

Pembina River Aquifer

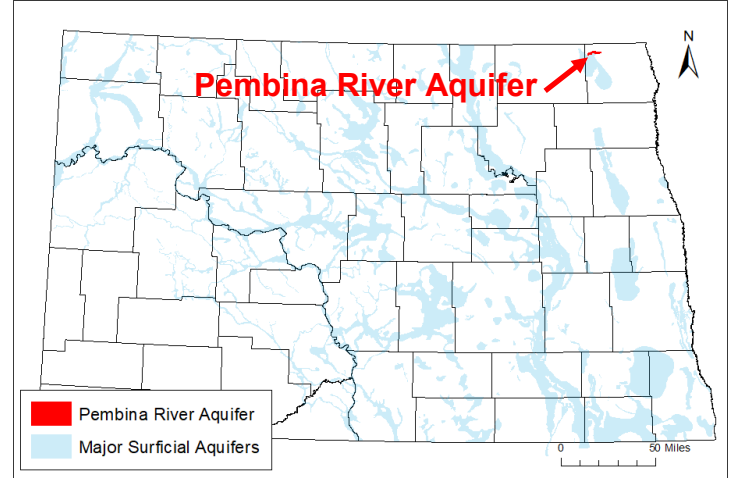
Pembina County

Aquifer At-a-Glance

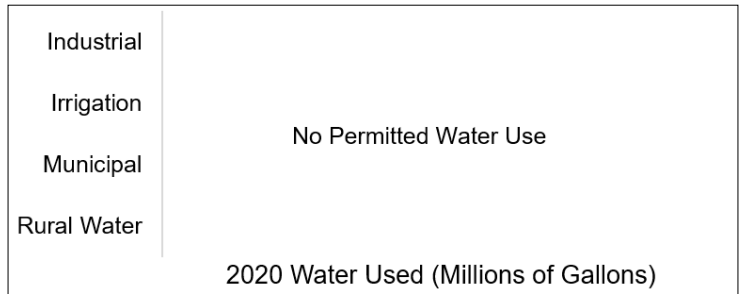
Area	9.6 square miles
Aquifer Type	Unconfined and Confined Surficial
Major Land Uses over Aquifer (percentage of aquifer area covered in 2017) ¹	Crops (48%) Open Water/Wetlands (39%)
Depth to Water (2021)*	5-20 feet
Total Unique Wells Sampled	10
Wells Sampled in 2021	5
Samples Collected in 2021	6
Years Sampled	1996, 2001, 2006, 2011, 2016, 2021

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

- Aquifer materials consist of sands and silts that were deposited by an earlier version of the Pembina River that had greater streamflow. Much of the aquifer is confined by a layer of silt at the top.²
- The aquifer is up to 35 feet thick and averages about 20 feet thick.²
- Domestic and stock wells are installed in the aquifer.
- In North Dakota, permits are required to withdraw large quantities of groundwater. In 2020, no permitted water was drawn from the aquifer. For more information on water use and permits, contact the North Dakota Department of Water Resources (dwr.nd.gov).



2020 Pembina River aquifer permitted water use (from North Dakota Department of Water Resources (dwr.nd.gov))↓



About the Agricultural Ambient 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.

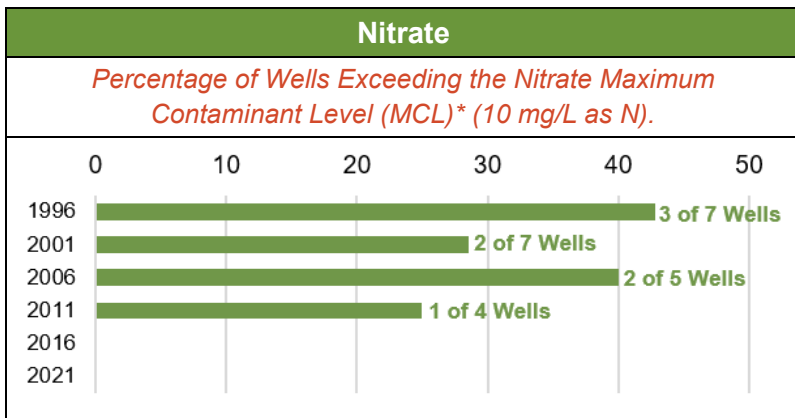
References

- (1) US Department of Agriculture, 2017, National Agricultural Statistics Service Cropland Data Layer.
- (2) Hutchinson, R.D., 1977, Ground-Water Resources of Cavalier and Pembina Counties, North Dakota, North Dakota State Water Commission County Ground-Water Studies 20-Part 3, North Dakota Geological Survey Bulletin 62.

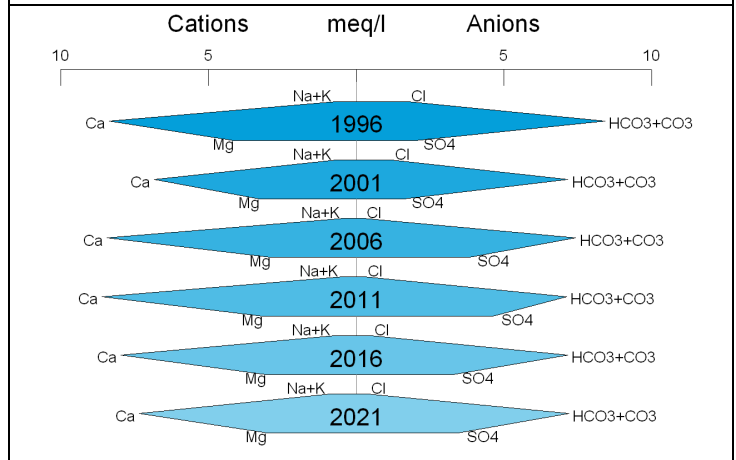
Water Chemistry

Is Aquifer Water High in...?	Analyte	Result	2021 Median Concentration	Potential Effects
	Arsenic	Locally	< 0.005 mg/L	Skin or circulatory system damage, increased cancer risk
	Iron	YES	0.73 mg/L	Metallic taste/odor, discoloration of surfaces
	Manganese	YES	1.04 mg/L	
	Sodium	NO	17.9 mg/L	Taste, people with certain health conditions may need to limit intake
	Sulfate	NO	166 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).				

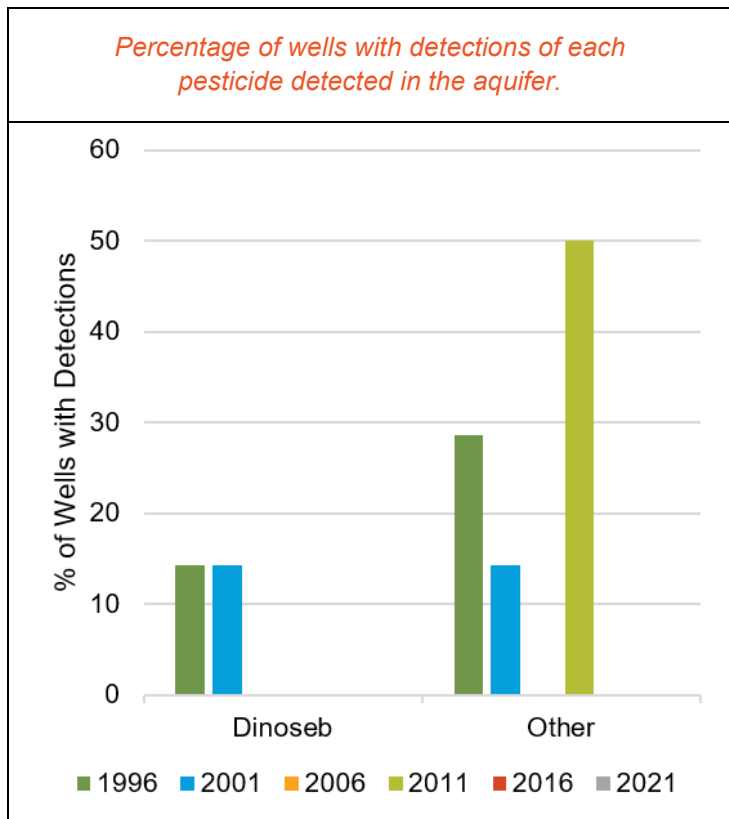
Dominant Water Type	Water Hardness
Calcium-Bicarbonate	Very Hard



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	Dinoseb at 90% of MCL in 2001; not detected above PAL in later samples
MCL or HAL Exceedances	Dinoseb at 257% of MCL in 1996; not detected in 1997 resample

Number of Unique Wells with Pesticide Detections since 1996	4 of 10 Total Wells
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2021 Pesticide Detections

No Pesticide Detections

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