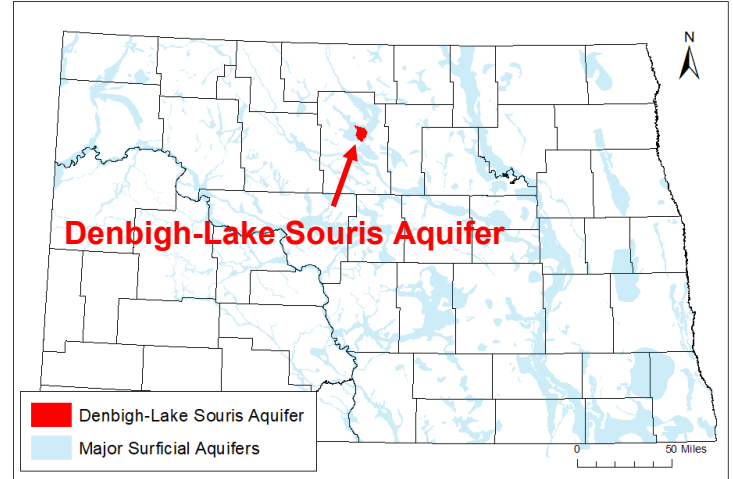


Denbigh-Lake Souris Aquifer

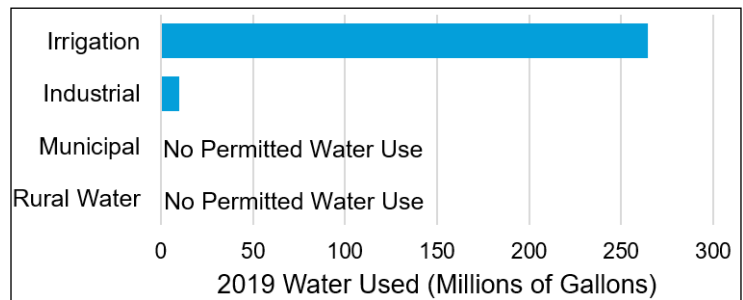
McHenry County

Aquifer At-a-Glance	
Area	34.9 square miles
Aquifer Type	Unconfined Surficial
Major Land Uses over Aquifer (percentage of aquifer area covered in 2017) ¹	Grassland/Pasture (67%) Crops (17%)
Depth to Water (2018)*	5-15 feet
Total Unique Wells Sampled	14
Wells Sampled in 2018	10
Samples Collected in 2018	17
Years Sampled	1993, 1998, 2003, 2008, 2013, 2018

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



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



- The Denbigh-Lake Souris aquifer is part of the Denbigh aquifer system. Aquifer system deposits consist of sands and gravel that were left behind by Glacial Lake Souris. This lake formed during the latter years of the last ice age as meltwater pooled behind retreating glaciers. Some aquifer system deposits are remnants of a buried ancient stream channel.²
- The Denbigh aquifer system ranges from 14-81 feet thick and averages about 40 feet thick.²
- Domestic, irrigation, and stock wells are installed in the aquifer. Irrigation is concentrated in the central part of the aquifer.
- In North Dakota, permits are required to withdraw large quantities of groundwater. In 2019, 275 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).

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.

References

- (1) US Department of Agriculture, 2017, National Agricultural Statistics Service Cropland Data Layer.
- (2) Randich, P.G., 1981, Ground-Water Resources of McHenry County, North Dakota, North Dakota State Water Commission County Ground-Water Studies 33-Part 3, North Dakota Geological Survey Bulletin 74.

Water Chemistry

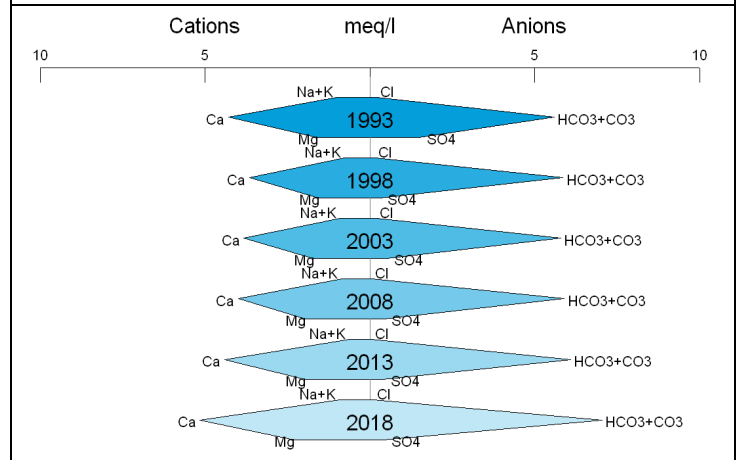
Is Aquifer Water High in...?	Analyte	Result	2018 Median Concentration	Potential Effects
	Arsenic	YES	0.010 mg/L	Skin or circulatory system damage, increased cancer risk
	Iron	YES	8.22 mg/L	Metallic taste/odor, discoloration of surfaces
	Manganese	YES	0.31 mg/L	
	Sodium	NO	19.6 mg/L	Taste, people with certain health conditions may need to limit intake
	Sulfate	NO	19.7 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).

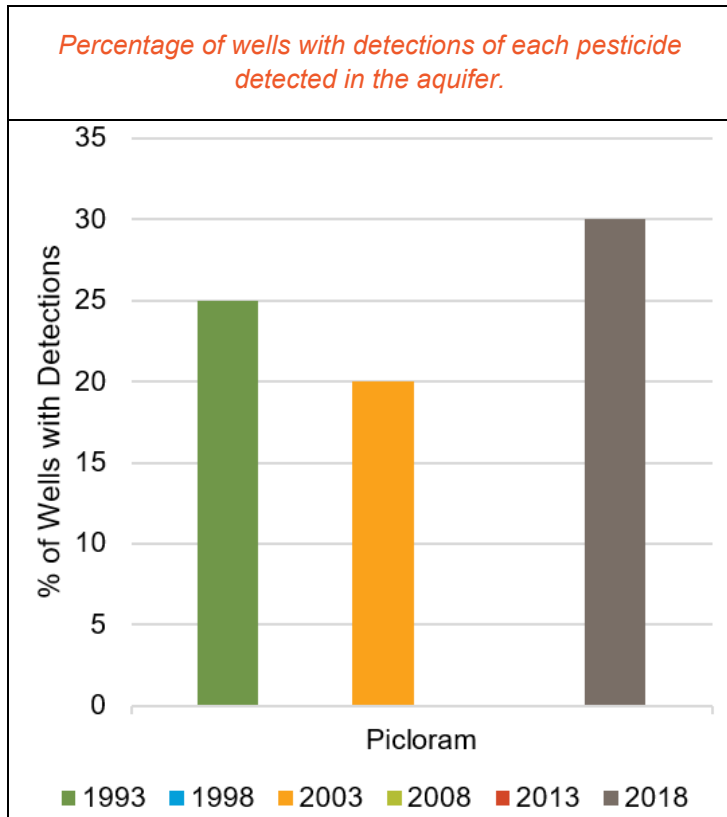
Dominant Water Type	Water Hardness
Calcium-Bicarbonate	Very Hard

Nitrate
<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.



Pesticides



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	None
MCL or HAL Exceedances	None

Number of Unique Wells with Pesticide Detections since 1993	4 of 14 Total Wells
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2018 Pesticide Detections

Picloram	3 Wells	Herbicide applied to crops and roads/rights-of-way
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*Note that MCLs are for public drinking water systems; private wells are not regulated in North Dakota. MCLs still provide guidelines for drinking groundwater.