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Groundwater Modeling of the West Plains, WA

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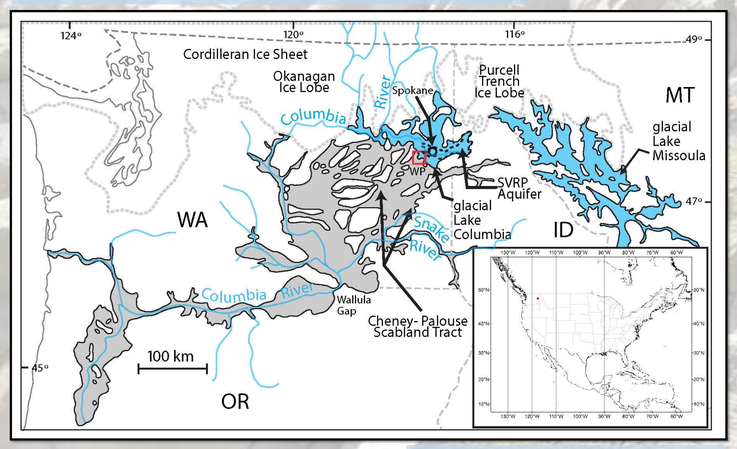
Abstract:

Located in Eastern Washington in the West Plains Region sits a plateau of Columbia River Basalts between Deep Creek, Hangman Creek, and south of the Spokane River. Primarily in Airway Heights, the amount of drinking water as well as the quality of the water has affected residents in the area. The most recent issue is PFAS contamination, which is thought to negatively affect human health and is found in drinking water wells across the West Plains. We can interpret subsurface geology using new well logs from Fairchild Air Force Base and in the Palisades area. When using ArcGIS PRO, well information can then be interpreted and projected as various data points. After this, it can be interpolated to predict multiple geological horizons and can be used to estimate the flow direction of groundwater. We will also use real PFAS results from across the West Plains to estimate if contamination can be linked to possible sources, including airports, fire stations, car washing facilities, or dumps. These models can help residences in the West Plains Region understand the possible sources of contamination as well as create a safer environment for them and their families. This research could put worried residents at ease and help them find clarity in this difficult situation.

Geologic Background and Groundwater:



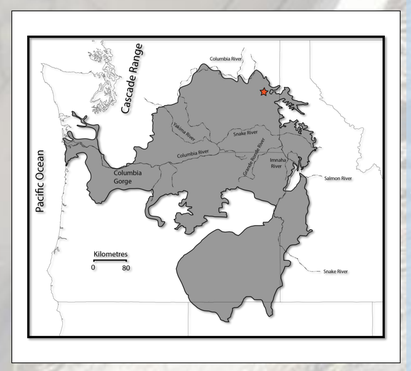


Fig.1, Above Map of the Pacific NW, illustrating the Missoula Floods ~ 16,000 years ago (Pritchard et al. 2021)

Left: Map of PNW showing extent of the Columbia River Basalt, which erupted about 16 million years ago. Basalt is the dominant aquifer in the West Plains (Reidel, 2020)

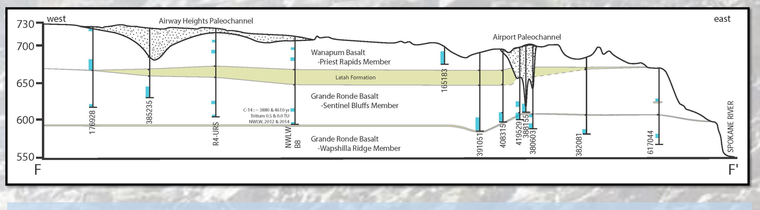


Fig.2, Cross sectional view from W-E across the west plains showing common aquifers, including surficial deposits of Missoula floods, and major basalt flows, the Wanapum and lower Grande Ronde basalt.

Background:

Fig.3, Here is some evidence describing the current state of the groundwater in the West Plains. Groundwater quantity, quality, and issues with stormwater, are some of the concerning points in these articles.

Methods:

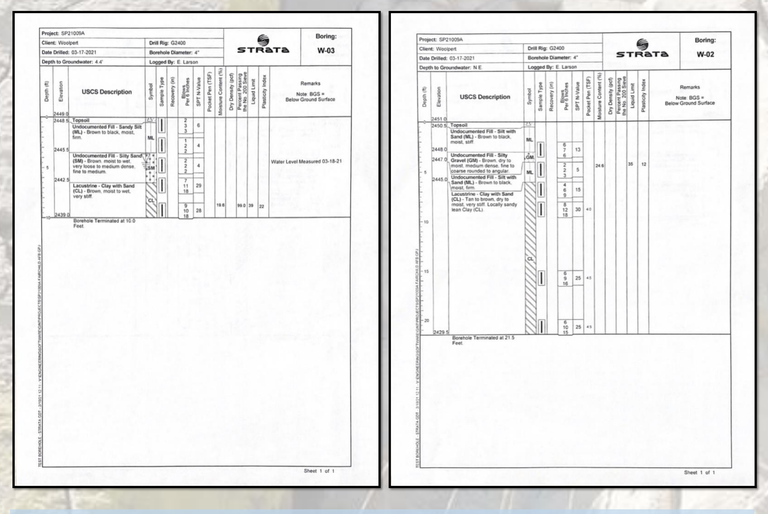


Fig.4, Above shows examples of water well reports used in the various maps on shown in Fig 5 and Fig 6. These reports help determine the lithology and elevation of the West Plains area.

Results:

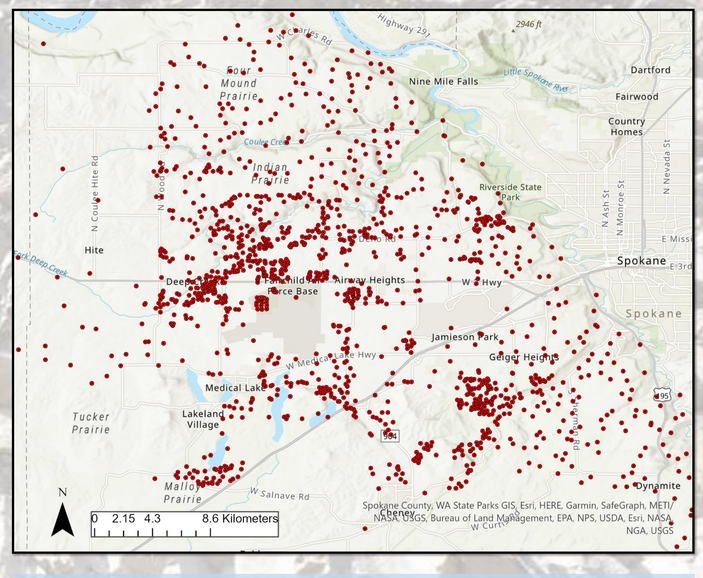


Fig.5, Map of the West Plains showing over 1400 wells used in this study. This data helped determine the upper restrictive layers shown below in Fig 6 . This will help determine a more accurate representation of where groundwater flows as this study develops further.

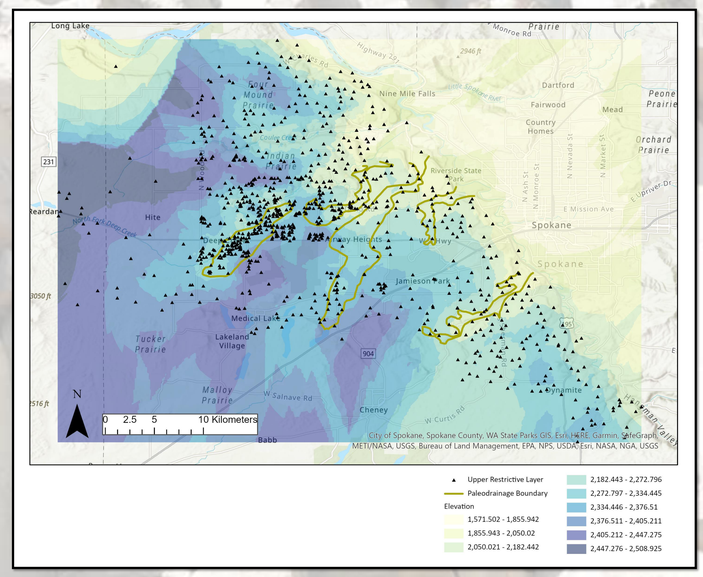


Fig 6. Map showing wells with upper restrictive layers. Upper restrictive layers are the highest layer of stratigraphy with clay or basalt. Darkest colors represent highest elevations and lightest colors represent lowest elevations. This indicates groundwater flows Northwest.