

Executive Summary:

Hydrogeologic Characterization of Dutch Canyon, Scappoose, OR

Columbia SWCD / Portland State University



**Columbia
Soil & Water
Conservation District**



**Portland State
UNIVERSITY**

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Geologic Overview

The Dutch Canyon area is composed of a complex mixture of Columbia River Basalt Groups (CRBG) overlying the Scappoose Formation, in a complex and highly fractured network of water bearing units. This complexity is due to historic landslides and fault lines. The upper layer of CRB groups is highly weathered in the higher elevation portions of the basin, resulting in decreased permeability for groundwater to infiltrate into the aquifers.

Methods

The study was conducted using physical and chemical data to identify and characterize water bearing units and determine the level of connection between them. Data used include lithographic information from 73 out of 196 well logs within the study area and analysis of 51 water samples from individual wells. Chemical parameters analyzed for pH, specific conductivity, temperature, dissolved oxygen, reduction potential, alkalinity, major ions, arsenic and stable isotopes.

Results

Groundwater resources in Dutch Canyon are limited and low well yields are common. The primary water quality concern is saline water, which is generally found in the lower and middle units of the Scappoose Formation underlying the valley. Low recharge rates determined from hydrograph analysis of stream discharge measurements are consistent with the geology and steep terrain of the area and further limit the available groundwater and the degree of flushing of what may be connate waters in the deeper units. On average, all hydrostratigraphic units west of the Portland Hills Fault have low transmissivities and water wells completed them are commonly low- yielding wells, though there are some exceptions. Other water quality issues present were sulfide smell and relatively high iron content in the three Scappoose Formation Units related to reducing conditions in the aquifer. The presence of a single record of arsenic (As) above current regulatory drinking water standards was found in a shallow irrigation well within the alluvium of Scappoose Creek in the lower watershed.

Hydrostratigraphic Unit	Unit Details	Average Values				
		Elec. Cond. (uS/cm)	Eh (mV)	O ₂ (mg/L)	pH	Temp (°C)
CRBG Ortley	Average Thickness 62m Pumping Rate 82 L/min	185	57	4.9	7.12	13.0
CRBG Wapshilla Ridge	Average Thickness 62m Pumping Rate 69 L/min	235	0.4	3.6	6.8	11.8
Scappoose Upper Unit	Elevation between 200m-100m Pumping Rate 78 L/min	198	118	5.0	6.7	13.3
Scappoose Middle Unit	Elevation between 100m-50m Pumping Rate 60 L/min	374	58	2.8	7.3	13.5
Scappoose Lower Unit	Elevation between 50m-25m Pumping Rate 52 L/min	610	-17	1.9	7.7	13.5

*elevations are meters in NAVD88 based on the National Elevation Dataset (NED) Digital Elevation Model (DEM) available from USGS for the study area.

Dutch Canyon Groundwater Study Executive Summary Appendix:

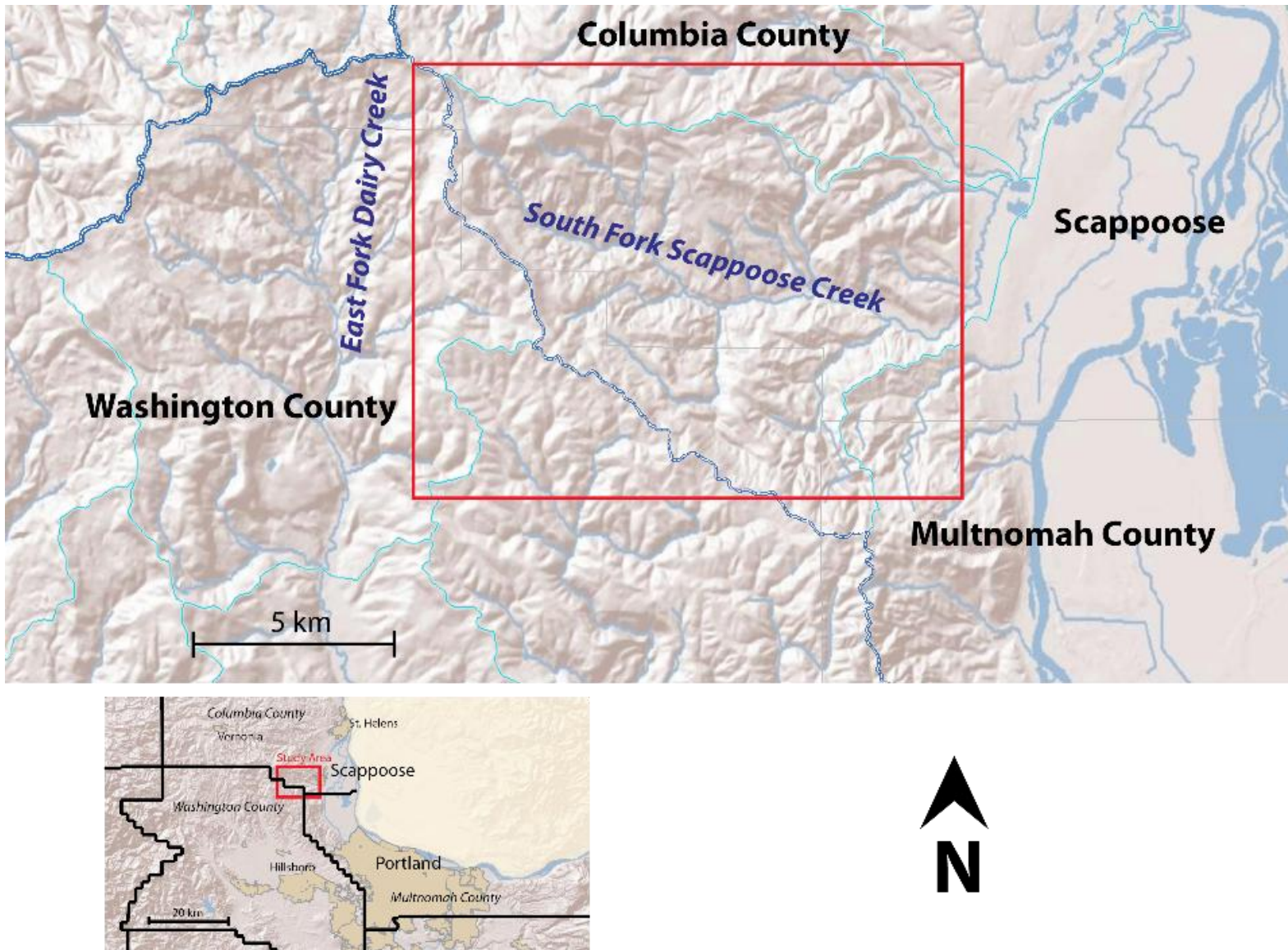


Figure 1: Study Location

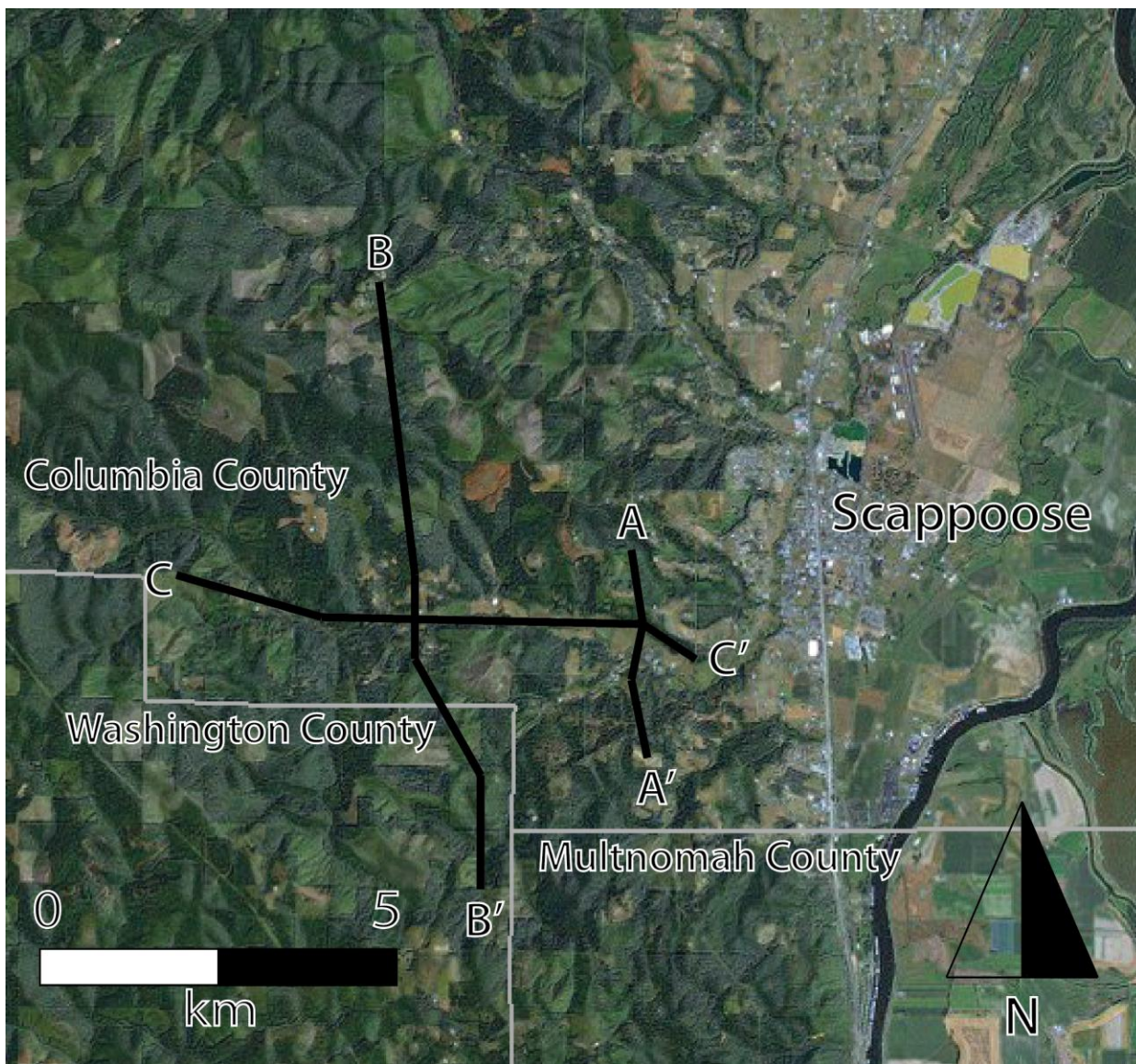


Figure 2: Location of cross sections

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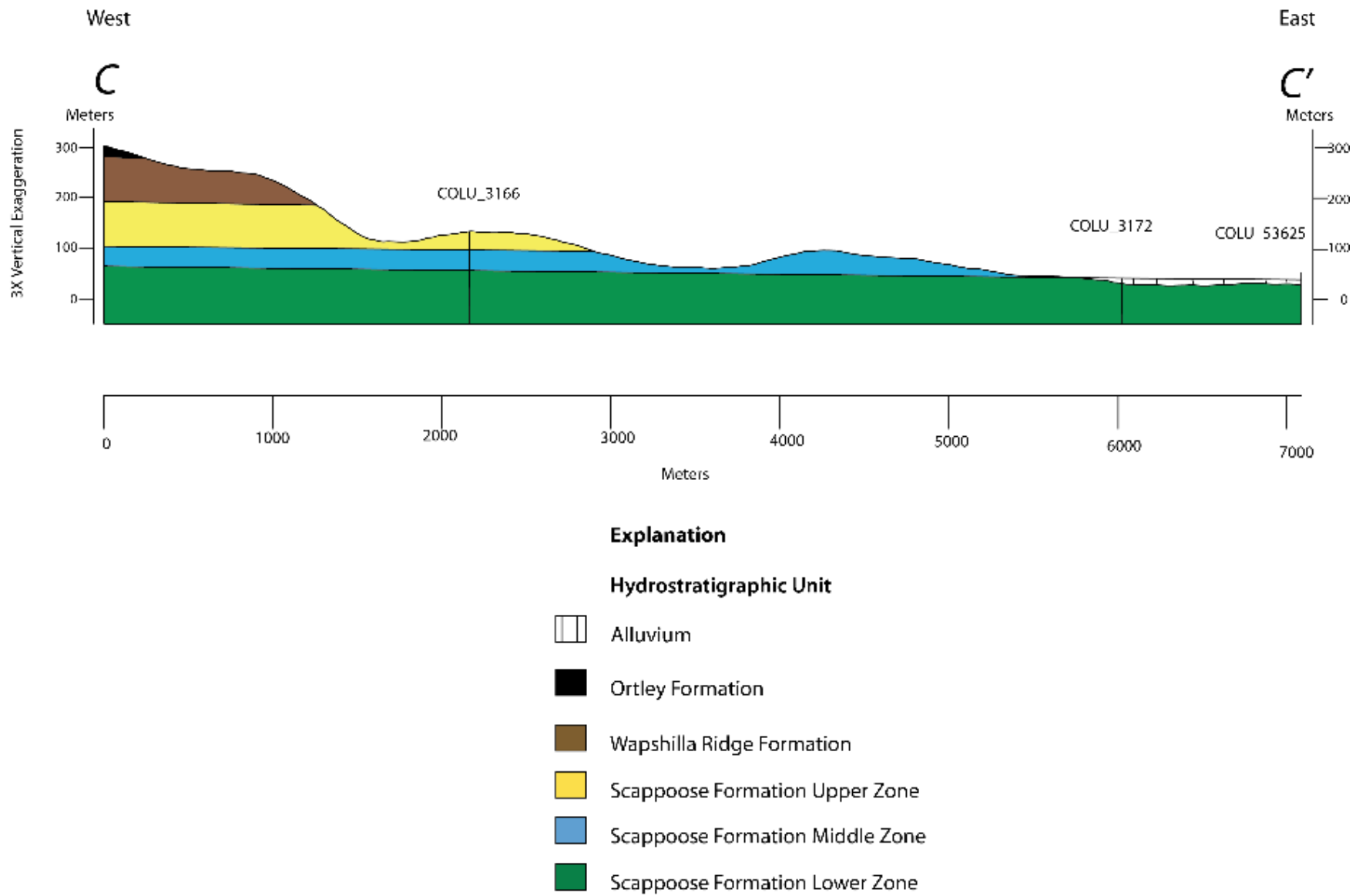
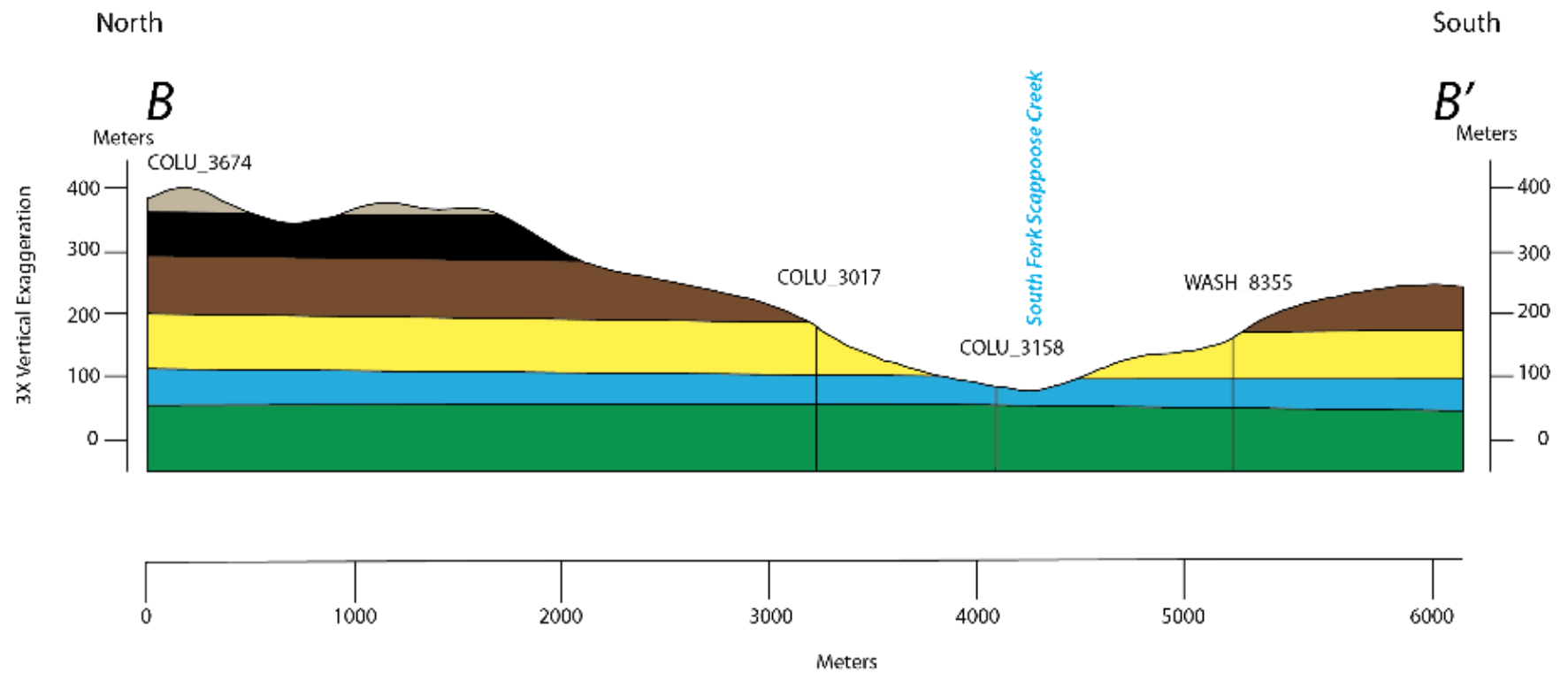


Figure 3: Cross Section C

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Explanation

Hydrostratigraphic Unit

- | | |
|---|---|
|  Winter Water Formation |  Scappoose Formation Upper Zone |
|  Ortleay Formation |  Scappoose Formation Middle Zone |
|  Wapshilla Ridge Formation |  Scappoose Formation Lower Zone |

Figure 4: Cross Section B

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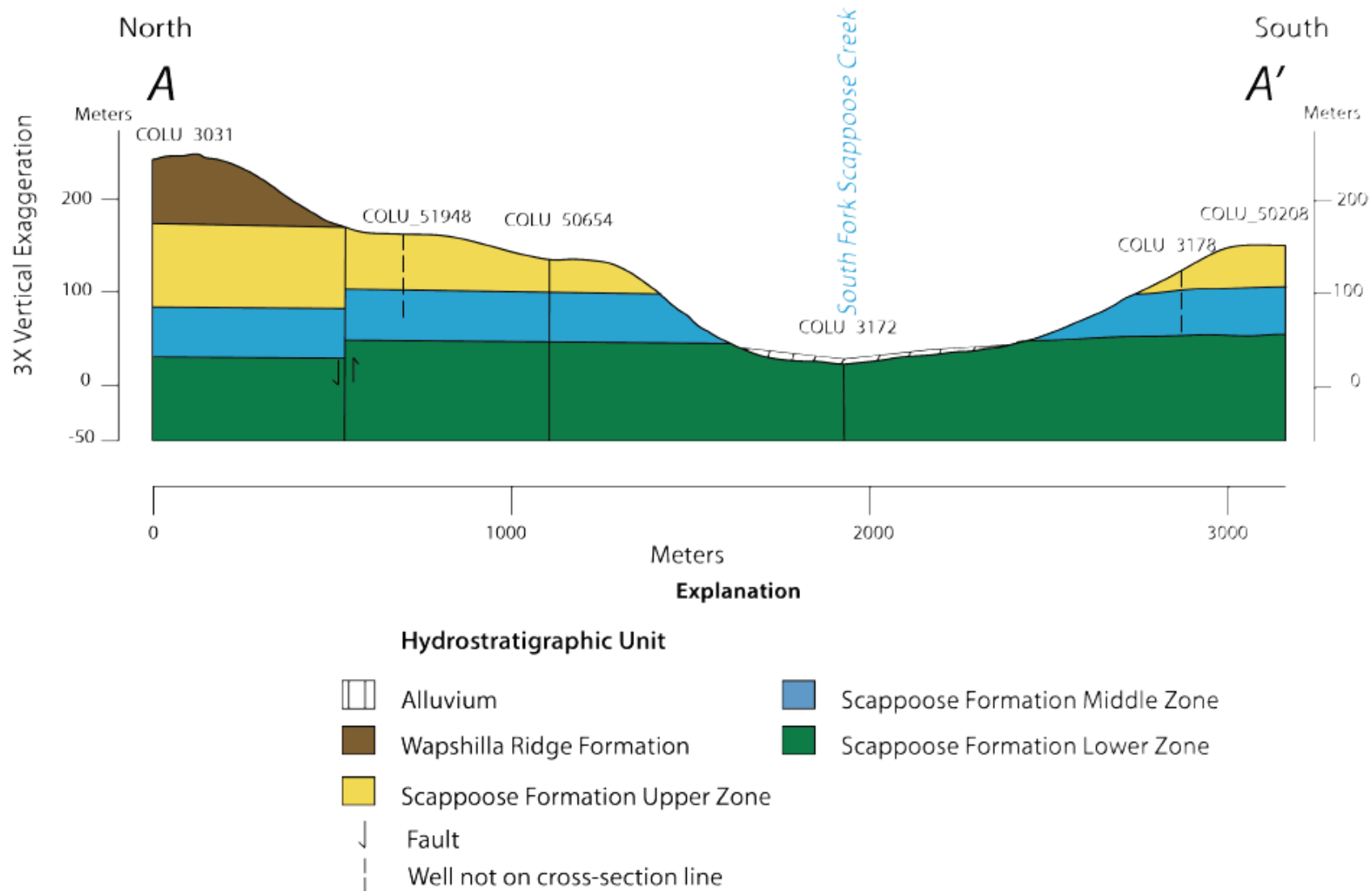


Figure 5: Cross Section A

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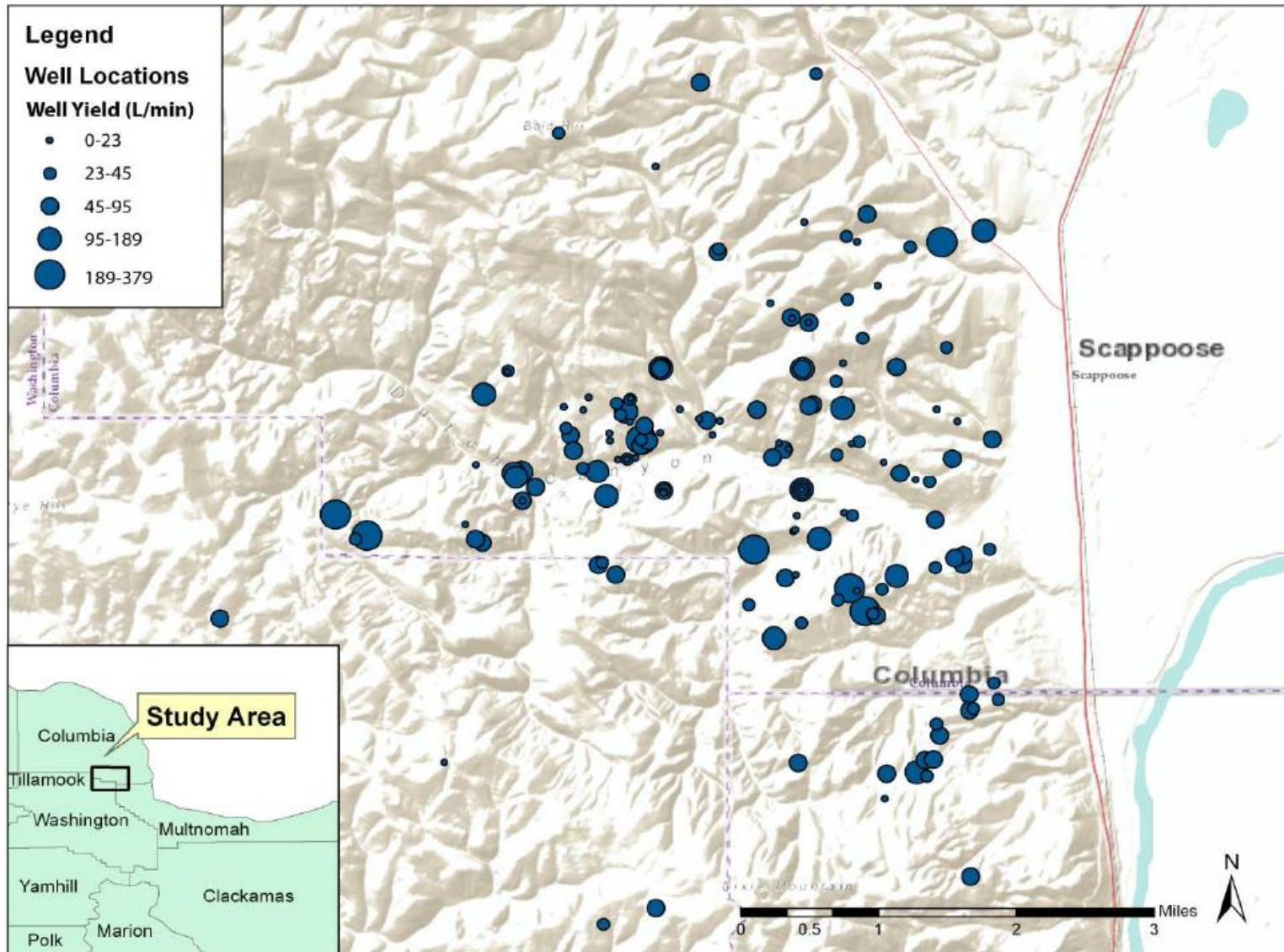


Figure 6: Locations of Wells

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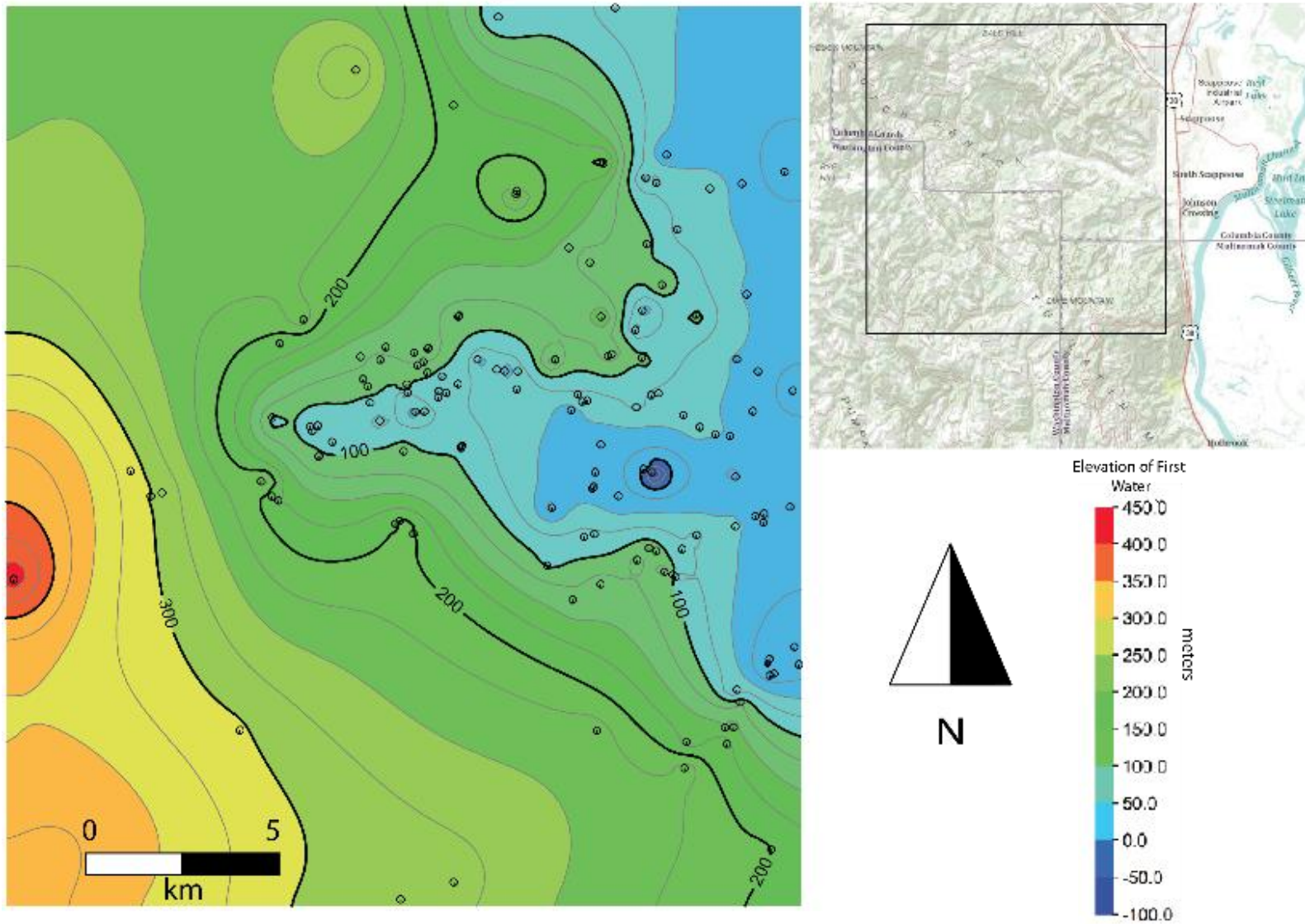


Figure 7: Elevation Map of "First Water" data