NORTH Dakota | Environmental Quality

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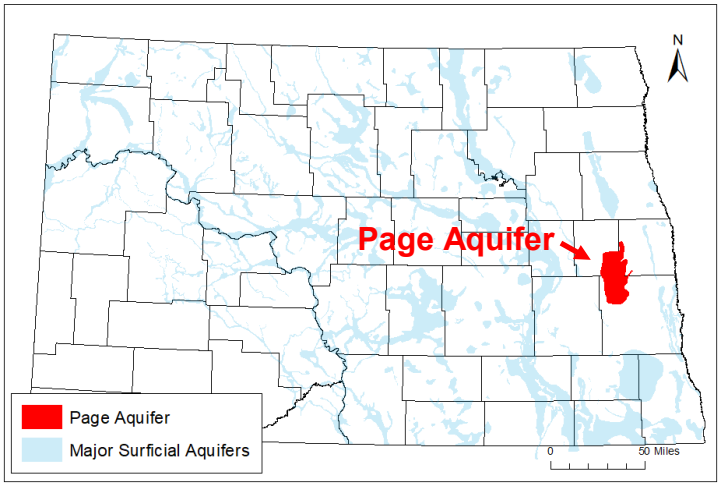
Agricultural Groundwater Monitoring Program

Page Aquifer

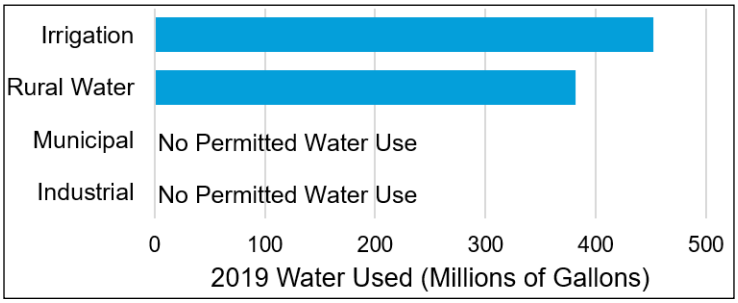
Cass, Steele, and Traill Counties

Aquifer At-a-Glance	
Area	352.4 square miles
Aquifer Type	Unconfined and Confined Surficial
Major Land Uses over Aquifer (percentage of aquifer area covered in 2017)[1]	Crops (87%) Developed (4%)
Depth to Water (2017)*	3-60 feet
Total Unique Wells Sampled	94
Wells Sampled in 2017	56
Samples Collected in 2017	66
Years Sampled	1994, 1999, 2004, 2009, 2014, 2017

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



2019 Page aquifer permitted water use (from North Dakota State Water Commission (swc.nd.gov))



- Aquifer materials consist sands and gravels that were deposited in two layers separated by glacially-deposited clay till. Both layers were deposited as part of a delta for a river carrying meltwater away from glaciers during the last ice age. Most of the aquifer is buried under 9-80 feet of clay till.[2,3]
- The aquifer ranges from 1-400 feet thick and averages about 30 feet thick in Cass County and 43 feet thick in Steele County.[2,3]
- Domestic, irrigation, and stock wells are common in the aquifer.
- The Cass Rural Water District and Traill Rural Water District rural water systems draw water from the aquifer.
- In North Dakota, permits are required to withdraw large quantities of groundwater. In 2019, 833 million gallons of permitted water were drawn from the aquifer; irrigation 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).

References

(1) US Department of Agriculture, 2017, National Agricultural Statistics Service Cropland Data Layer.

(2) Downey, J.S. & Armstrong, C.A., 1977, Ground-Water Resources of Griggs and Steele Counties, North Dakota, North Dakota State Water Commission County Ground-Water Studies 21-Part 3, North Dakota Geological Survey Bulletin 64.

(3) Klausing, R.L., 1968, Geology and Ground Water Resources of Cass County, North Dakota, North Dakota State Water Commission County Ground-Water Studies 8-Part 3, North Dakota Geological Survey Bulletin 47.

About the Agricultural Groundwater Monitoring Program

- The North Dakota Department of Environmental Quality monitors a network of wells in approximately 50 surficial aquifers that are at elevated risk of agricultural contamination.
- Aquifers are sampled on a 5-year rotation.
- Monitoring began in 1992.
- The vast majority of these aquifers are located in central and eastern North Dakota.
- Water is tested for 21 general chemistry parameters, eight trace metals, and 64 pesticides.

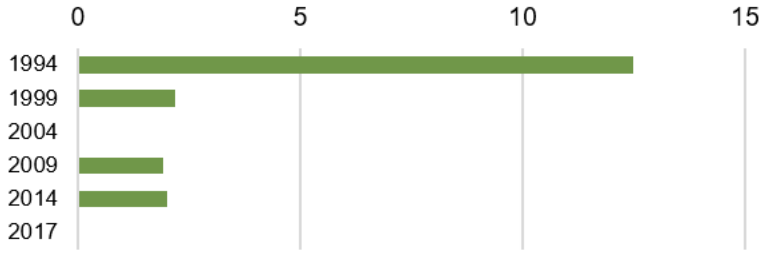
Water Chemistry

Is Aquifer Water High in…?	Analyte	Result	2017 Median Concentration	Potential Effects
	Arsenic	YES	0.021 mg/L	Skin or circulatory system damage, increased cancer risk
	Iron	YES	1.49 mg/L	Metallic taste/odor, discoloration of surfaces
	Manganese	YES	1.17 mg/L	
	Sodium	NO	20.1 mg/L	Taste, people with certain health conditions may need to limit intake
	Sulfate	NO	212 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
Calcium-Bicarbonate	Very Hard

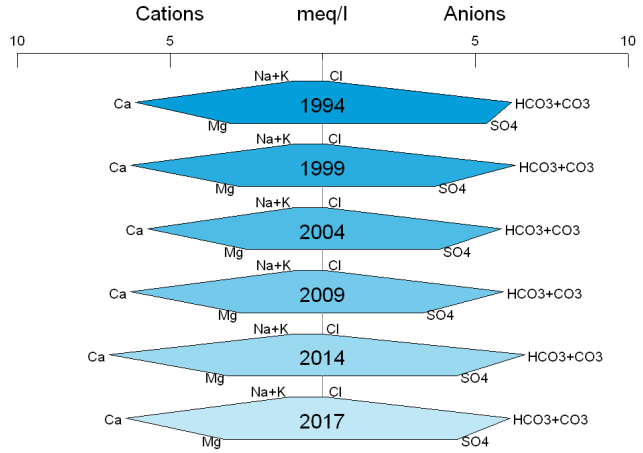
Nitrate

Percentage of Wells Exceeding the Nitrate Maximum Contaminant Level (MCL) (10 mg/L as N).*



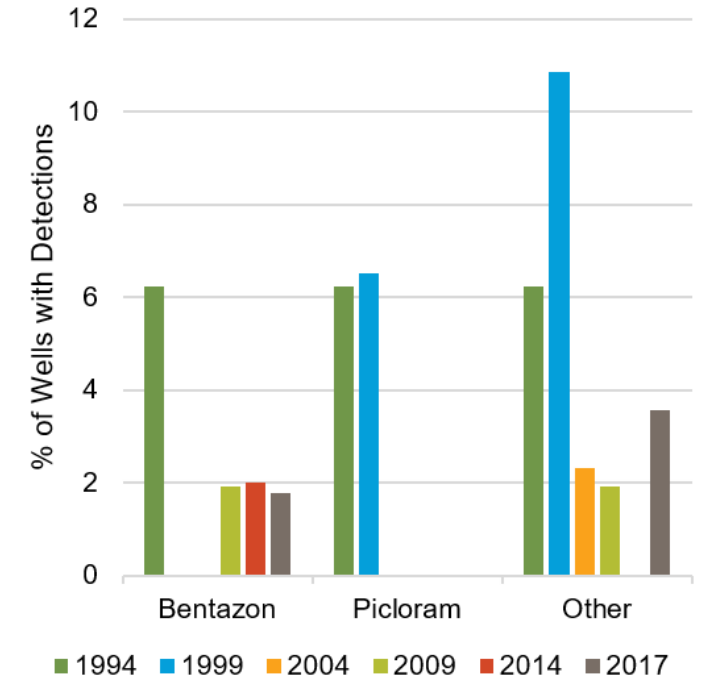
Stiff diagram of aquifer median general water chemistry.

Changes in diagram shape represent changes in general chemistry.



Pesticides

Percentage of wells with detections of each pesticide detected in the aquifer.



State Pesticide Management Plan

Agricultural Groundwater Monitoring Program aquifers are monitored as a part of the State Pesticide Management Plan. A Prevention Action Level (PAL) threshold of 25% of the pesticide's Maximum Contaminant Level (MCL)* or Health Advisory Level (HAL) is used to identify whether action is needed to prevent further contamination.

Prevention Action Level Exceedances	**Bentazon** at 27% of HAL in 2009; not detected in 2009 resample. Detected in same well at 31% of HAL in 2014, not detected above the PAL in any later samples.
MCL or HAL Exceedances	None

Number of Unique Wells with Pesticide Detections since 1994	**10** of 94 Total Wells

2017 Pesticide Detections

Bentazon	1 Well	Herbicide applied to crops
Carbaryl	1 Well	Insecticide applied to crops
Dicamba	1 Well	Herbicide applied to crops

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