ARTESIAN AQUIFER RISK MAPPING IN THE FRASER VALLEY AND OKANAGAN REGIONS

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Uncontrolled flowing artesian wells are a costly burden to drillers and homeowners, and can have detrimental effects on aquifers



- **Purpose**: To expand the knowledge of the risk of flowing artesian wells in BC, and disseminate that knowledge to decision-makers, practitioners and the general public through the development of a more comprehensive understanding of the factors controlling where flowing artesian wells may exist and where there is greater risk for flowing artesian wells, and by examining how current policies and regulatory requirements regarding flowing artesian wells might be enhanced.
- Project team:
 - Diana Allen, Professor, SFU
 - Brynje Johnson, MSc candidate, SFU
 - Mike Wei, Hydrogeologist
- Timeline: Sept 2018 March 2021
- Funding: BC Groundwater Science Program and SFU

The Project



British Columbia

The Study Areas

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Alberta

Vancouver Island

Okanagan Basin

Calgary

e Edmonton

Lower Fraser Valley Seattle Washington

Portland

Phase 1 (compete):

I carried out a preliminary scoping exercise for the Okanagan (Allen, 2017).



Phase 1

Frequency

Flowing Artesian Wells in Okanagan Basin



Phase 2

- 1. Carry out a similar preliminary geostatistical analysis in the Lower Fraser Valley following the approach used in the Okanagan (Allen, 2017).
- 2. Engage with well drillers and professionals to glean practical (geological) knowledge and the hydrogeological (groundwater) context surrounding known cases of artesian wells.
- 3. Analyze well records in the provincial WELLS database (~1000 wells).
- 4. Assemble and interpret geological and hydrogeological information (e.g. stratigraphy/confinement, depth of occurrence, location (e.g., valley bottom, slope or upland, length of flow path)).
- 5. Develop **conceptual hydrogeological models** for the occurrence of flowing artesian wells in mountainous (Okanagan) and low relief (Lower Fraser Valley) settings.
- 6. Develop a series of interpretive groundwater flow models









B. Flowing artesian well where confining layer is less permeable overburden.

Conceptual Models





Topography driven models



Conceptual Models





Lambly (Bear) Creek, west side Okanagan Lake Courtesy: L Welch



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Phase 3

Map the likelihood (or risk) of flowing artesian 1. wells throughout the Lower Fraser Valley and the Okanagan.

Risk of arsenic occurrence in Langley Township

Phase 3



Phase 4

- Assist FLNR (if there is interest) in conducting inspections in the Lower Fraser Valley and the Okanagan (over two years) to document current conditions of identified flowing artesian wells
- 2. Review information collected during the study to:
 - assess how well owners can comply with s. 53 of the WSA given the typical well construction (and situation from inspections),
 - examine enforcement challenges and identify the main barriers affecting compliance with s. 53 and strategies that government can employ to strengthen compliance, and
 - identify where construction standards can be developed in the GWPR, in a local municipal government by-law, or even as best practice to promote s. 52 of the WSA (stopping and controlling artesian flow).
- 3. Work with ENV and FLNR to create area-specific advisories for landowners and water well drillers.
- 4. Prepare a Water Science Series report & provide all GIS maps.

Phase 4

We welcome your views and look forward to information sharing on this important topic.





" I think you should be more explicit here in step two "