

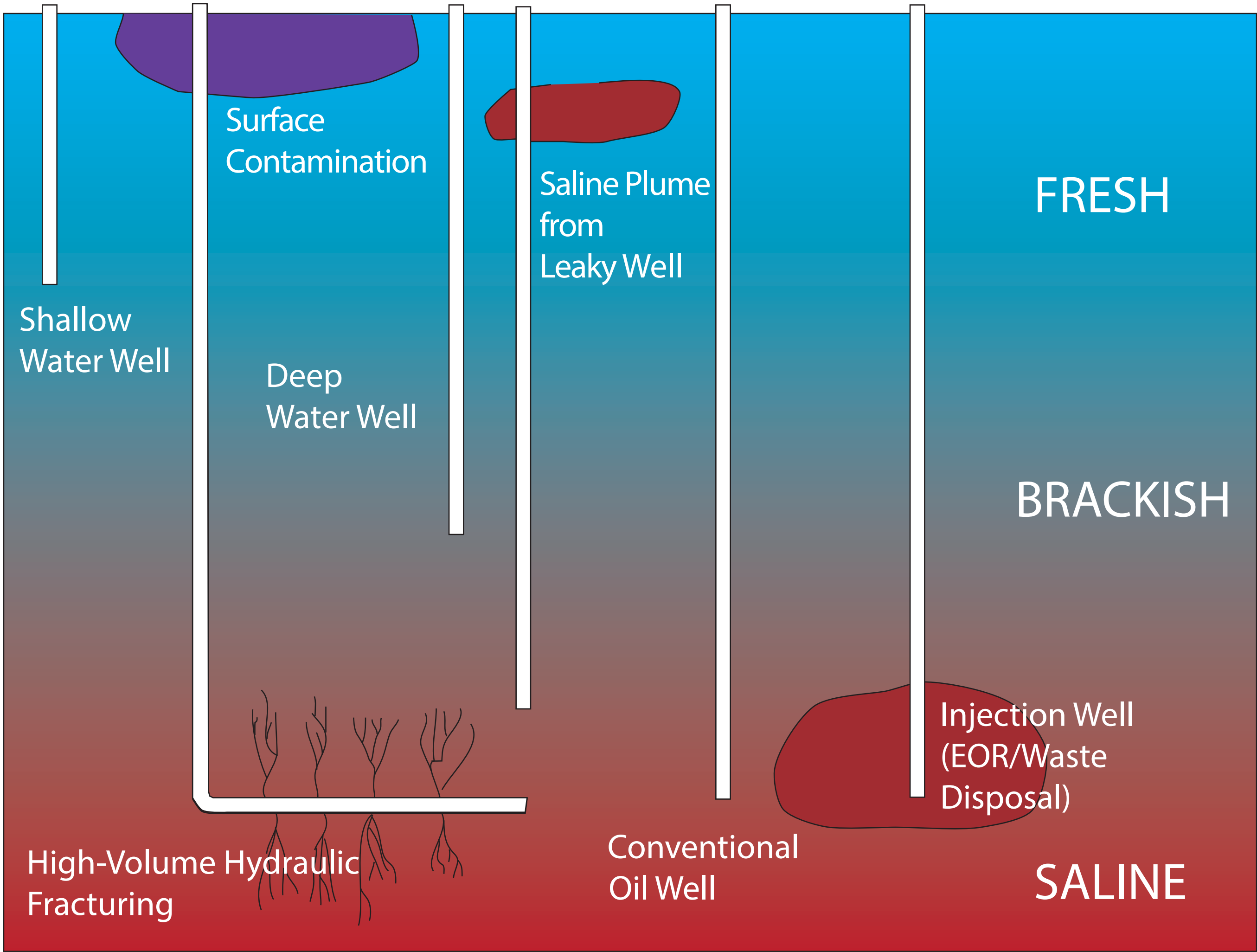
# Old Meets New: Subsurface Hydrogeological Connectivity and Groundwater Protection

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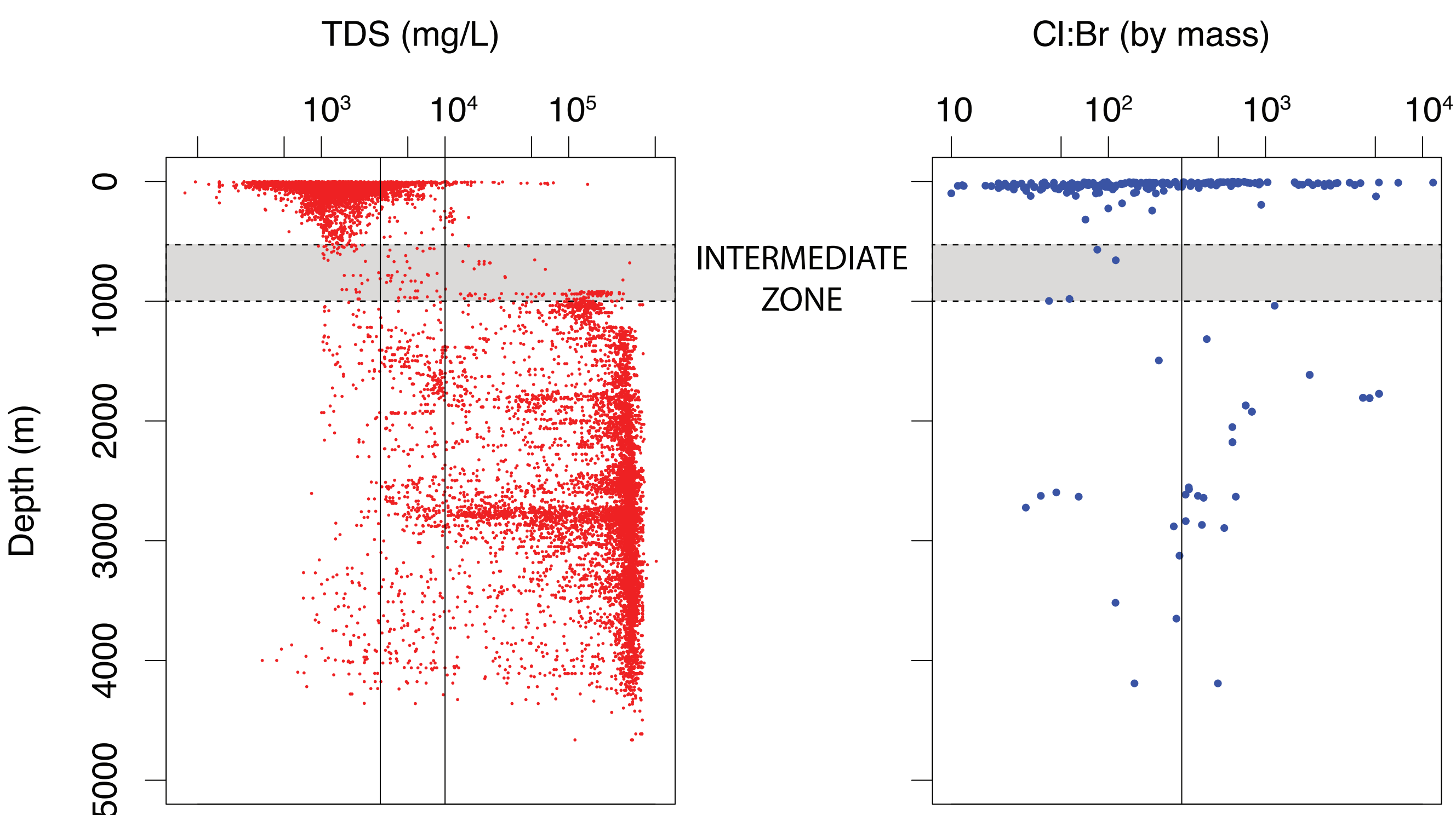
This project addresses the Global Water Futures aims to:

- 2) **Predicting water futures:** Our knowledge of the subsurface hydrological cycle is poorly understood in Western Canada, particularly at greater depths. Understanding the distribution of groundwater quality and how it is changing over time is also a current challenge.
- 3) **Adapting and managing risk:** Groundwater is a strategic resource that can be used to mitigate drought, meet potential demands for irrigation with changes in agriculture and provide water security where surface water is contaminated (e.g. Buffalo Pound algae blooms, pipeline leaks).

This project addresses **UN Sustainable Development Goal 6.6**, which seeks to protect aquifers among other water bodies and dependent ecosystems.



**“Top down”** contamination from the surface and **“bottom up”** stress from the oil and gas industry threaten groundwater resources in Western Canada.



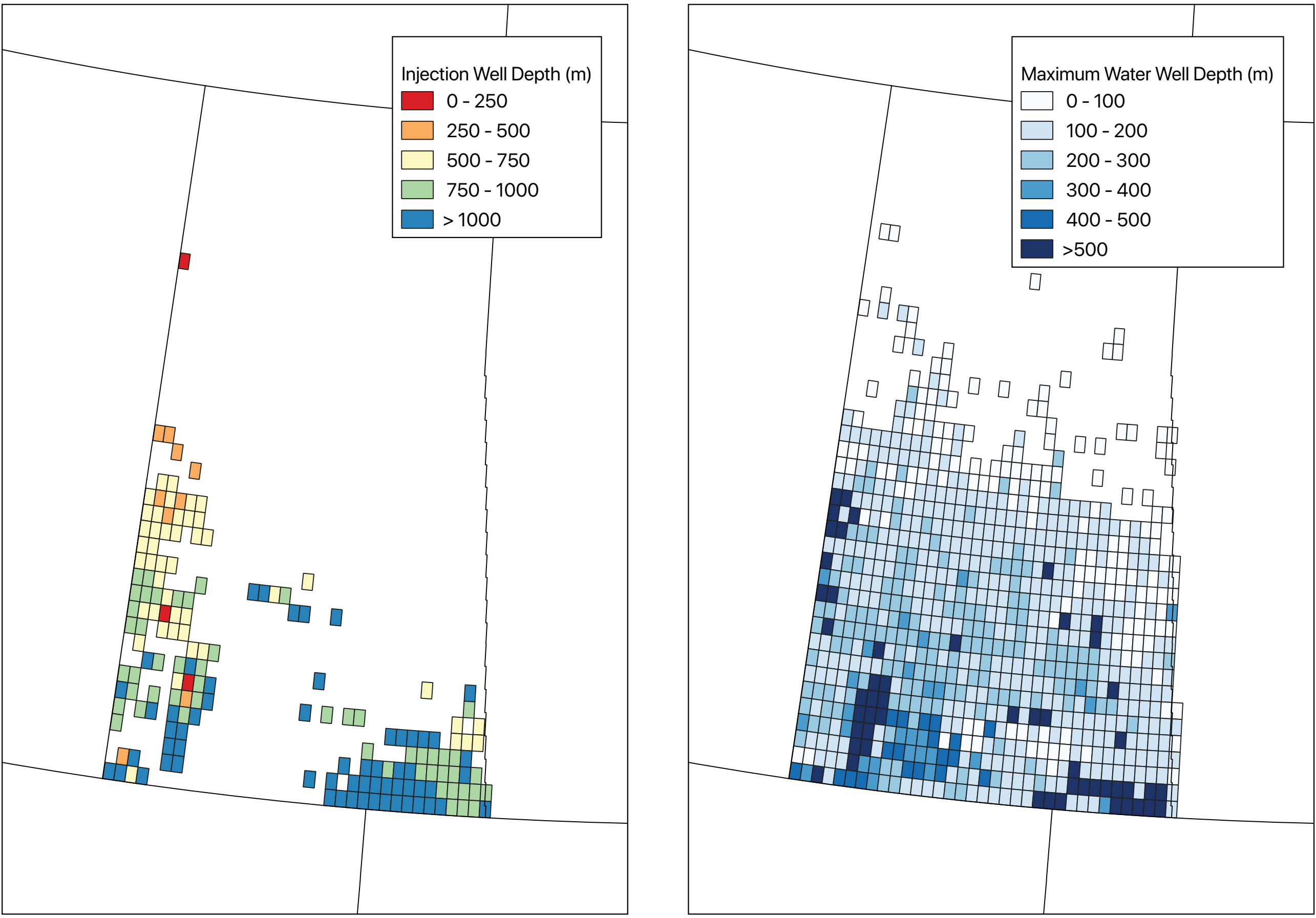
Geochemical data is scarce in the **“Intermediate Zone”** between oil and gas production and the base of groundwater exploration. Understanding this zone is key for understanding the impacts of oil and gas activities on shallow groundwater. The Intermediate Zone may also contain strategic groundwater resources, in particular brackish groundwater resources.



A water supply well in the East Regina aquifer system, which known to produce a combination of modern and fossil water. This creates a situation where both the sustainability of withdrawals and groundwater protection are unclear.

## The Shrinking Window of Groundwater

- Depletion
  - Use potable groundwater resources
  - Brackish and saline groundwater use by the oil and gas industry
- “Top down” contamination:
  - Nitrates and other agricultural contaminants
  - 1000s of spills by the oil and gas industry
- “Bottom up” contamination:
  - Through leaky wells
  - Upward transport induced by pressure increases due to injection
  - Displacement of brackish groundwater by injection



**Injection wells** occur in close proximity to water wells in many areas of Saskatchewan. Few impacts to potable groundwater have been reported but current hydrogeological characterization and monitoring are unlikely to reveal the extent of groundwater contamination.

## Collaborators

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