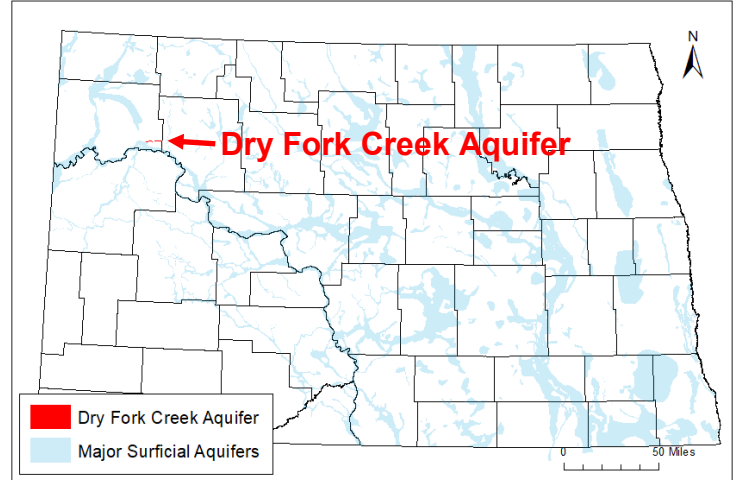


Dry Fork Creek Aquifer

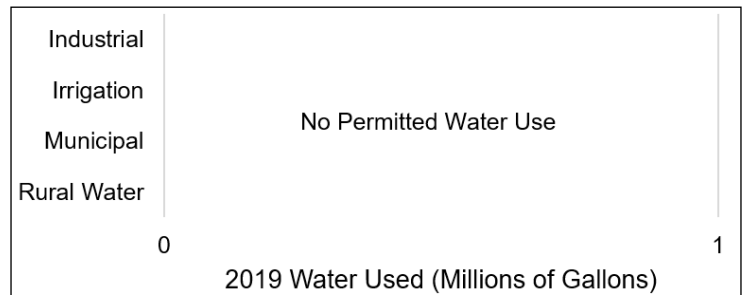
Williams County

Aquifer At-a-Glance	
Area	3.6 square miles
Aquifer Type	Confined Surficial
Major Land Uses over Aquifer (percentage of aquifer area covered in 2017) ¹	Crops (52%) Grassland/Pasture (26%)
Depth to Water (2013-2018)*	17+ feet
Total Unique Wells Sampled	1
Wells Sampled in 2018	1
Years Sampled	2013, 2016, 2017, 2018

*Depths to water may vary seasonally, year to year, and across the aquifer



2019 Dry Fork Creek aquifer permitted water use (from North Dakota State Water Commission (swc.nd.gov)) ↓



- This aquifer has not been sampled since 2018 because of damage to the monitored well.
- Aquifer materials consist of sands and gravels. The western part of the aquifer includes layers of silt and clay that may reach over 30 feet thick. The aquifer is overlain by a layer of clay that increases in thickness from 30 feet in the west to 100 feet in the east.²
- The aquifer ranges from 80 feet thick in the west to absent in the east.²
- Several domestic and stock wells are installed in the aquifer.
- In North Dakota, permits are required to withdraw large quantities of groundwater. In 2019, no permitted water was drawn from the aquifer. For more information on water use and permits, contact the North Dakota State Water Commission (swc.nd.gov).

About the Western Groundwater Monitoring Program

- The North Dakota Department of Environmental Quality (NDDEQ) monitors a network of wells in approximately 20 surficial aquifers that are at elevated risk of oilfield contamination.
- Aquifers are sampled on a 1.5-year rotation.
- Monitoring began in 2013.
- The monitored aquifers are all within the oil-producing counties of northwestern North Dakota.
- Water is tested for general chemistry parameters, trace metals, diesel and gasoline range organics, benzene, toluene, ethylbenzene, and xylenes.

References

- (1) US Department of Agriculture, 2017, National Agricultural Statistics Service Cropland Data Layer.
- (2) North Dakota State Water Commission, 2018, Written communication.

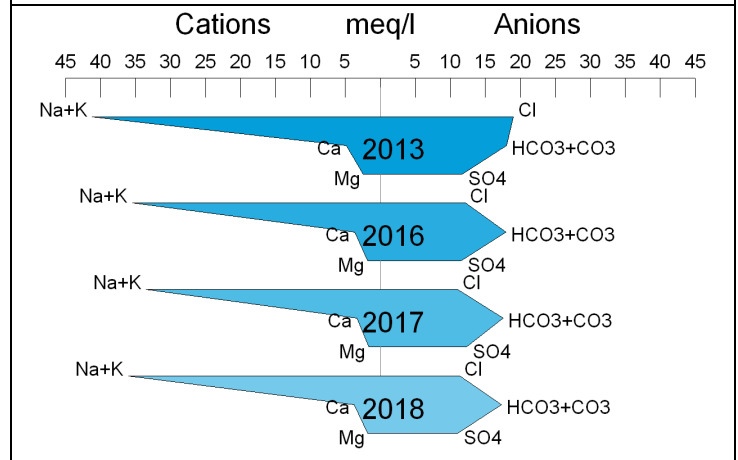
Water Chemistry

Is Aquifer Water High in...?	Analyte	Result	2018 Median Concentration	Potential Effects
	Arsenic	Locally	0.005 mg/L	Skin or circulatory system damage, increased cancer risk
	Iron	YES	2.59 mg/L	Metallic taste/odor, discoloration of surfaces
	Manganese	YES	0.10 mg/L	
	Sodium	YES	813 mg/L	Taste, people with certain health conditions may need to limit intake
	Sulfate	YES	529 mg/L	Taste/odor, laxative effect for people not used to the water
For more information about Maximum Contaminant Levels (MCLs), health effects, and treatment options for these contaminants and more, see the NDDEQ's fact sheets (deq.nd.gov/wq/1_Groundwater) or visit the US EPA website (epa.gov/ground-water-and-drinking-water).				

Dominant Water Type	Water Hardness
Sodium-Bicarbonate	Very Hard

Nitrate
<i>Percentage of Wells Exceeding the Nitrate Maximum Contaminant Level (MCL)* (10 mg/L as N).</i>
No Nitrate MCL Exceedances

Stiff diagram of aquifer median general water chemistry.
Changes in diagram shape represent changes in general chemistry.



Oilfield Compounds

Gasoline and Diesel Range Organics	
Gasoline and diesel range organics (GRO and DRO) are groups of chemical compounds containing carbon that are common in either gasoline or diesel fuel. Neither group has a regulatory limit, but the NDDEQ uses a screening level of 500 µg/L. Detections below this may be from other natural carbon sources such as decaying plant matter rather than oil byproducts.	
GRO Screening Level Exceedances	None
DRO Screening Level Exceedances	None

BTEX	
Benzene, toluene, ethylbenzene, and xylenes (BTEX) are a group of compounds that are naturally occurring in petroleum. All four have Maximum Contaminant Levels (MCLs)* that can be used as screening levels to determine the severity of any detection.	
Benzene Detections	None
Toluene Detections	None
Ethylbenzene Detections	None
Xylenes Detections	None

Chloride	
Chloride is both a natural component of groundwater and a component of brine (salt water), a byproduct of oil production.	
<i>Percentage of Wells Exceeding the Non-regulatory Chloride Secondary Water Quality Standard (250 mg/L).</i>	
0 20 40 60 80 100	
2013	1 of 1 Wells
2016	1 of 1 Wells
2017	1 of 1 Wells
2018	1 of 1 Wells

Bromide	
Bromide is a natural component of groundwater and can also be introduced through oil and gas extraction.	
Wells Exceeding NDDEQ's 3-5 mg/L Screening Level:	None

*Note that MCLs are for public drinking water systems; private wells are not regulated in North Dakota. MCLs still provide guidelines for drinking groundwater.

Feel free to use this information, but please credit the North Dakota Department of Environmental Quality.