

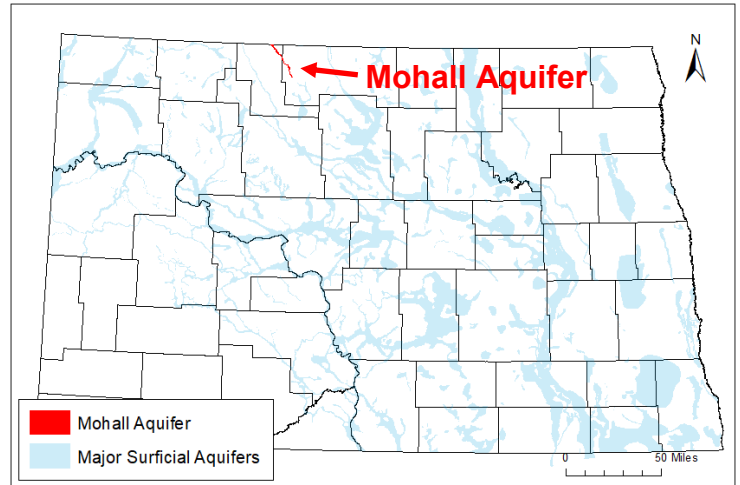
# Mohall Aquifer

## Bottineau and Renville Counties

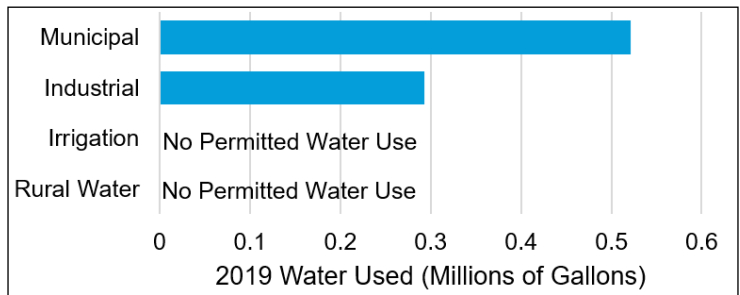
Aquifer At-a-Glance	
Area	14.1 square miles
Aquifer Type	Unconfined Surficial
Major Land Uses over Aquifer (percentage of aquifer area covered in 2017) <sup>1</sup>	Open Water/Wetlands (62%) Crops (25%)
Depth to Water* <sup>2</sup>	1-15 feet
Total Unique Wells Sampled	1
Wells Sampled in 2017	1
Years Sampled	2014, 2016, 2017

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

- This aquifer has not been sampled since 2017 because of damage to the monitored well.
- Aquifer materials consist of sands and gravels deposited by streams carrying meltwater away from glaciers during the last ice age. The aquifer is located in the Cut Bank Creek valley.<sup>2</sup>
- Aquifers in stream valleys in Bottineau County typically range from 3 to 61 feet thick and average around 15 feet thick.<sup>2</sup>
- Several domestic and stock wells are installed in the aquifer.
- The city of Mohall draws water from the aquifer.
- In North Dakota, permits are required to withdraw large quantities of groundwater. In 2019, 815 thousand gallons of permitted water were drawn from the aquifer; municipal use consumed the largest quantity of water. For more information on water use and permits, contact the North Dakota State Water Commission ([swc.nd.gov](http://swc.nd.gov)).



2019 Mohall aquifer permitted water use (from North Dakota State Water Commission ([swc.nd.gov](http://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) Randich, P.G. & Kuzniar, R.L., 1984, Ground-Water Resources of Bottineau and Rolette Counties, North Dakota, North Dakota State Water Commission County Ground-Water Studies 35-Part 3, North Dakota Geological Survey Bulletin 78.

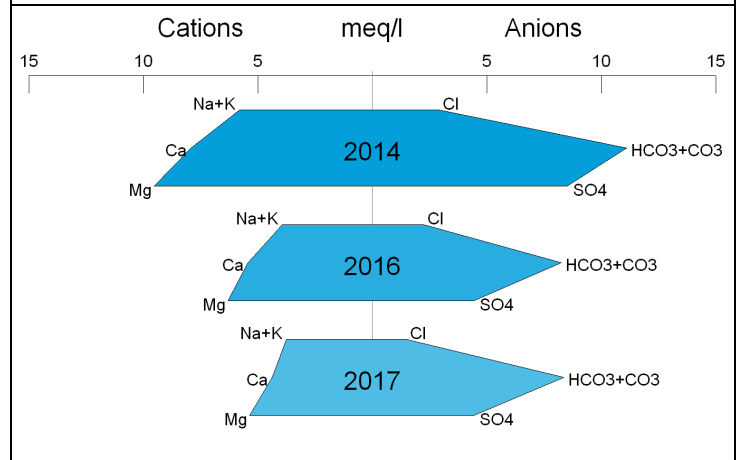
# Water Chemistry

<b>Is Aquifer Water High in...?</b>	Analyte	Result	2017 Median Concentration	Potential Effects
	<b>Arsenic</b>	<b>Locally</b>	0.005 mg/L	Skin or circulatory system damage, increased cancer risk
	<b>Iron</b>	<b>YES</b>	4.64 mg/L	Metallic taste/odor, discoloration of surfaces
	<b>Manganese</b>	<b>YES</b>	0.94 mg/L	
	<b>Sodium</b>	<b>Locally</b>	73.9 mg/L	Taste, people with certain health conditions may need to limit intake
	<b>Sulfate</b>	<b>Locally</b>	213 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 ( <a href="http://deq.nd.gov/wq/1_Groundwater">deq.nd.gov/wq/1_Groundwater</a> ) or visit the US EPA website ( <a href="http://epa.gov/ground-water-and-drinking-water">epa.gov/ground-water-and-drinking-water</a> ).				

Dominant Water Type	Water Hardness
Magnesium-Bicarbonate	Very Hard

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

**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.	
<b>GRO Screening Level Exceedances</b>	<b>None</b>
<b>DRO Screening Level Exceedances</b>	<b>None</b>

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>	
<b>No Chloride Standard Exceedances</b>	

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.	
<b>Benzene Detections</b>	<b>None</b>
<b>Toluene Detections</b>	<b>None</b>
<b>Ethylbenzene Detections</b>	<b>None</b>
<b>Xylenes Detections</b>	<b>None</b>

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

\*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.**