

# Advancing groundwater vulnerability assessment in the Yukon and Northwest Territories

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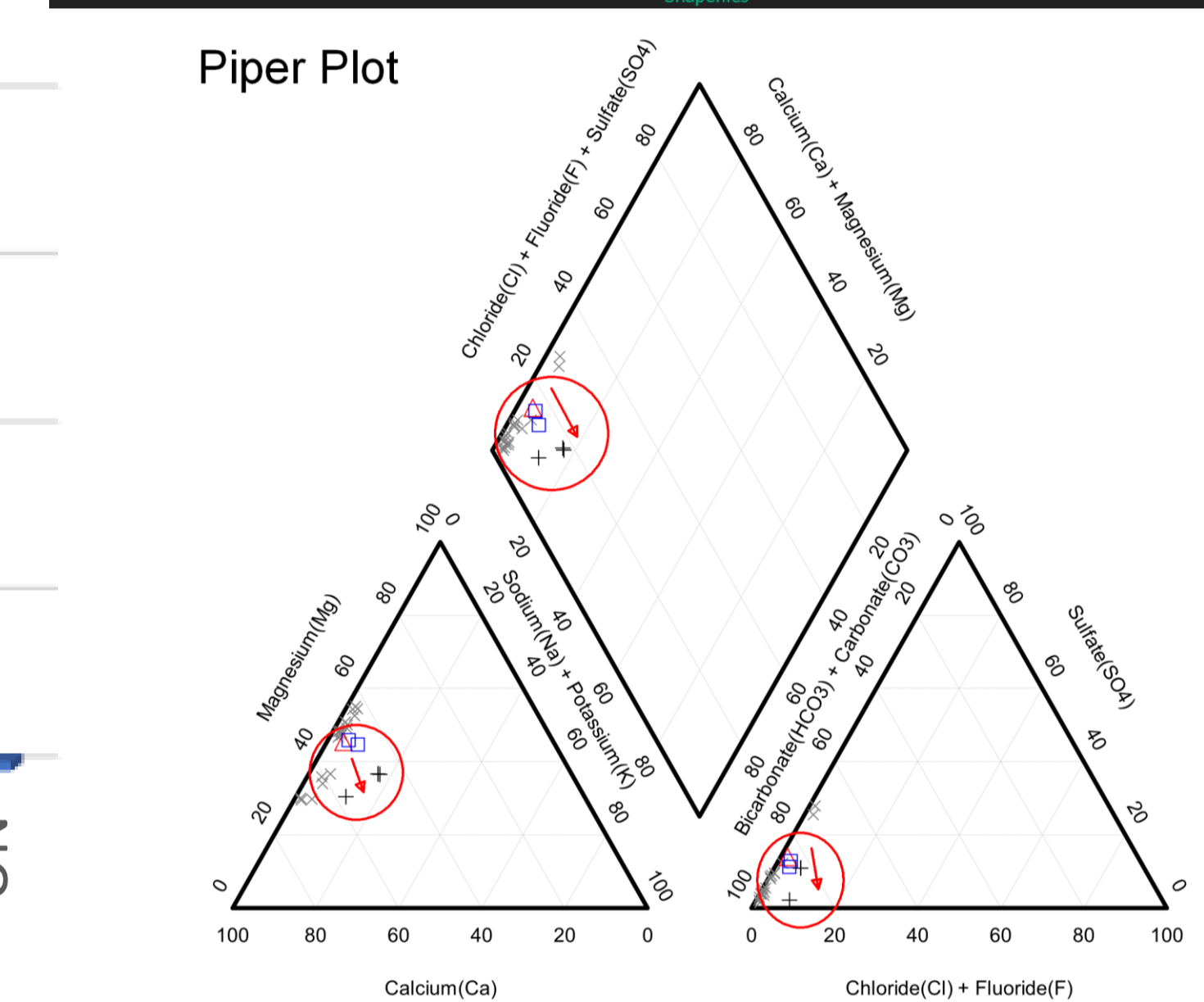
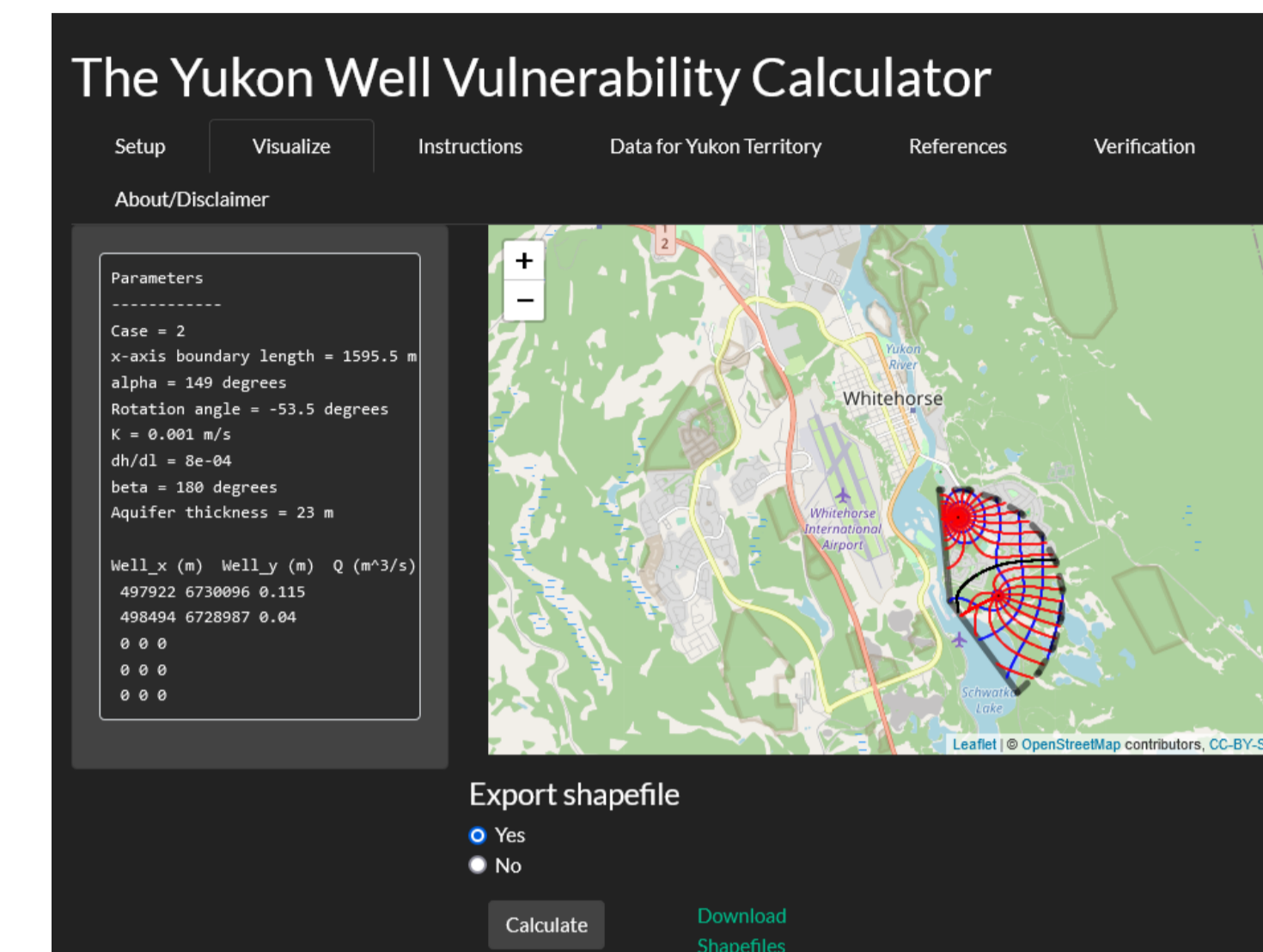
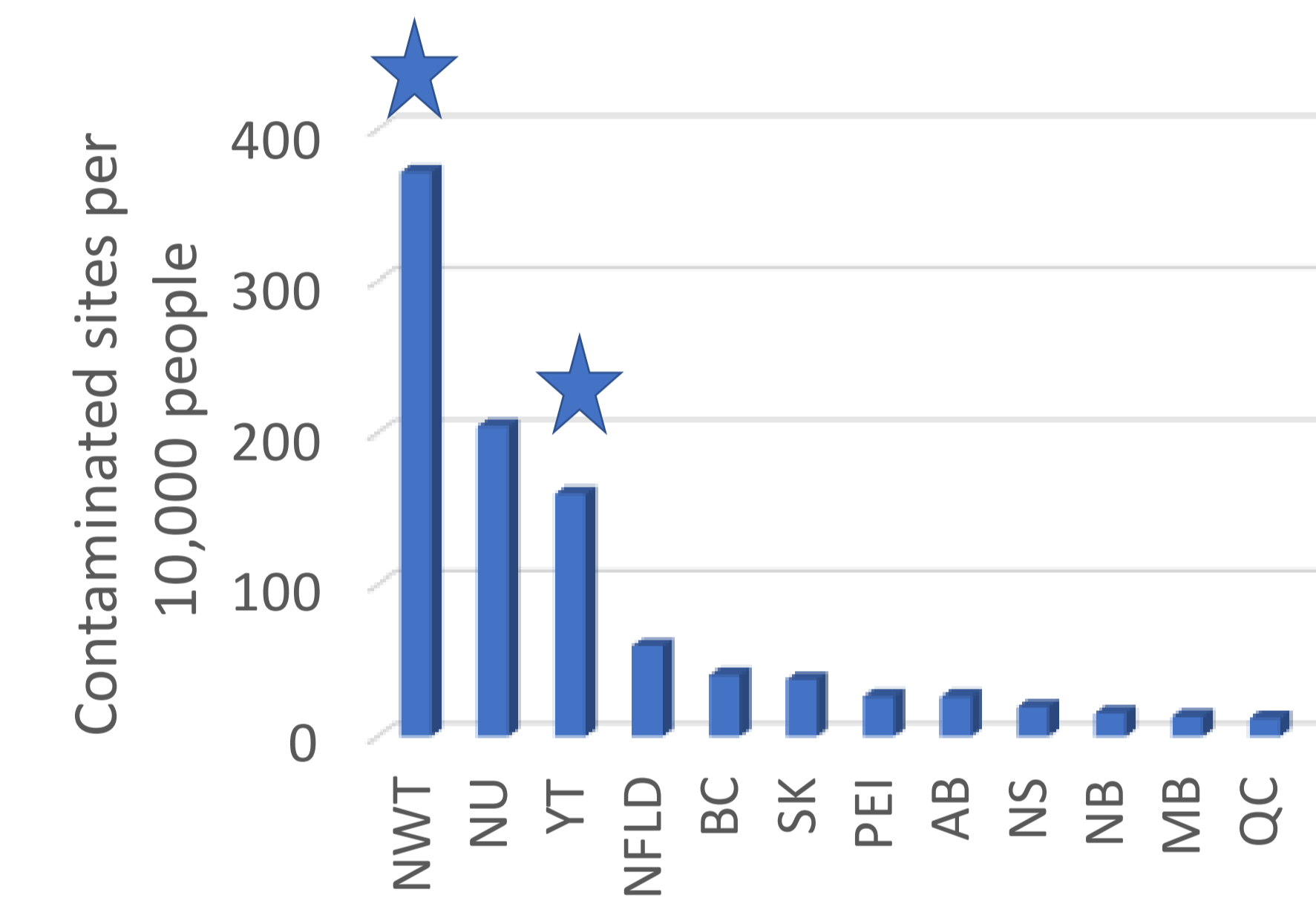
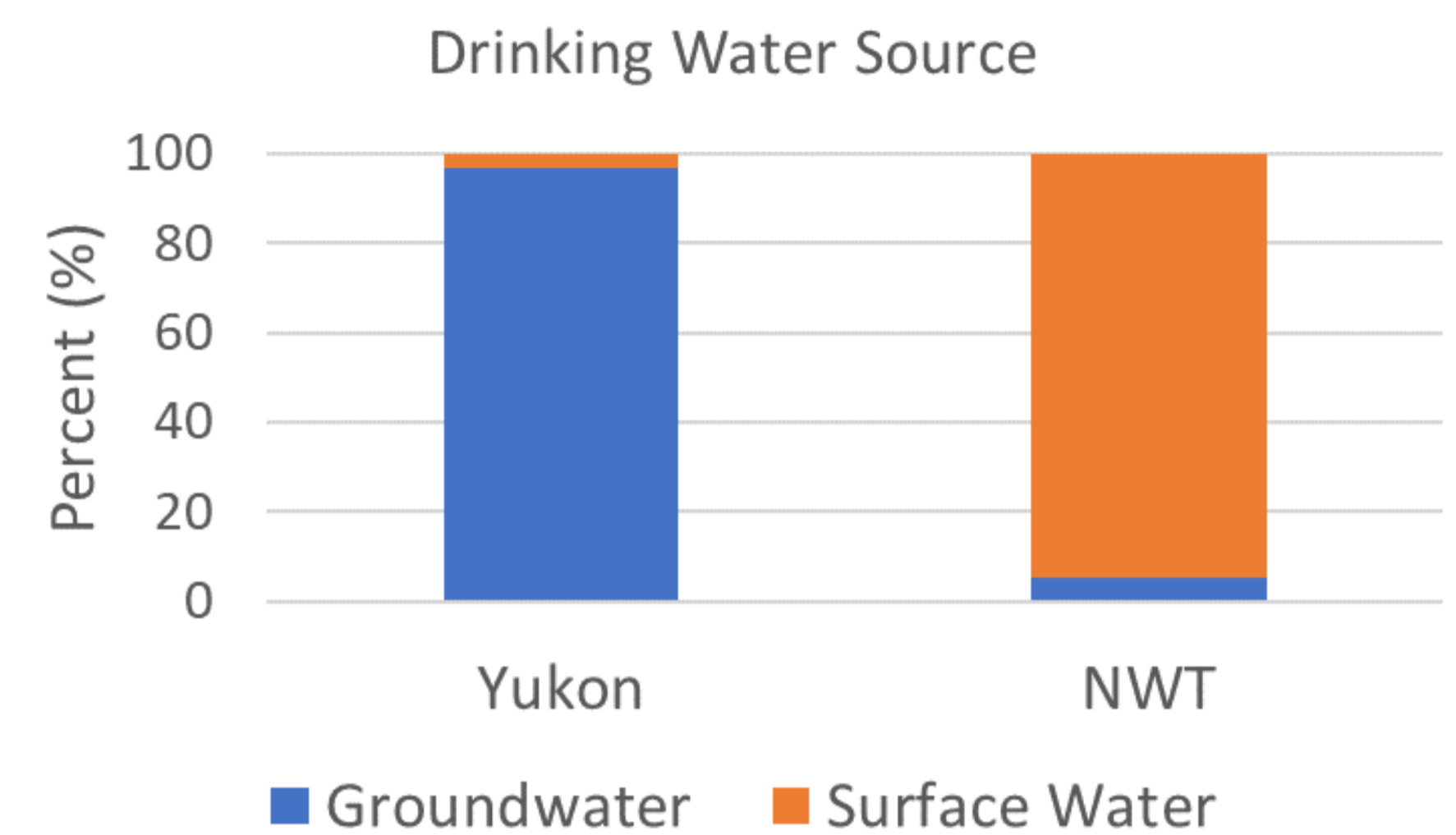
## Introduction

- Reliance on groundwater varies across the Yukon<sup>1</sup> and Northwest Territories (NWT)<sup>2</sup>
- Groundwater vulnerability: how susceptible aquifers or wells are to contamination
- No groundwater vulnerability strategies unique to cold regions<sup>3</sup>



## Under-the-Land 2022

- Met with Indigenous Elders, communities, water/land resources staff, and youth to discuss water and groundwater issues
- Tr'ondëk Hwëch'in, Little Salmon / Carmacks First Nation, Whatì

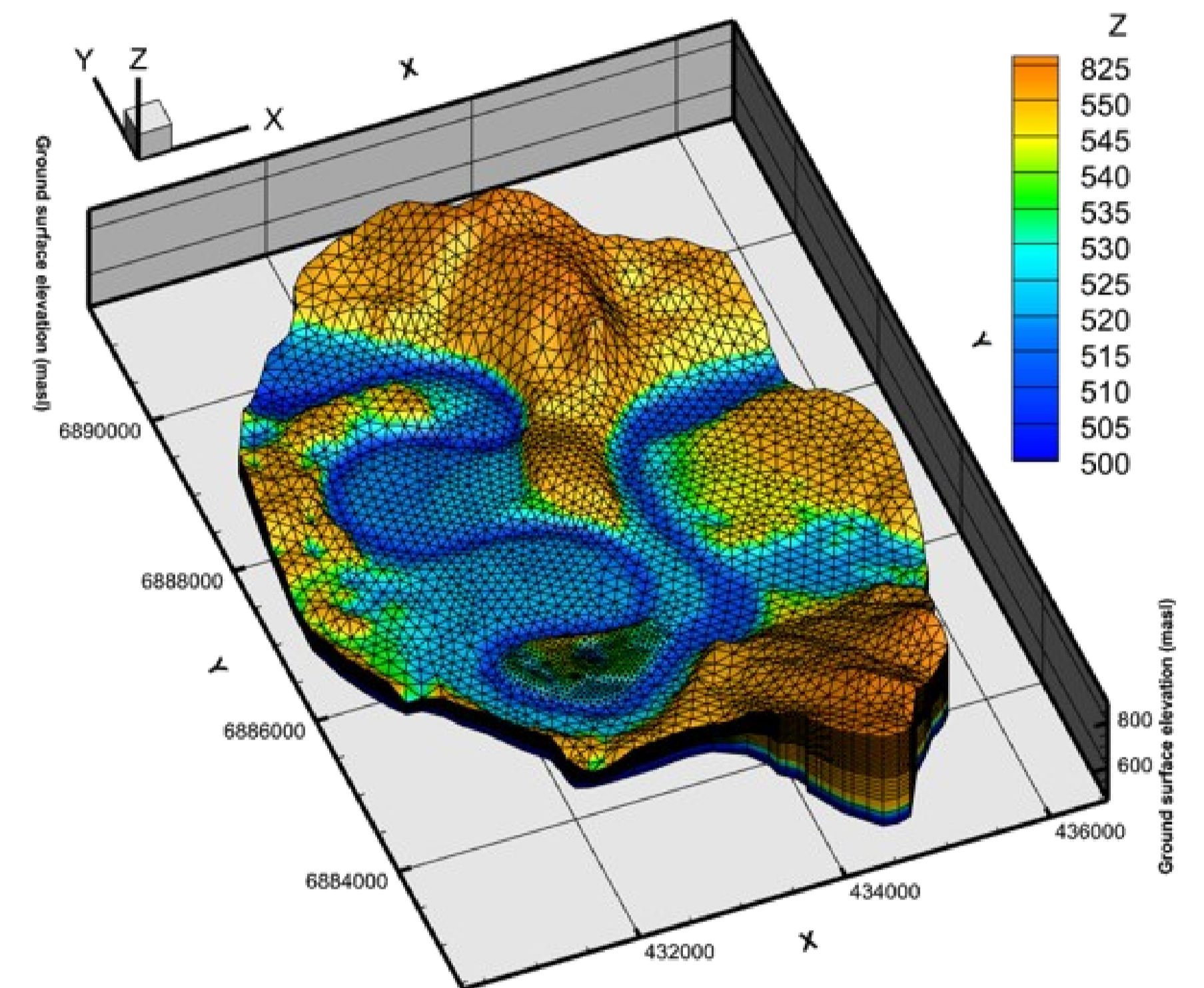


## Challenges

- Climate change / permafrost thaw
- Limited hydrogeological capacity
- Disproportionate number of reported contaminated sites per capita<sup>3</sup>
- Waste management historically relied on permafrost for containment
- Groundwater flooding
- Distrust of groundwater quality

## Approaches

- Development of web app for well capture zone analysis<sup>4</sup>
- Integrated groundwater-surface water modelling to estimate flood risks



## Recommendations

- Two-eyed seeing<sup>5</sup>
  - Valuing both Indigenous and Western knowledge
- Easily implemented methods
  - Start with conceptual diagrams, test hypotheses
- Integrate hydrogeologic information with geochemistry



### References

- <sup>1</sup> Yukon Government (2017). Yukon Observation Well Network: 2017 Report, <https://yukon.ca/en/yukon-observation-well-network-2017-report>. Cited 12 August 2022.
- <sup>2</sup> Northwest Territories Bureau of Statistics (2020). Population Estimates by Community, <https://www.statsnwt.ca/population/population-estimates/bycommunity.php>. Cited 14 October 2021.
- <sup>3</sup> Wiebe AJ, McKenzie JM, Hamel E, Rudolph DL, Mulligan B, de Grandpré I (submitted manuscript). Groundwater vulnerability in the Yukon and Northwest Territories, Canada.
- <sup>4</sup> Wiebe AJ, McKenzie JM (2022). An Open-Source Web Tool for Visualizing Estimates of Well Capture Zones Near Surface Water Features. Poster presentation at: AGU Fall Meeting 2022, Chicago, IL, USA, 12-16 Dec 2022. <http://dx.doi.org/10.22541/essoar.167267811.10671930/v1>.
- <sup>5</sup> Wong C, Ballegooyen K, Ignace L, Johnson MJ(G), Swanson H (2020). Towards reconciliation: 10 Calls to Action to natural scientists working in Canada, FACETS 5:769-783. <https://doi.org/10.1139/facets-2020-0005>.