

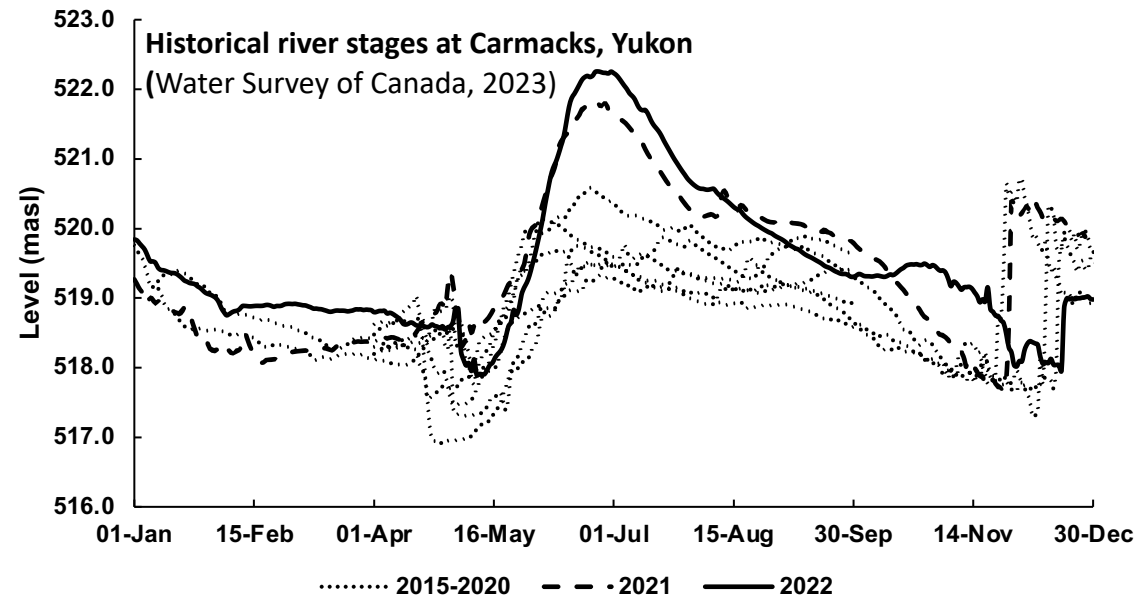
Background

- Groundwater is critical to people living in Yukon, Canada

Total Pop. **41,648** → Pop. served by drinking water plants: **31,350**
(Statistics Canada, 2021)

Groundwater as source: **30,928** (over **98%**)
Surface water as source: **422**

- Many aquifers are **hydraulically connected** to the **surrounding river (s)**
- Seasonal snow/ice melt → **Seasonal river stage variation**



- Overland flood



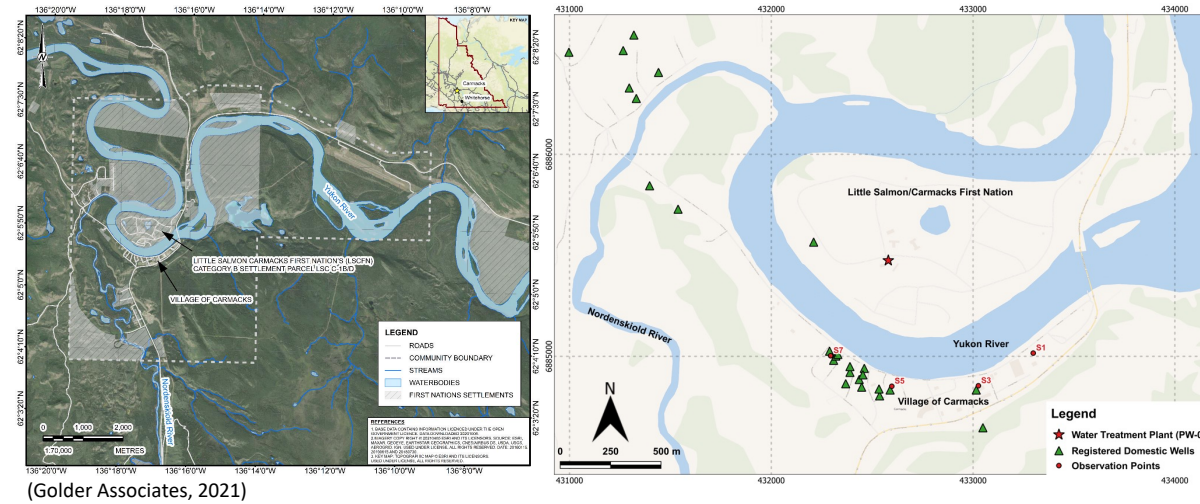
Carmacks, Yukon field pictures took by Andrew J. Wiebe (left) and Jeffrey McKenzie (right)

Problems

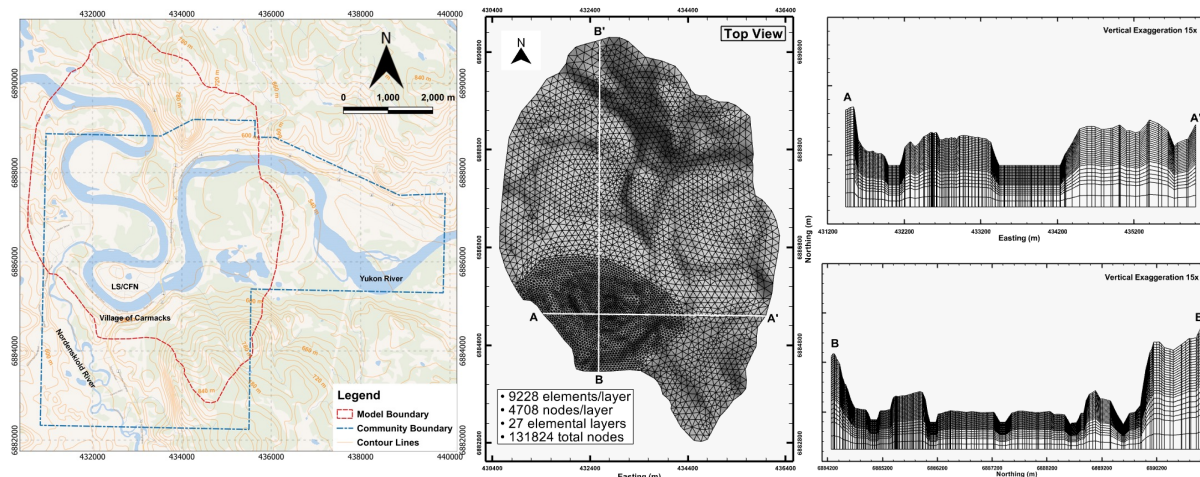
- Seasonal River stage variation might influence **well vulnerability**
- No standard vulnerability assessment approaches **designed specifically for cold regions** where have seasonal river stage variation
- River stage variation is causing **basement inundation** issues

Approaches

- Case study: Carmacks, Yukon

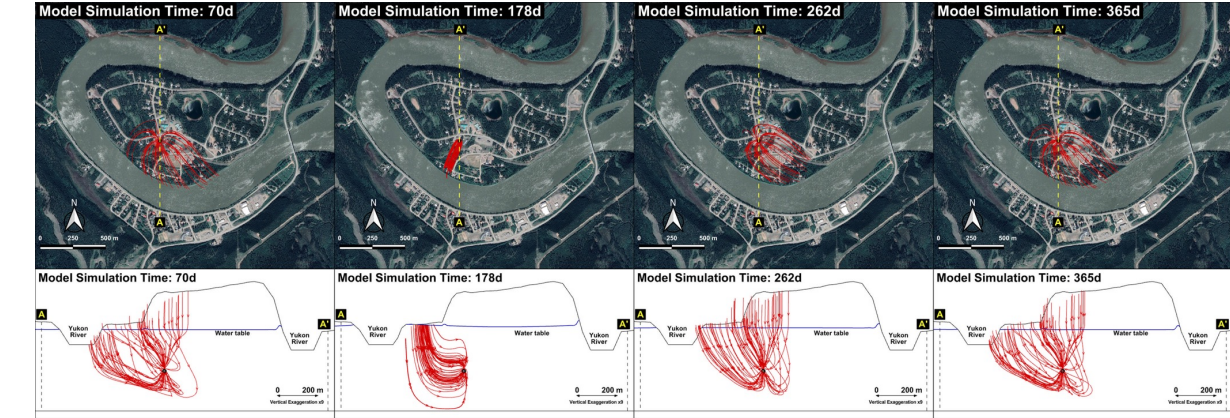


- 3-D, SW-GW flow/transport model—HydroGeoSphere

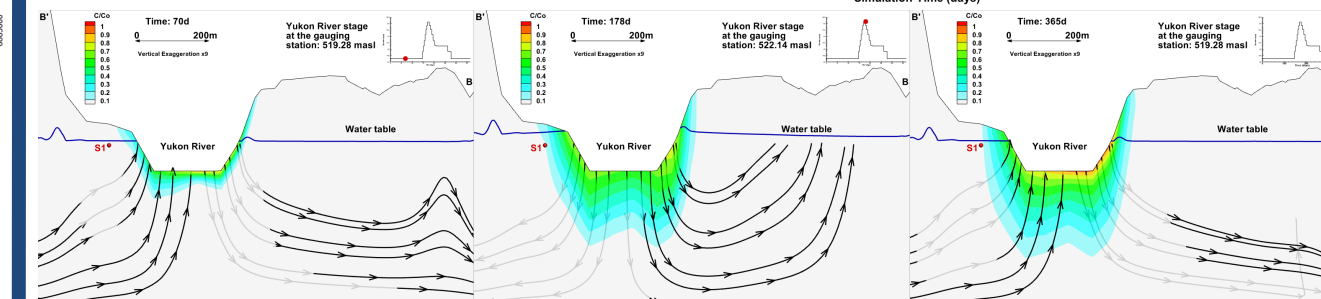
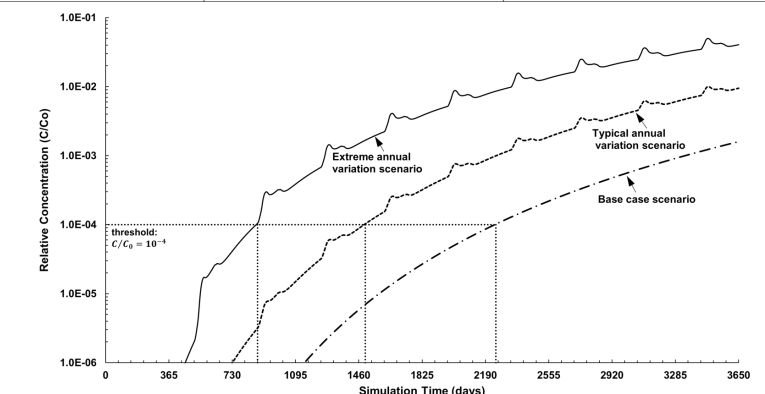


Model Results

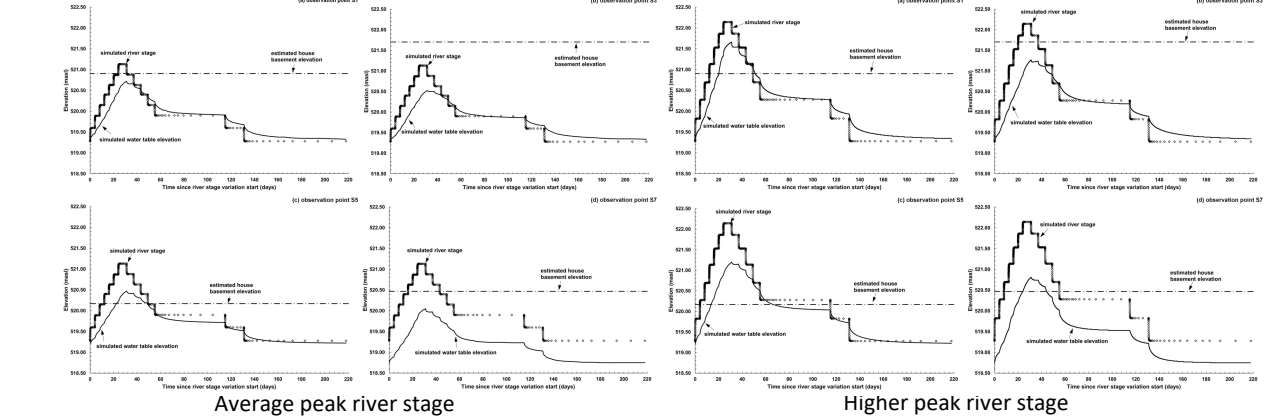
- Temporarily change in the size and orientation of the region that contributes water to pumping wells



- Shorter travel time under seasonal river stage variation
- Temporarily reversed hydraulic gradient between river and riverbank



- Basement inundation analyses



References

Golder Associates. (2021). Aquifer Mapping Report: Village of Carmacks.
 Statistics Canada. (2021, Aug 17). Population served by drinking water plants (Table 38-10-0093-01). <https://doi.org/10.25318/3810009301-eng>
 Water Survey of Canada. (2023, March 2). Daily discharge graph for Yukon River at Carmacks (09AH001).