

# Grise Fiord, ⊲⊳⊀∆⊂⊃<sup>™</sup>, Aujuittuq, "Place that never thaws"

### Introduction

Grise Fiord is the northernmost community in Canada and is situated on the southern coast of Ellesmere Island, overlooking Jones Sound. In 2016 the population was at 129. The community is located between a mountain range and the ocean and relies heavily on the sea for food and transportation. Carving, traditional crafts and clothing are also important sources of income<sup>1</sup>. The community's hunting and fishing area includes Jones Sound, and extending into the Norwegian Bay, Baumann Fiord, Vendom Fiord, and Makinson Inlet. Nirjutiqavvik National Wildlife Area and Quttinirpaaq National Park are near the Hamlet<sup>2</sup>.

## **Community Restoration Priorities**

**1.** The restoration of the eroded natural harbor and risk assessment of the restoration - does restoration impact marine mammals? **2.** A new community freezer (foundation has eroded); and **3.** To rebuild the road along eroding shoreline.

# **Community Map and Workshop Highlights**

The CRN research team visited the community in March 2018. Environmental changes were observed in the permafrost leading to impacts on infrastructure, fiords were melting faster and making ice more dangerous, and the channel between Ellesmere and Greenland has less multiyear ice. Ecological changes included increases in dead seals but the cause for this mortality was unknown, and in the abundance and occurrence of jellyfish. Increased shipping/marine traffic and tourism, especially around walrus haul-outs and resting/calving grounds could have a negative impact on marine mammals. A current opportunity is the exploratory study being conducted by Arctic Fishery Alliance (AFA) for a shrimp fishery in this area.



As a result of the project, the team funded the development of a risk assessment proposal for the restoration of the natural harbour. Other government departments are now funding a small craft harbour in the community, with construction slated for 2023.



### **Literature Review**

Increased temperatures are likely to reduce the extent of the zone of superimposed-ice accumulation and the thickness of superimposed ice formed. This will have a negative effect on glacier mass balance since near-surface ice temperatures will rise<sup>3</sup>. Although such a response could be small in comparison to the changes that could occur as a result from summer warming, this would still be important given the very low specific mass balance of many high-Arctic glaciers<sup>4</sup>. Community members were also concerned about low flying helicopters and increased shipping activity disturbing wildlife<sup>2</sup>.

| Attributes   | Examples of Environmental Changes and Observations   |
|--------------|--|
| Sea ice      | • The ice-free season is longer now, with sea ice melting sooner and breaking up faster. As such, sea ice  |
| -            | became less stable with less summer ice, which makes travelling more dangerous <sup>2</sup> .  |
| Multi-year   | For much of the 20th century, multiyear land-fast sea ice (MLSI) formed a permanent ice cover in   |
| sea ice      | Yelverton Bay, Ellesmere Island. This cover survived intact for 55–60 years until 2005, when >690 km2  |
|              | (90%) of MLSI was lost from Yelverton Bay. Further losses occurred in 2008, and the last of the Yelverton  |
|              | Bay MLSI was lost in August 2010 <sup>+</sup> .  |
| Weather      | <ul> <li>There is more wind and less snow in the area<sup>1</sup>.</li> </ul>  |
| Glacier melt | <ul> <li>Glaciers are melting and receding quickly. Large pieces of ice caps and glaciers are breaking off and less water is running off glaciers in the summer affecting the conditions of trails<sup>2</sup>.</li> </ul> |
|              | • For John Evans Glacier, Ellesmere Island, a 1°C rise in mean annual air temperature due solely to winter   |
|              | warming is predicted to reduce the specific mass balance of the glacier by 0.008 m a-1 because of  |
|              | decreased superimposed-ice formation <sup>3</sup> .  |
| Erosion      | • There appears to be an increase in coastline erosion due to larger waves <sup>1</sup> .  |
|              |  |
| Attributes   | Examples of Ecosystem Changes and Observations   |
| Polar bears  | <ul> <li>Polar bears are increasing. Not as big as before but are healthy, however other residents think bears are<br/>larger, accordingly in the fall<sup>2</sup></li> </ul>  |
| Moleue       | anger, especially in the fail .  |
| vvairus      | <ul> <li>Fewer wards on the north side of jones sound, on Ellesmere Island but more on the south side of jones</li> <li>Sound, on Devon Island<sup>2</sup></li> </ul>  |
|              | <ul> <li>Less walrus seen during tagging projects, but numbers seem to be increasing now<sup>2</sup></li> </ul>  |
| Soals        | <ul> <li>Eess want as seen during tagging projects, but handers seen to be increased<sup>2</sup></li> <li>Eewer harn seals and ringed seals in 2012 but hearded seals have increased<sup>2</sup></li> </ul>                |
| Seals        | <ul> <li>Seals are more variable in size and are generally smaller<sup>2</sup></li> </ul>  |
| Whales       | • Decrease in below over the past 2-3 years, but more parwhals in the area <sup>2</sup>  |
| Fisheries    | • Decrease in beinga over the past 2-5 years, but note har whats in the area.  |
| Fisheries    | • More char now, yet other community members consider char numbers have decreased hear town  |
| Birds        | <ul> <li>Seen new species of birds and insects in the area. Cackling geese had arrived in the area in the late</li> </ul>  |
|              | 1980s <sup>2</sup> .   |

# Based on the Current Gaps in the Literature, Research Needs Include:

- **Erosion mitigation studies:** Current impacts of climate and environmental changes require that the community take necessary steps to protect its shoreline and implement measures to mitigate the impacts to the people<sup>1</sup>.
- Fisheries development: Residents are concerned that clams could become overharvested if not properly managed. Others thought that there was not enough fish in the area to be used as a commercial resource, but studies are needed to determine feasibility<sup>2</sup>.

#### Selected references

1. Government of Nunavut (n.d.) Integrated Community Sustainability Plan (ICSP) Webtool. Grise Fiord community profile. https://bit.ly/3ep0WJz Accessed May 8, 2020.

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 Woodward, J., Sharp, M., and Arendt, A. (1997). The influence of superimposed-ice formation on the sensitivity of glacier mass balance to climate change. Annals of Glaciology (24), 186-190. https://bit.ly/2ZD2FuQ

4. Pope, S., Copland, L., & Mueller, D. (2012). Loss of multiyear landfast sea ice from Yelverton Bay, Ellesmere Island, Nunavut, Canada. Arctic, Antarctic, and Alpine Research, 44(2), 210-221. https://bit.ly/2WQmJCa.

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