



NIRB Application for Screening #125593

Instability of permafrost landscapes from climate change and the hydrological implications to high Arctic watersheds.

Application Type: New

Project Type: Scientific Research

Application Date: 3/5/2021 1:15:28 PM

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

Proposed Authorization: from 0001-01-01 to 0001-01-01

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DETAILS

Non-technical project proposal description

English: Researchers and affiliation:-Kethra Campbell-Heaton; graduate student; Department of Geography, Environment and Geomatics, University of Ottawa, Canada-Denis Lacelle; professor, Department of Geography, Environment and Geomatics, University of Ottawa, Canada-Wayne Pollard; professor, Department of Geography, McGill University, Canada

What:Proposed is scientific research, to be carried out over 3-4 years. This project seeks to understand the impact thawing permafrost has on two watersheds in the high Arctic. This project's scale is small, as it will focus on two streams near the Eureka Weather Station. However, this project's results can be used to address the impacts of permafrost thaw on other high arctic watersheds. There are approximately three people involved in the project, with one to two participating in fieldwork. Planes will be the primary means of transport to and from Eureka, transportation will be arranged on a commercial aeroplane from Ottawa to Resolute. Then, from Resolute to Eureka a Twin Otter will be used, this is provided by PCSP.

Why:The importance of this project is rooted in climate change research. Much of the circumpolar Arctic is experiencing rapid climate change; thus, northern communities are experiencing permafrost thaw firsthand. Thawing permafrost can alter a regions' water resources, increase surface flooding and cause terrain instability. This project aims to understand the impact climate-induced permafrost thaw has on two high Arctic watersheds. The long-term implications of permafrost thaw are unknown; as climate warming increases, we see a shift in the Arctic tree line, more flooding events, a thicker active layer and more carbon emissions. Therefore, it is more important than ever to study permafrost thaw in relation to water resources in the high Canadian Arctic.

Where:This study location for this project is near the Eureka Weather Station, Nunavut. This area has the PEARL research station and a national defence base. This area is over 500km away from northern communities and protected areas.

When:This is a multi-year project (2021-2024), with fieldwork occurring during the summer months (May-August).

French: Chercheurs et affiliation: -Kethra Campbell-Heaton; étudiant diplômé; Département de géographie, d'environnement et de géomatique, Université d'Ottawa, Canada-Denis Lacelle; professeur, Département de géographie, d'environnement et de géomatique, Université d'Ottawa, Canada-Wayne Pollard; professeur, Département de géographie, Université McGill, Canada-Quel est le projet de recherche scientifique, qui s'effectuera sur une période de 3 à 4 ans. Ce projet vise à comprendre l'impact du dégel du pergélisol sur deux bassins versants de l'Extrême-Arctique. L'échelle de ce projet est petite, car il se concentrera sur deux cours d'eau près de la station météorologique Eureka. Toutefois, les résultats de ce projet peuvent être utilisés pour s'attaquer aux impacts du dégel du pergélisol sur d'autres bassins hydrographiques de l'Extrême-Arctique. Environ trois personnes participent au projet, dont une à deux participent à des travaux sur le terrain. Les avions seront le principal moyen de transport à partir d'Eureka, le transport sera organisé à bord d'un avion commercial d'Ottawa à Resolute. Ensuite, de Resolute à Eureka, un Twin Otter sera utilisé, ce qui est fourni par pcp. Pourquoi : L'importance de ce projet est enracinée dans la recherche sur les changements climatiques. Une grande partie de l'Arctique circumpolaire connaît des changements climatiques rapides; ainsi, les collectivités du Nord connaissent un dégel du pergélisol de première main. Le dégel du pergélisol peut modifier les ressources en eau d'une région, augmenter les inondations de surface et causer l'instabilité du terrain. Ce projet vise à comprendre l'impact du dégel du pergélisol causé par le climat sur deux bassins versants de l'Extrême-Arctique. Les implications à long terme du dégel du pergélisol sont inconnues; à mesure que le réchauffement climatique augmente, nous voyons un changement dans la limite des arbres de l'Arctique, plus d'inondations, une couche active plus épaisse et plus d'émissions de carbone. Par conséquent, il est plus important que jamais d'étudier le dégel du pergélisol par rapport aux ressources en eau de l'Extrême-Arctique canadien. Où : Ce lieu d'étude pour ce projet se trouve près de la station météorologique d'Eureka, au Nunavut. Cette région possède la station de recherche PEARL et une base de défense nationale. Cette zone se trouve à plus de 500 km des collectivités et des aires protégées du Nord. Quand : Il s'agit d'un projet pluriannuel (2021-2024), dont le travail sur le terrain a lieu pendant les mois d'été (mai-août).

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Operations Phase: from 2021-06-01 to 2024-08-31

Activities

Location	Activity Type	Land Status	Site history	Site archaeological or paleontological value	Proximity to the nearest communities and any protected areas
Eureka Region	Camp	Crown	Researchers will be staying the PCSP weather haven located near the Eureka Airstrip. This haven is provided by PCSP.	This site has no-known archaeological value/ significance. However, ~500 meters away, on the other side of the runway is Late Dorset and Thule Inuit settlements. This was originally identified by Sutherland (2000).	Over 50km to either
Eureka Region	Scientific/International Polar Year Research	Crown	Research will focus on active layer water balance, thawing permafrost (thaw slumps and ice wedge degradation) and water quality. Focus will be on the polygonal terrain nearby the Eureka Airport and the two creeks in eureka (Station creek and Blacktop creek).	Besides the Thule Inuit site previously mentioned, there is no other known sites with archaeological value. No field work will be conducted on or near the Thule Inuit settlement.	Over 50kms

Community Involvement & Regional Benefits

Community	Name	Organization	Date Contacted
Information is not available			

Authorizations

Indicate the areas in which the project is located:

North Baffin

Authorizations

Regulatory Authority	Authorization Description	Current Status	Date Issued / Applied	Expiry Date
Government of Nunavut, Nunavut Research Institute	Application for a research license	Not Yet Applied		
Other	Nunavut Planning Commission (NPC) Application for a research license.	Active	2021-02-21	

Project transportation types

Transportation Type	Proposed Use	Length of Use
Air	Regular prop-plane will be used to go from Ottawa to Resolute, then a Twin Otter will be used to go from Resolute to Eureka.	
Land	ATV and by foot, used to travel on pre-existing trails in Eureka.	

Project accommodation types

Temporary Camp

Material Use

Equipment to be used (including drills, pumps, aircraft, vehicles, etc)

Equipment Type	Quantity	Size - Dimensions	Proposed Use
All Terrain Vehicle	2	4x3x3 ft	To access study sites

Detail Fuel and Hazardous Material Use

Detail fuel material use:	Fuel Type	Number of containers	Container Capacity	Total Amount	Units	Proposed Use
Gasoline	fuel	1	220	220	Liters	Used to run the ATVs; this is provided by the Polar Continental Shelf Project, we will not need the entire container.

Water Consumption

Daily amount (m3)	Proposed water retrieval methods	Proposed water retrieval location
0	The tap at the weather station, will fill up 20L containers and bring back to camp.	From the Eureka Weather Station, the station has the infrastructure already in place to accommodate our water usage.

Waste

Waste Management

Project Activity	Type of Waste	Projected Amount Generated	Method of Disposal	Additional treatment procedures
Camp	Sewage (human waste)	6lbs/ day/ human	At the Eureka Weather Station, there is infrastructure already in place to accommodate us.	N/A

Environmental Impacts:

Our impacts are minimal, as we are staying in the PCSP weather haven near the Eureka airport. We access our drinking water and the washroom facility at the Eureka Weather Station and our food waste is disposed in the same fashion as that of the EWS. Travel to our field sites will be similar to that of normal activity in the area (travel by ATV or by foot along existing trails). Our equipment is hand-operated by one person. During the field study, active layer and stream sites will be regularly monitored and sampled. Approximately 500mL to 1L of water will be collected for laboratory analysis. The stream monitoring and sample collection will be conducted out of the stream to ensure no disruption downstream. Environmental impacts resulting from our methodology will be minimized by sampling the least amount necessary for laboratory purposes. All collected samples will be utilized for planned analyses. Study sites will be left in initial conditions as much as possible.

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

Description of Existing Environment: Physical Environment

Permafrost is continuous >500m deep, location is a polar desert. Rich with ground ice and polygonal terrain.

Description of Existing Environment: Biological Environment

Low-laying vegetation. Animals: Arctic fox, Arctic Tern, Muskox, Arctic Wolf, Arctic Hare. Note that in 2019, much of the wildlife was not encountered because of the noise from the runway construction.

Description of Existing Environment: Socio-economic Environment

Not close to communities or protected areas. This area is considered crown land. Currently there is the Eureka Weather station, the National Defence base, the PEARL research Station and the runway construction crew.

Miscellaneous Project Information

Identification of Impacts and Proposed Mitigation Measures

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Cumulative Effects

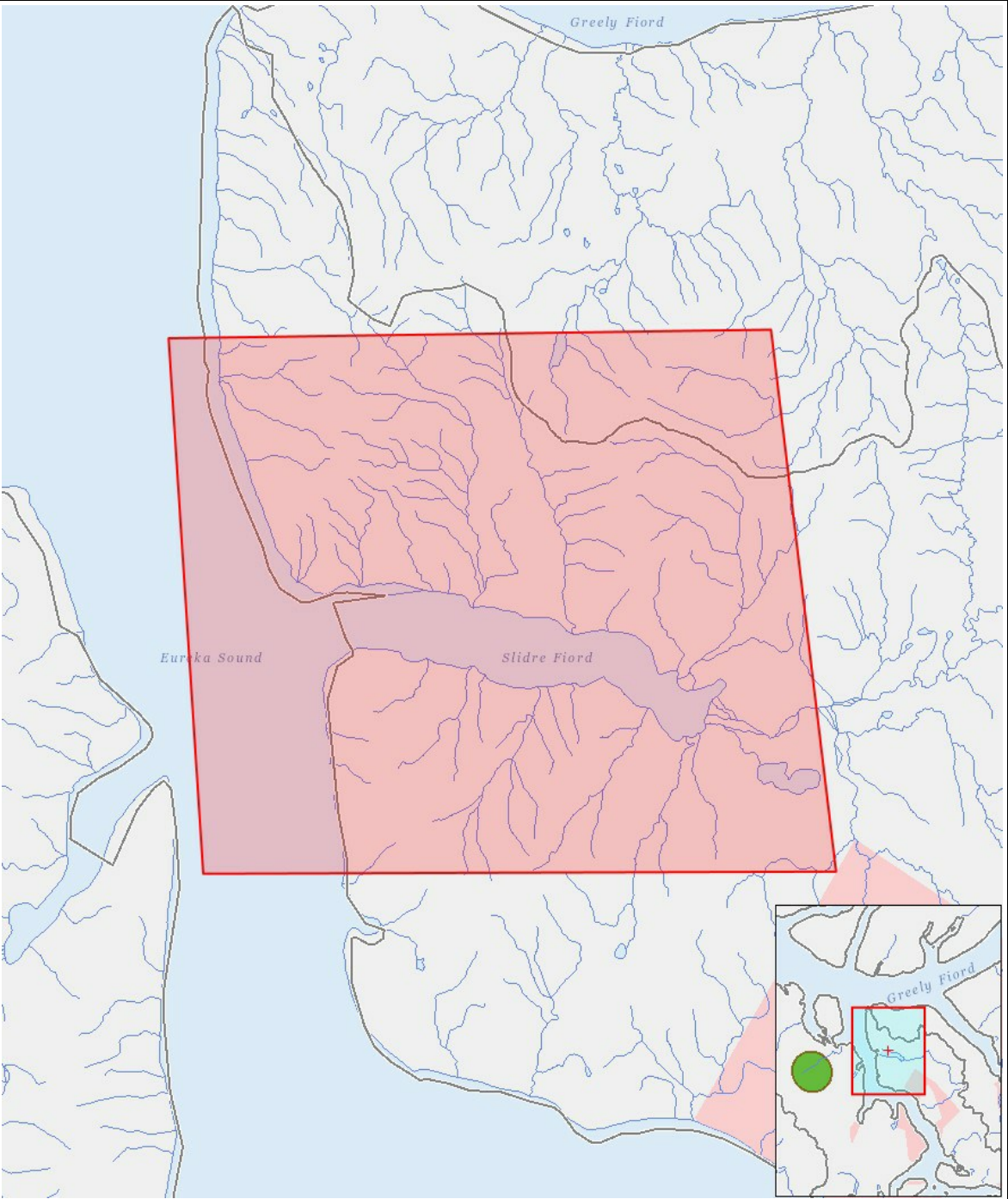
Impacts

Identification of Environmental Impacts

		PHYSICAL																								BIOLOGICAL										SOCIO-ECONOMIC									
		Designated environmental areas																								Vegetation										Archaeological and cultural historic sites									
		Ground stability																								Wildlife, including habitat and migration patterns										Employment									
		Permafrost																								Birds, including habitat and migration patterns										Community wellness									
		Hydrology / Limnology																								Aquatic species, incl. habitat and migration/spawning										Community infrastructure									
		Water quality																								Wildlife protected areas										Human health									
		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																																											
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Operation																																													
Scientific/International Polar Year Research		-	P	P	-	P	P	-	-	P	-	-	-	-		P	-	-	P	-		-	-	-	-	-	-																		
Decommissioning																																													
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(P = Positive, N = Negative and non-mitigatable, M = Negative and mitigatable, U = Unknown)

Project Location



List of Project Geometries

1	polygon	Eureka Region
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