

# Shell Valley Aquifer

## Rolette County

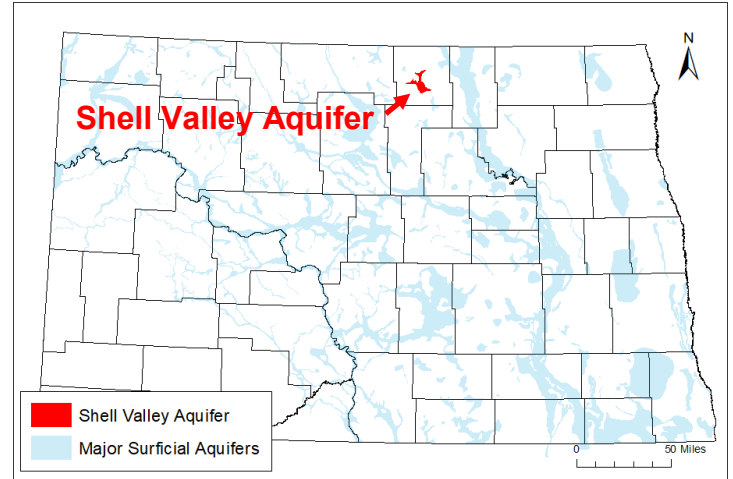
Aquifer At-a-Glance	
Area	47.1 square miles
Aquifer Type	Unconfined and Confined Surficial
Major Land Uses over Aquifer (percentage of aquifer area covered in 2017)	Crops (39%) Grassland/Pasture (35%)
Depth to Water (2018)*	3-15 feet
Total Unique Wells Sampled	33
Wells Sampled in 2018	13
Samples Collected in 2018	15
Years Sampled	1993, 1998, 2003, 2008, 2013, 2018

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

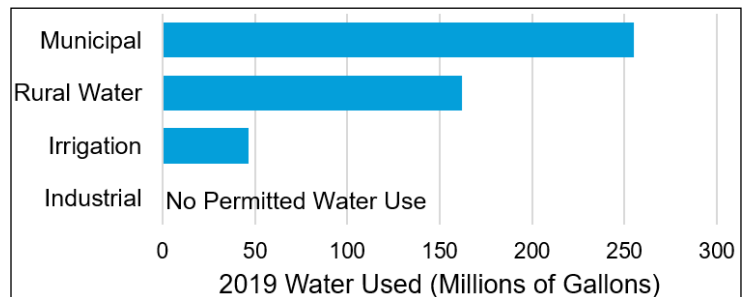
- Aquifer materials consist of sands and gravels that were deposited by streams moving meltwater away from glaciers in the last ice age. Some small, scattered areas of the aquifer are overlain by a layer of glacially-deposited clay till.<sup>2</sup>
- The aquifer ranges from 6-117 feet thick and averages 35 feet thick.<sup>2</sup>
- Several irrigation and domestic wells are installed in the aquifer.
- The city of Rolette, the Turtle Mountain Band of Chippewa, and the All Seasons Water Users District rural water system draw water from the Shell Valley aquifer.
- In North Dakota, permits are required to withdraw large quantities of groundwater. In 2019, 464 million 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)).

#### 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.



2019 Shell Valley aquifer permitted water use (from North Dakota State Water Commission ([swc.nd.gov](http://swc.nd.gov)))↓



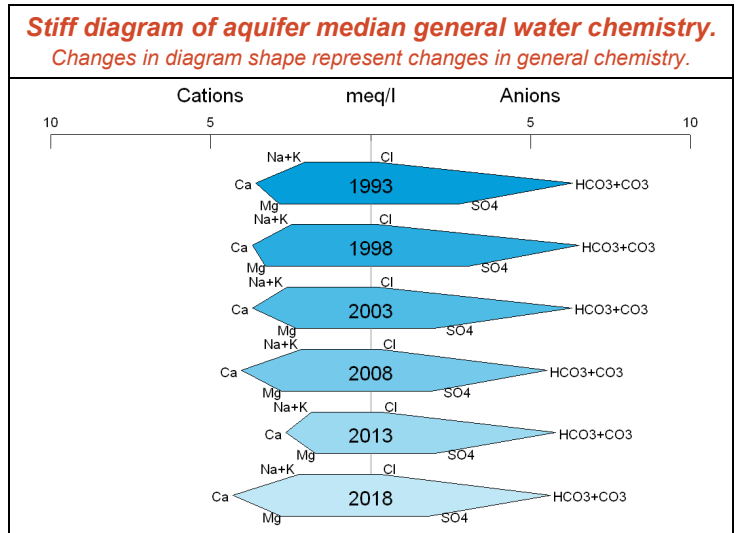
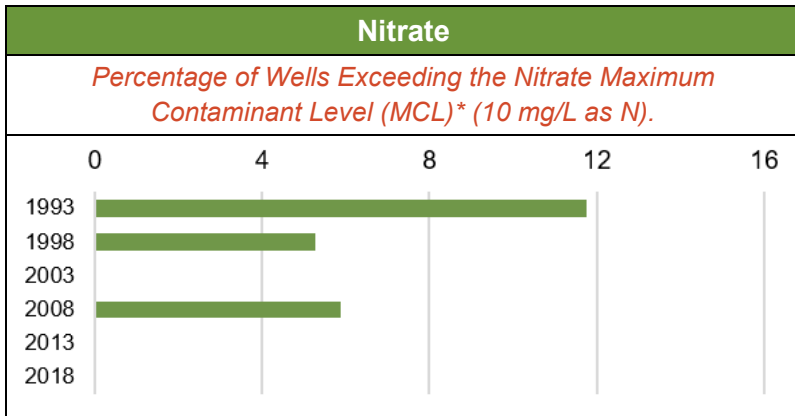
## About the Agricultural Groundwater Monitoring Program

- 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.

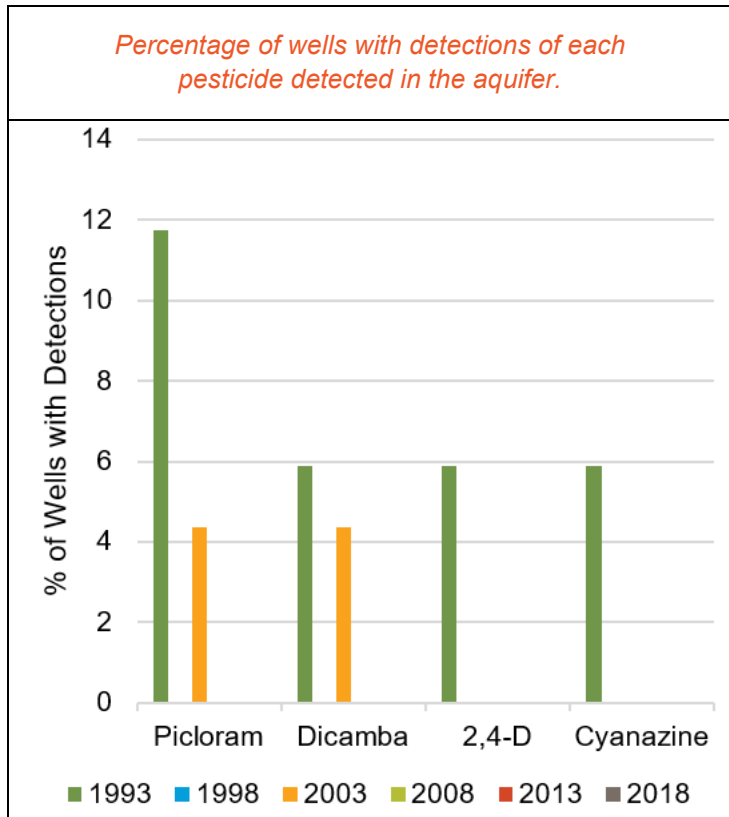
# Water Chemistry

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	4.98 mg/L	Metallic taste/odor, discoloration of surfaces
	Manganese	YES	0.42 mg/L	
	Sodium	NO	48.9 mg/L	Taste, people with certain health conditions may need to limit intake
	Sulfate	NO	86.8 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
Calcium-Bicarbonate	Very Hard



# 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.	
<b>Prevention Action Level Exceedances</b>	<b>2,4-D</b> at 35% of MCL in 1993; Not detected in 1994 resample.
<b>MCL or HAL Exceedances</b>	<b>None</b>

<b>Number of Unique Wells with Pesticide Detections since 1993</b>	<b>4</b> of 33 Total Wells
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2018 Pesticide Detections
<b>No Pesticide Detections</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.

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