Global Water Futures 2021 Operations Team Meeting – Project Reporting Template

Instructions: All GWF projects are asked to provide a summary update on their activities and accomplishments in preparation for the upcoming Operations Team meeting. **Please submit these by email to chris.debeer@usask.ca by no later than December 2.** These will be used to help guide discussions and breakout synthesis activities and will be made generally accessible on our website in advance of the meeting.

Project Name:	Geogenic contamination of groundwater resources in subarctic regions

Our major accomplishments to date are:

Fieldwork

We had a successful 2021 field season in Yukon.

- **Anna Grunsky (MSc) interned at Yukon Government (YG)'s Water Resources Branch** where she established key project connections with YG, learned groundwater sampling techniques, and successfully **sampled 24 monitoring wells** across Southern Yukon. Our partners at YG supported completion of this sampling campaign after Anna returned to McMaster for her MSc studies. Samples have been submitted to analytical laboratories for geochemical analyses. Grunsky has also established connections with other YG departments to gain access to a territory-wide groundwater monitoring well network.
- **Elliott Skierszkan (PDF) secured access to two remote geological exploration camps** in west-Central Yukon through connections with the mining industry that enabled Skierszkan and Matthew Fellwock (MSc) to undertake two permafrost coring trips at remote sites that have previously been identified as having elevated geogenic U and As in groundwater. **This resulted in approximately 50 permafrost and active-zone samples** collected at seven sites in west-central Yukon. These fieldtrips also resulted in **collection of dozens of surface-water and groundwater samples** for geochemical analyses.
- A second permafrost sampling trip by Grunsky in partnership with YG resulted in 5 permafrost samples collected from a permafrost thaw slump located near Whitehorse.

HQP Training

- Fellwock, Skierszkan, and Grunsky acquired key training, including field and laboratory sampling and analytical techniques; completed required health & safety training; and developed strong networks local stakeholders.

Knowledge Mobilization

- Elliott Skierszkan (PDF) held an **in-person meeting in Dawson City with staff from Tr'ondëk Hwëch'in**'s (TH) Department of Land and Resources in which they discussed the research occurring on their traditional territory and identified where this research is most likely to intersect with TH concerns and priorities; how possible future involvement of TH staff or citizens in the project might proceed; and possibilities for shared participation in water-focused outreach events. This meeting provided a great networking and exchange opportunity between the research team and TH.
- Successful knowledge mobilization included a **radio spot with CBC's Quirks and Quarks** (https://www.cbc.ca/listen/live-radio/1-51-quirks-and-quarks/clip/15865485-see-canadian-researchers-summer-science); **launching of the project research website** (https://gwf.usask.ca/geogenic/); **several meetings with key local players** including the YG, the Yukon mining industry, and Yukon First Nations.
- Skierszkan has **authored one research paper** on geogenic uranium mobilization in the Dawson Range that has been accepted for publication in *Earth & Space Chemistry* (Oct 2021).

- All project members (Grunsky, Skierszkan, Fellwock, Ferguson, Lindsay, and Carey, along with collaborator Brendan Mulligan from YG) **presented at the 2021 GWF Annual workshop**.

Other Achievements

- Skierszkan and Lindsay have secured synchrotron beamtime for advanced mineralogical investigations of permafrost samples with a successful proposal to the Canadian Light Source. This beatmtime is scheduled in March and June 2022.

Our current activities are:

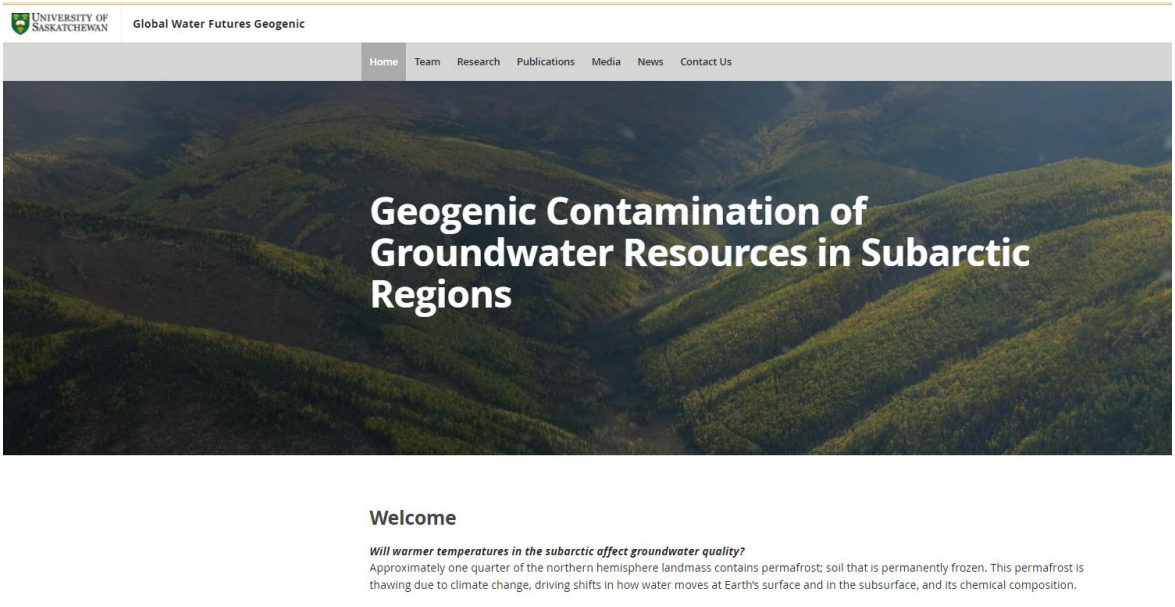
- Skierszkan and Fellwock are processing permafrost samples for laboratory geochemical analyses
- The research team is compiling groundwater, surface water, and permafrost geochemical analyses to build up the dataset that will be the foundation of this project. This includes compiling analyses of new samples collected in 2021 and submitted to various analytical facilities this fall.
- The research team is holding ongoing conversations with YG to create the Yukon groundwater geochemical database that will form the backbone of Grunsky's MSc.
- Fellwock, Skierszkan, and Lindsay are planning laboratory permafrost-thaw experiments, which will be initiated during the winter 2022 term.
- Grunsky and Fellwock are completing MSc course requirements this academic year.

The main accomplishments expected by the end of the project are:

- Production and analysis of a Yukon groundwater geochemical database to assess interactions between (hydro)geology, permafrost, and trace element concentrations in groundwater.
- Geochemical characterization of porewater and solids in permafrost samples.
- Laboratory permafrost-thaw experiments to assess geochemical evolution of water under warming temperatures.
- Ongoing interactions and communications with Yukon government, First Nations, mining industry.

Here is a key visual from the project (figure, photo, table, graph, etc.)

Launching of the Research Website:



Groundwater sampling at a community supply well near Whitehorse that is contaminated by naturally occurring uranium:

Skierszkan and Fellwock returning to the mine camp after a day of permafrost coring in Casino Creek:

Skierszkan and Fellwock coring ice-rich permafrost from the Dawson Range, Yukon: