

ፌዴራል ልዩ ሰርዲየት ከበረካቸው ጋር ምሽት የገናኝኝ ሆኖ #125340

Back for the future: Long-term observations of vegetation and snowcover in the High Arctic

[illegible]

Scientific Research

D-ᐅᓴ ᑕᔭᒃᑐᑦᑎᑦᑲᐱᐁᑦ: 4/30/2018 12:50:06 PM

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

b6 b7C from 0001-01-01 to 0001-01-01

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כחול לבן

$\epsilon_b \Delta^c \dot{\bar{O}} \Pi \sigma^b \quad \Lambda_{\tau} \rho \nabla^{\epsilon_b} \sigma \nabla \rho \nabla^{\epsilon_b} L^a \sigma^b$

ᑭᓐᓂᕈᕋᖅ: Long-term scientific observations are important to understanding environmental changes. Because of climate change, woody shrubs are expected to increase on the tundra; snow conditions will change, too. The goal of my study is to evaluate these long-term changes. During 1991-1993, I spent 15 months on the land at Ekalluktok, on Wellington Bay, west of Cambridge Bay. I established 80 vegetation and snow observation points during my research on muskoxen. I recorded the quantity and types of plants; I measured the hardness and thickness of snow. These observations are important for assessing changes over the past 25 years. They are also a baseline for the future. I intend to repeat this study. In 2018, I will return to these observation points. In 1991, I marked each point with a small metal stake. I left those stakes on the land; I expect to find them again. In August 2018, I will estimate the abundance and composition of plants again. In April 2019, I will return to measure snow conditions. I will compare my new observations to the observations from the 1990s. Finally, I will share my information. I will photograph each plot; I will demonstrate the techniques to local residents and/or the staff at the Canadian High Arctic Research Station; and I will store the photographs and data so that people can use them in future.

▷ΔΑΝΟ: Not applicable

 $\Delta \mathcal{M}^b \cap \mathcal{D}^c$: Not applicable

Inuinnaqtun: Hivituyumik qauyiharnikkut tautukhimayangit aturnaqhuni kangiqhittiarimi nunap avatingit aallannguqtqihimayut. Hamna hilaup aallannguqpallianinga, qiyulingnit iviit naahuriyauyut amigainniaqhutik manirarmi; aputit qanurilinganingit aallanngurniaqhunilu, ilaa. Hamna hivunigiyara naunaiyainikhanut qimilruqtakhaat hivituyumik aallannguqpallianingit. Uvani 1991-1993, manirarmiitkaluaqtunga 15 nit tatqiqhiutigut uvani lqaluktuuq, uataaniittuq lqaluktuuttiarmi. Aulapkaivlunga 80 nit nauhimayunit apunmullu ihivriughugit qauyihahungu umingmainnit. Titirahungalu amihuuningit aallatqiinguyullu nauttiat; uuktuqhungalu naptunninga hilingningalu apunmut. Hapkuat ihivriughimayatka aturnaqhutik ihivriughigiami aallannguqpallianingit qangaraalungmit 25 nit ukiunganit. Kigliuvlutik hivunikhamut. Huli havaffaarumayatka naunaiqhiinianut. Uvani 2018 mi, utirniarmiyunga ihivriuffaariami. Uvani 1991 mi, nalunaiyaghimayatka nuvuani naittumik havigalingnit naunaitkutarmik. Manirarmiittut naunaitkutait; naahurihimayara naniniaqtatka. Uvani Niqiliqivimgmi 2018 mi, naunaiqhiiniaqtunga amihuuningit havaangillu nauttianut havaarilugillu. Uvani Qitiqqautiyuq 2019 mi, utiffaarniarmiyunga ihivriurlugit aputit qanurilinganingit. Ihivriurniarmiyatka nutaam ihivriurningit uumanngat naunaiyaimayaraluatka hamannat 1990 ngugaluagtumi. Kinguani, ilittupkainiaqtatka avvautihimalugillu naunaiyainingit. Piksaliurniaqtatka tamait maniraq havaarihimayatkal ilittuqhiiniaqtatka qauyiharnianut nunaqatigiingnut unalu/havaktunut uvani

Kanatamiunut Qulvahiktumut Ukiuqtaqtumi Qauyiharvik; piksallu naunaiyainingillu tutquumaniqtut inuit aturumagumiuk hivunngani.

Personnel

Personnel on site: 2

Days on site: 21

Total Person days: 42

Operations Phase: from 2018-08-06 to 2018-08-27

$$\Lambda \subset \mathbb{N} \subset \mathbb{Z} \subset \mathbb{Q} \subset \mathbb{R} \subset \mathbb{C}$$

| ᐃᑦ | ᖃᓄᐃᑐᕈᑦ ᐱᑦᐲᐊᖃᖅᐊᖃᑦ | ᑭᐊᑦ ᓄᐊᑦᑯᑦ | ᑐᔨᐃᒪᓴᖃᑦ ᓄᐊᑦ ᖃᓄᖃᖅ ᐊᑐᒪᐃᑦᐊᖃᖅ ᑭᒪᓴᐊᖃᖅᓄᐊᖅ | ᐃᑦᔨᖅᐆᖅᖃᖅᐃᐃᑦᑦᐊᖃᑦ ᐃᓄᖅᓄᑦ ᐊᑯᖃᑦᐆᐆᖅᐆᖅᐊᑦᑯᑦ ᐆᐃᑦᑭᒪᓂᑐᖃᖅᑐᖃᖅ | ᖃᓂᖅᓂᖃᖅᑯᖃᖅ ᓄᐊᑦᑭᓴᐃᑯᑦᐊᖃᖅ ᐊᑯᒪᑐᑦ ᔨᑯᑭᒫᖃᐃᑯᑦᑐᖅ ᑭᓄᓄᑦ |
|--|--|--------------|--|---|---|
| Wellington Bay, in vicinity of Ekalluk River | Scientific/International Polar Year Research | Crown | Unknown | Unknown | Roughly 60 km west of the community of Cambridge Bay |

[illegible]

| ᓄᓇᑦᑎᓪᓴᖅ | ᐱᑏᑦ | ᕐᓂᔭᐱᓪᓴᖅᑎᑏᑦᑎᓪᓴᖅ | ᖃᖅᓴᓴ ᐱᓪᓴᖅᑎᑎᐱᓪᓴᖅᑎᓪᓴᖅᑎᓪᓴᖅ |
|----------|---------------|---------------------------------------|----------------------------|
| ᐱᓪᓴᖅᑎᓪᓴᖅ | Aili Pedersen | Canadian High Arctic Research Station | 2018-01-19 |

ᄇᄅᄂᄃᄅ ᄇᄃᄅᄂᄃᄅ ᄇᄃᄅᄂᄃᄅ ᄇᄃᄅᄂᄃᄅ ᄇᄃᄅᄂᄃᄅ

$a^{\dagger}r^a r^a \sigma^b$ $\Lambda_{\text{C}} n_4 n^c \delta b \sigma^c d^{cb} c$ $n n q^c \omega^c$

$\epsilon \Delta^{\frac{1}{2}} j^C \wedge J_{\omega} d\dot{N} \quad \nabla^{\omega} r^{ab} C D F L R^C$

[illegible]

Project transportation types

| Transportation Type | ᑭᓐᓂᓄᓇᑦ | ᓴᓕᓲᓪᓃᑦ ᐱᓚᓴᓂᐱᑭᓪᓗᑦ | Length of Use |
|---------------------|--------|---------------------|---------------|
| Air | 0 | Twin Otter | |
| Water | 0 | Canoe | |
| Land | 0 | On foot | |

Project accomodation types

Temporary Camp

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ᐱᖃᐅᓂ ᐱᖃᐅᓂ ᐱᖃᐅᓂᐅᐱᖃᐅᓂ ᐃᓴᓴᐅᓂᐅᓂᐱᖃᐅᓂ ᐃᓴᓴᐅᓂᐅᓂᐱᖃᐅᓂ, ᐱᖃᐅᓂᐅᓂᐱᖃᐅᓂ, ᐱᖃᐅᓂᐅᓂᐱᖃᐅᓂ ᐱᖃᐅᓂᐅᓂᐱᖃᐅᓂ

| ᐱᖃᐅᓂ ᐱᖃᐅᓂ ᐱᖃᐅᓂᐅᓂᐱᖃᐅᓂ ᐱᖃᐅᓂᐅᓂᐱᖃᐅᓂ | ᐱᖃᐅᓂᐅᓂᐱᖃᐅᓂ | ᐱᖃᐅᓂᐅᓂᐱᖃᐅᓂ - ᐱᖃᐅᓂᐅᓂᐱᖃᐅᓂ | ᐱᖃᐅᓂ ᐱᖃᐅᓂᐅᓂᐱᖃᐅᓂ |
|---------------------------------------|------------|-------------------------|--|
| Tent | 3 | 2 m x 3 m | Accommodation |
| Canoe | 1 | 5 m | Cross Ekalluk River to access sampling sites |

ᐱᖃᐅᓂᐅᓂᐱᖃᐅᓂ ᐱᖃᐅᓂᐅᓂᐱᖃᐅᓂ ᐱᖃᐅᓂᐅᓂᐱᖃᐅᓂ

| ᐱᖃᐅᓂ ᐱᖃᐅᓂᐅᓂᐱᖃᐅᓂ ᐱᖃᐅᓂᐅᓂᐱᖃᐅᓂ | ᐱᖃᐅᓂᐅᓂᐱᖃᐅᓂ ᐱᖃᐅᓂᐅᓂᐱᖃᐅᓂ | ᐱᖃᐅᓂᐅᓂᐱᖃᐅᓂ ᐱᖃᐅᓂᐅᓂᐱᖃᐅᓂ | ᐱᖃᐅᓂᐅᓂᐱᖃᐅᓂ ᐱᖃᐅᓂᐅᓂᐱᖃᐅᓂ | ᐱᖃᐅᓂᐅᓂᐱᖃᐅᓂ | ᐱᖃᐅᓂᐅᓂᐱᖃᐅᓂ ᐱᖃᐅᓂᐅᓂᐱᖃᐅᓂ | ᐱᖃᐅᓂ ᐱᖃᐅᓂᐅᓂᐱᖃᐅᓂ |
|----------------------------------|--------------------------|--------------------------|--------------------------|------------|--------------------------|--------------------|
| | fuel | 2 | 1 | 2 | Gallons | Naptha for cooking |

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| ᐱᖃᐅᓂ ᐱᖃᐅᓂᐅᓂᐱᖃᐅᓂ | ᐱᖃᐅᓂ ᐱᖃᐅᓂᐅᓂᐱᖃᐅᓂ | ᐱᖃᐅᓂ ᐱᖃᐅᓂᐅᓂᐱᖃᐅᓂ |
|-----------------|-----------------|-----------------|
| 0 | Buckets | Ekalluk River |

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| ᐱᖃᐅᓂᐅᓂᐱᖃᐅᓂ ᐱᖃᐅᓂᐅᓂᐱᖃᐅᓂ | ᐱᖃᐅᓂᐅᓂᐱᖃᐅᓂ ᐱᖃᐅᓂᐅᓂᐱᖃᐅᓂ | ᐱᖃᐅᓂᐅᓂᐱᖃᐅᓂ ᐱᖃᐅᓂᐅᓂᐱᖃᐅᓂ | ᐱᖃᐅᓂᐅᓂᐱᖃᐅᓂ ᐱᖃᐅᓂᐅᓂᐱᖃᐅᓂ | ᐱᖃᐅᓂᐅᓂᐱᖃᐅᓂ ᐱᖃᐅᓂᐅᓂᐱᖃᐅᓂ |
|--------------------------|--------------------------|--------------------------|---|--------------------------|
| Researching | ᐱᖃᐅᓂᐅᓂᐱᖃᐅᓂ ᐱᖃᐅᓂᐅᓂᐱᖃᐅᓂ | Less than 1 kg per day | Return to Cambridge Bay and deposit in regular municipal waste or recycling | . |
| Researching | ᐱᖃᐅᓂᐅᓂᐱᖃᐅᓂ | Less than 1 kg per day | Small open pit | . |

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Minimal. Our camp will be temporary; it will consist of just two people. No motorized vehicles will be used. No refuse (other than a small amount of sewage waste) will left on-site. On the other hand, the project will lead to better scientific understanding of long-term changes to tundra vegetation.

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 11: Municipal Development

[illegible][illegible][illegible]

Miscellaneous Project Information

$\alpha \rightarrow \Delta^{\pm} C D \sigma^{\mp} \Gamma^C$ $\bar{d} b \rightarrow \bar{s} C D F L \bar{L}^C$ $s \bar{b} \rightarrow s \bar{c} C \dot{\sigma}^{\mp} \Gamma^C$ $K_L D \Gamma^+ \bar{L} \Gamma^{\pm} C D \sigma \bar{d}^{\pm} \sigma^{\mp} \Gamma^C$

Cumulative Effects

Impacts

$\mathcal{A}^b \subset \mathcal{B}^b \subset \mathcal{C}^b \subset \mathcal{D}^b \subset \mathcal{E}^b \subset \mathcal{F}^b \subset \mathcal{G}^b \subset \mathcal{H}^b \subset \mathcal{I}^b \subset \mathcal{J}^b \subset \mathcal{K}^b \subset \mathcal{L}^b \subset \mathcal{M}^b \subset \mathcal{N}^b \subset \mathcal{O}^b \subset \mathcal{P}^b \subset \mathcal{Q}^b \subset \mathcal{R}^b \subset \mathcal{S}^b \subset \mathcal{T}^b \subset \mathcal{U}^b \subset \mathcal{V}^b \subset \mathcal{W}^b \subset \mathcal{X}^b \subset \mathcal{Y}^b \subset \mathcal{Z}^b$

| | | | | | | | | | | | | | | | | | | | | | | | | | |
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| ᐃᔭᕋᑲᑦᑕᑦᓂᑦᑲ | | | | | | | | | | | | | | | | | | | | | | | | | |
| Scientific/International Polar Year Research | | - | - | - | - | - | - | - | - | - | - | - | - | | P | P | - | - | - | | - | - | - | - | - |
| ᐃᓗᑦᑎᓄᓂᑦᑲ | | | | | | | | | | | | | | | | | | | | | | | | | |
| - | | - | - | - | - | - | - | - | - | - | - | - | - | | - | - | - | - | - | | - | - | - | - | - |

$$(P = \langle b \rangle \Delta^2 \cap \langle a \rangle^c, N = \langle b \rangle^b \vee \langle C \rangle \langle a \rangle^c \langle C \rangle^c, M = \langle b \rangle^b \vee \langle C \rangle \langle a \rangle^b \langle C \rangle^c, U = \langle b \rangle^b \vee \langle C \rangle \langle a \rangle^b \langle C \rangle^c)$$