NORTH Dakota | Environmental Quality

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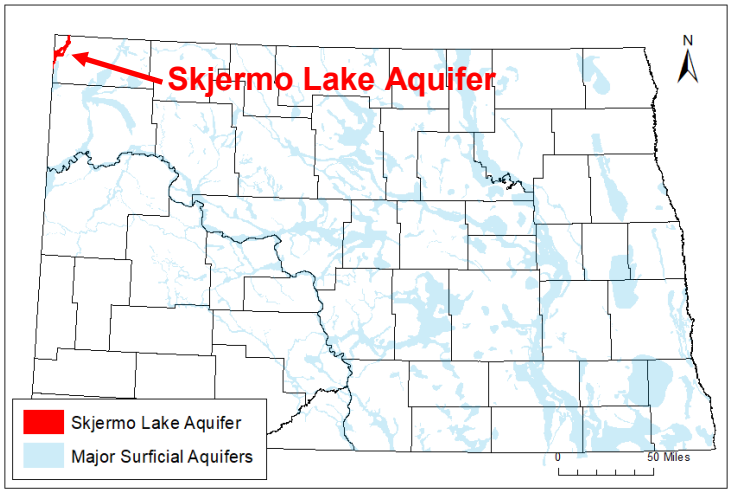
Western Groundwater Monitoring Program

Skjermo Lake Aquifer

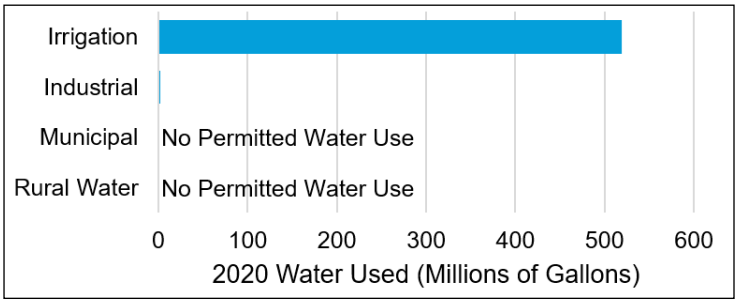
Divide County

Aquifer At-a-Glance	
Area	42.0 square miles
Aquifer Type	Unconfined and Confined Surficial
Major Land Uses over Aquifer (percentage of aquifer area covered in 2017)[1]	Grassland/Pasture (50%) Crops (37%)
Depth to Water (2021)*	4-70 feet
Total Unique Wells Sampled	6
Wells Sampled in 2021	6
Years Sampled	2014/2015, 2016, 2018, 2019, 2021
*Depths to water may vary seasonally, year to year, and across the aquifer	

- Materials in the upper part of the aquifer consist of sands and gravels that were deposited by streams carrying meltwater away from glaciers during the last ice age. Below this layer is another sand and gravel layer deposited as terraces along ancient streams. The aquifer is unconfined in its northern part, but the southern part may be confined by 15 or more feet of clay.[2]
- The aquifer ranges from one to over 100 feet thick and averages around 66 feet thick.[2]
- Domestic, stock, and irrigation wells are common in the aquifer. Several industrial wells are also installed in the aquifer.
- In North Dakota, permits are required to withdraw large quantities of groundwater. In 2020, 521 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 Department of Water Resources (dwr.nd.gov).



2020 Skjermo Lake aquifer permitted water use (from North Dakota Department of Water Resources (dwr.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) Armstrong, C.A., 1967, Geology and Ground Water Resources of Divide County, North Dakota. North Dakota State Water Commission County Ground-Water Studies 6-Part 3, North Dakota Geological Survey Bulletin 45.

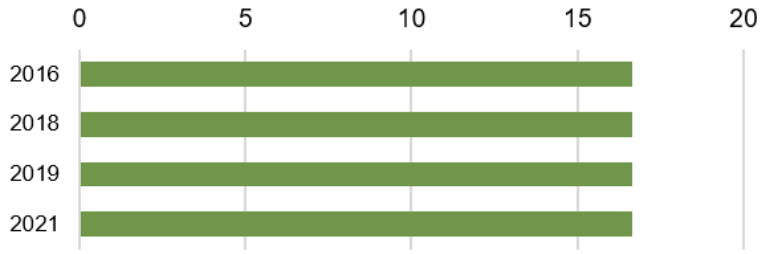
Water Chemistry

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**	1.36 mg/L	Metallic taste/odor, discoloration of surfaces
	Manganese	**YES**	0.49 mg/L	
	Sodium	**YES**	154 mg/L	Taste, people with certain health conditions may need to limit intake
	Sulfate	**YES**	570 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
Sodium-Magnesium-Sulfate	Very Hard

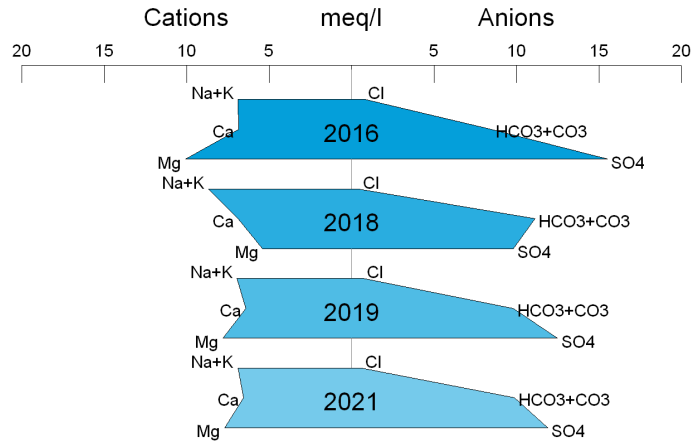
Nitrate

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.



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.

GRO Screening Level Exceedances	**None**
DRO Screening Level Exceedances	**None**

Chloride

Chloride is both a natural component of groundwater and a component of brine (salt water), a byproduct of oil production.

Percentage of Wells Exceeding the Non-regulatory Chloride Secondary Water Quality Standard (250 mg/L).

No Chloride Standard Exceedances

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.

Benzene Detections	**None**
Toluene Detections	**None**
Ethylbenzene Detections	**None**
Xylenes Detections	**None**

Bromide

Bromide is a natural component of groundwater and can also be introduced through oil and gas extraction.

Wells Exceeding NDDEQ's 3-5 mg/L Screening Level:	**None**

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