the establishment of three temporary research sites (each 300 m x 300 m) in summer 2023.	Scientific/International Polar Year Research	Crown	The target area for the establishment of the three research sites (300 m x 300 m each), contains different areas with various histories, ranging from currently settled areas to open tundra.	The area contains various sites of archaeological / paleontological value. We will coordinate closely with our collaborators in the team at the Canadian High Arctic Research Station, to ensure that our choice of site locations will not interfere with these.	The area of interest contains parts of the community of Cambridge Bay and the Ovayok Territorial Park. We will coordinate closely with the team at CHARS and all relevant organisations to ensure that our research will cause as little impact on the cultural and natural environment as possible. (See also environmental impacts section). Note: The area contains a mixture of land ownership types, including Inuit owned land.

Nunaliin Ilauyun, Aviktuqhimayuniitunullu Ikayuuhiarunguyun

Nunauyuq	Atia	Timiuyuq	Upluani Uqaqatigiyaungmata
Ikaluktuttiak	Tannis Bolt	Kitikmeot Inuit Association	2023-01-31
Ikaluktuttiak	David Hik	Polar Knowledge Canada	2022-10-11

Angiuttauvaktunik

Naunaiqlugu nunanga talvani havauhikhaq ittuq:

Kitikmeot

Angiuttauvaktunik

Munariniqmut Ayuittiaqtuq	Angirutinga Qanurittuq	Tadja Qanurittaakhaanik	Ublua Tuniyauyuq/Uuktuqtuq	Umikvikhaa Ublua
Nunavunmi Ihivriuqniqmut Timiqutigiyanga	Nunavut License (Physical / Natural Sciences)	Applied, Decision Pending		
Kitikmeot Inuit Katimayiingit	Land Use – Certificate of Exemption	Applied, Decision Pending		
Nunavut Kavamanga, Avatiliriyikkut	Wildlife Permit	Applied, Decision Pending		
Nunavut Kavamanga, Avatiliriyikkut	Nunavut Territorial Parks Use Permit (for Ovayok Territorial Park)	Applied, Decision Pending		
Tingmiliqiyiitkut Kaanatami	Special Flight Operations Certificate (SFOC) for foreign drone operators (all operations in the basic category)	Applied, Decision Pending		

Project transportation types

Transportation Type	Qanuq Atuqtauniarmangaa	Length of Use
Land	We will walk or use ATVs for transport between our accommodation in Cambridge Bay and the three field research sites. We will mainly operate the ATVs on roads and ATV tracks. We will avoid going off road as much as possible. Where possible the ATVs will be parked next to the track and the remaining distance from the ATV track to the study sites will be completed by foot. Transport across the field research sites will be by foot only.	

Project accomodation types

Alaanut,

Ihuaqutivaluin Atuqtauyukhan

Hanalrutit atuqtaunahuat (ukuallu ikuutat, pampiutainnik, tingmitinik, akhaluutinik, hunaluuniit)

Hanalrutit Qanurittuq	Qaffiuyut	Aktikkulaanga – Qanurittullu	Qanuq Atuqtauniarmangaa
All Terrain Vehicles (ATVs)	2	approx. 1.2 m x 2.1 m x 1.2 m (L x W x H)	We will use All Terrain Vehicles (ATVs) for transport from the Canadian High Arctic Research Station (CHARS) in Cambridge Bay to the field study sites. We will mainly operate the ATVs on roads and ATV tracks. We will avoid going off road as much as possible. Where possible the ATVs will be parked next to the track and the remaining distance from the ATV track to the study sites will be completed by foot. The locations of the field study sites will be chosen within approx. 20 km of CHARS.
Drone / Remotely Piloted Aircraft	2	max. takeoff weight equal to or less than 1.6 kg	We will use small, battery powered, survey drones to obtain maps of the field study sites. All operations will be done according to Transport Canada regulations (“basic operations” category). We will obtain pilot licenses and a Special Flight Operations Certificate as required for foreign operators. We will pay particular attention to safety and privacy when operating the drone, always keeping a minimum distance of 150 m to bystanders, infrastructure, or groups or large individuals of wildlife.

Qanurittuq Urhuqyuaq unalu Qayangnaqtut Hunavaluit Aturninnga

Qanurittuq urhuqyuaq hunavaluit aturninnga:	Urhuqyuaq Qanurittuq	Qaffiuyut qattaryut	Qattaryuk Aktikkulaanga	Atauttimut Qaffiuyut	Ilanga	Qanuq Atuqtauniarmangaa
Gasoline	fuel	1	82	82	Liters	Fuel for ATVs used for transport between field sites and the Canadian High Arctic Research Station in Cambridge Bay. All fuel will be purchased at fuel stations in town. No fuel will be stashed at the field sites. We will only bring the amount of fuel fitting into the tanks of the ATVs. The figure provided is an estimate of fuel consumption based on

						an average travel distance of 20 km for 15 days of field work, using two ATV vehicles and an estimated fuel consumption rate of 13.5 L per 100 km.
Reagents for DNA extractions (flammable / harmful to environment)	hazardous	1	1	1	Liters	We require a small amount of hazardous substances to extract the genetic code ("DNA") from soil and plant tissue. The extractions will be done in the laboratory at the Canadian High Arctic Research Station in Cambridge Bay. We will use commercial extraction kits. These kits contain a combined amount of 0.7 L of hazardous substances classified as "flammable / harmful to environment": 350 ml ethanol solution; and 350 ml solution containing ethanol, isopropanol, and guanidine hydrochloride.
Reagents for DNA extractions (corrosive)	hazardous	1	1	1	Liters	We require a small amount of hazardous substances to extract the genetic code ("DNA") from soil and plant tissue. The extractions will be done in the laboratory at the Canadian High Arctic Research Station in Cambridge Bay. We will use commercial extraction kits. These kits contain a combined amount of 0.47 L of hazardous substances classified as "corrosive": 120 ml solution containing aluminum chloride hexahydrate; and 350 ml solution containing guanidine thiocyanate.

Imaqmik Aturninnga

Ubluq qanuraaluk (m3)	Aturumayain imavaluin utiqittagaani qanuq	Atulirumayain imavaluin utiqittagani humi
0		

Iqqakuq

Ikkakunik Munakgiyauyunik

Havauhikhaq Hulilukaarut	Qanurittuq Iqqakut	Ihumagiyauyuq Qanuraaluktut Atuqtait	Qanuq Iqqakuurniarmangaa	Halummaqtirarnirutikhan piyutin
Scientific/International Polar Year Research	Ikulalaaqtun iqqakuuvaluin	120 litres	Disposal of all combustible waste (household waste, packaging, non- hazardous laboratory waste) will be coordinated with the team of the Canadian High Arctic Research Station (CHARS). We will use the local waste service providers in Cambridge Bay.	Not applicable.
Scientific/International Polar Year Research	Hivuuranaqtun iqakuuvaluin	1.17 liters (total)	The extractions of the genetic code from the soil and plants that we will carry out in the laboratory at the Canadian High Arctic Research Station (CHARS) will generate the following projected quantities of hazardous waste. Flammable / harmful to the environment: 350 ml ethanol solution, 350 ml solution containing ethanol, isopropanol and guanidine hydrochloride. Corrosive: 120 ml solution containing aluminumchloride hexahydrate, 350 ml solution containing guanidine thiocyanate. We will bring all required containers, packaging and labels required for the safe disposal of the hazardous waste. We will coordinate disposal of these substances with the laboratory management at CHARS. Where safe disposal is not possible locally, we will arrange for shipment and disposal of the hazardous waste to the south of	Not applicable.

			Canada according to the regulations with the help of a waste disposal company licensed for handling the types of waste listed above.	
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Avatiliriniqmut Ayurhautingit:

The predicted impact on the environment, people and wildlife from our research project is small. Nonetheless, we will take great care to reduce the impacts of our activities as much as possible. Impacts could arise from the selection of the research sites, the collection of soil and plant tissue samples, the marker placement for the study locations, the use of ATVs, the use of drones for mapping, the handling of hazardous substances for the extraction of genetic code (DNA). We will closely work with team at the Canadian High Arctic Research Station to ensure that our planned fieldwork and the choice of field research locations do not pose a threat to the natural and cultural environment, and do not interfere with people's privacy or livelihoods. We will collect only what is necessary to meet the objectives of our study (estimate: 162 soil samples of 50 ml each; five leaves each for 150 plants) to reduce the impact of the sample collection. We will only use temporarily placed markers (pin flags and pegs) to indicate the research sites and plots to mitigate the impact on the landscape. All markers will be removed at the end of our visit. We will limit the use of ATVs as much as possible (emissions, damage to tundra plants) and rely on transport by foot where we can. To mitigate the risk of disturbance of humans or wildlife by the drones, we will only operate small drones (less than 1.6 kg) and we will not fly within 150 m of groups or large individuals of wildlife, as well as people, camps, houses, infrastructure etc. All extractions of DNA and the handling of the hazardous substances will be done in the specifically designed genetics laboratory at CHARS. We will use commercial DNA extraction kits optimized for personal and environmental safety.

Additional Information

SECTION A1: Project Info

SECTION A2: Allweather Road

SECTION A3: Winter Road

SECTION B1: Project Info

SECTION B2: Exploration Activity

SECTION B3: Geosciences

SECTION B4: Drilling

SECTION B5: Stripping

SECTION B6: Underground Activity

SECTION B7: Waste Rock

SECTION B8: Stockpiles

SECTION B9: Mine Development

SECTION B10: Geology

SECTION B11: Mine

SECTION B12: Mill

SECTION C1: Pits

SECTION D1: Facility

SECTION D2: Facility Construction

SECTION D3: Facility Operation

SECTION D4: Vessel Use

SECTION E1: Offshore Survey

SECTION E2: Nearshore Survey

SECTION E3: Vessel Use

SECTION F1: Site Cleanup

SECTION G1: Well Authorization

SECTION G2: Onland Exploration

SECTION G3: Offshore Exploration

SECTION G4: Rig

SECTION H1: Vessel Use

SECTION H2: Disposal At Sea

SECTION I1: Municipal Development

Qanurittuq Ittunik Avatinga: Avatingalluanga

Qanurittuq Ittunik Avatinga: Inuuhimayunut Avatinga

Qanurittuq Ittunik Avatinga: Inungit-maniliurutingit Avatinga

Miscellaneous Project Information

Naunaiyainiq ukuninnga Ayurhautingit unalu Piumayaat Ikikliyuumiutinahuarutit

Tamatkiumayunik Ihuikgutivaktunik

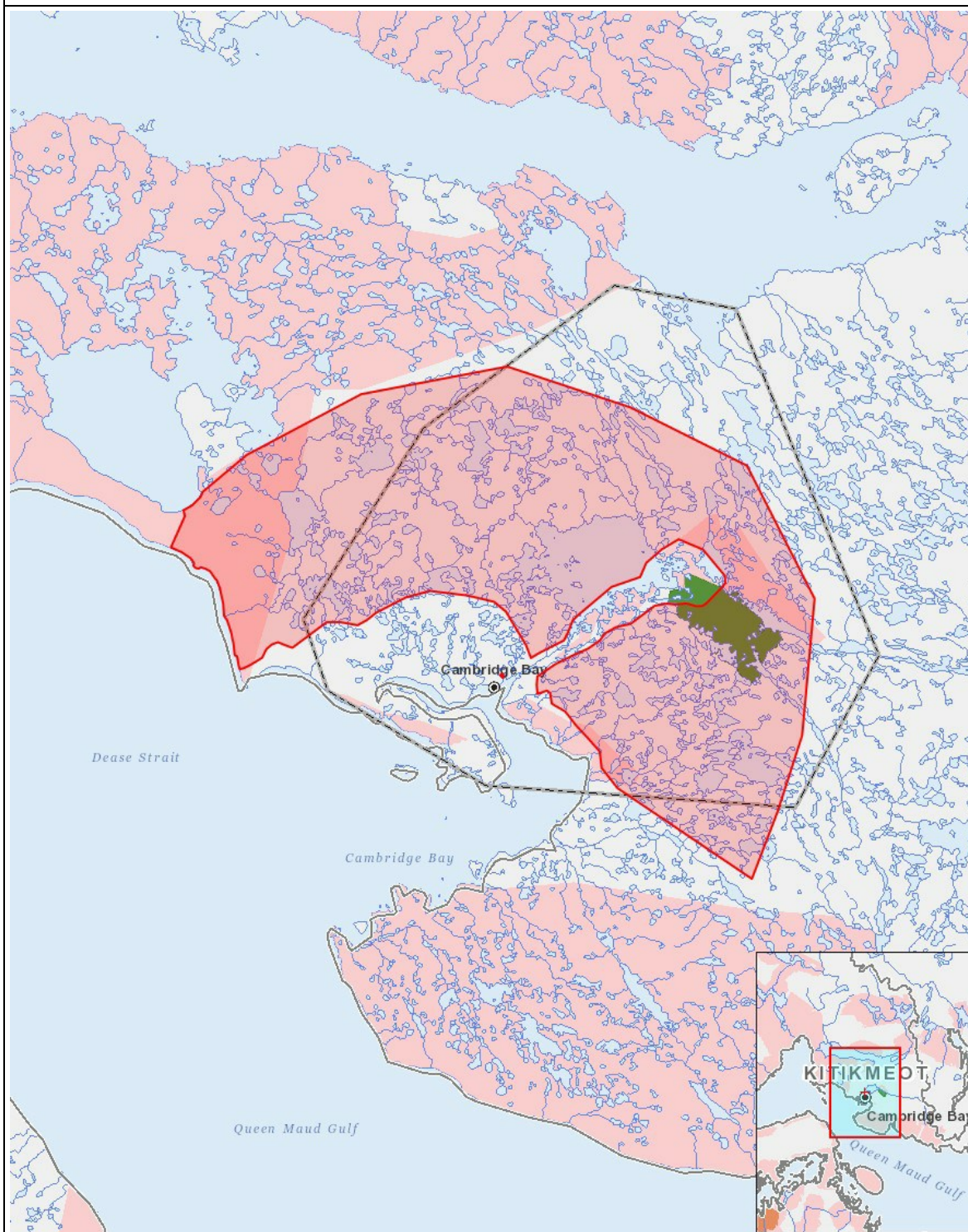
Impacts

Ilitariyauniq Avatiliriniqmut Ayurhautingit

		PHYSICAL	Designated environmental areas	Ground stability	Permafrost	Hydrology / Limnology	Water quality	Climate conditions	Eskers and other unique or fragile landscapes	Surface and bedrock geology	Sediment and soil quality	Tidal processes and bathymetry	Air quality	Noise levels	BIOLOGICAL	Vegetation	Wildlife, including habitat and migration patterns	Birds, including habitat and migration patterns	Aquatic species, incl. habitat and migration/spawning	Wildlife protected areas	SOCIO-ECONOMIC	Archaeological and cultural historic sites	Employment	Community wellness	Community infrastructure	Human health
Havakvinga																										
-			-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-		-	-	-	-	-
Aulapkaininnga																										
Scientific/International Polar Year Research			M	-	-	-	-	-	-	-	-	M	-	-	-		M	M	N	-	-		-	P	-	-
Piiqtauniq																										
-			-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-		-	-	-	-	-

(P = Nakuuyuq, N = Nakuungittut unalu mikhilimaittuq, M = Nakuungittut unalu mikhittaaqtuq, U = Naluyauyuq)

Havaariyauyukhamut Nayugaa



List of Project Geometries

- 1 polygon Target area for the establishment of three temporary research sites (each 300 m x 300 m) in summer 2023.
- 2 polygon Canadian High Arctic Research Station - Laboratory and Lodging.