Missouri River Aquifer
Mercer, Morton, and Oliver Counties

- Aquifer materials consist of sands and gravels deposited by streams moving meltwater away from glaciers during the last ice age and more recent sands and gravels deposited by the Missouri River.²
- The aquifer is up to 200 feet thick.²
- Domestic wells are common in the aquifer. Irrigation and stock wells are also installed in the aquifer.
- The city of Bismarck and the South Central Regional Water District rural water system draw water from the aquifer.
- In North Dakota, permits are required to withdraw large quantities of groundwater. In 2019, 1.02 billion gallons of permitted water were drawn from the aquifer; rural water 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).

Aquifer At-a-Glance

<table>
<thead>
<tr>
<th>Area</th>
<th>96.5 square miles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aquifer Type</td>
<td>Unconfined Surficial</td>
</tr>
</tbody>
</table>
| Major Land Uses over Aquifer (percentage of aquifer area covered in 2017)¹ | Open Water/Wetlands (51%)  
Crops (26%) |
| Depth to Water* ² | 5-50 feet |
| Total Unique Wells Sampled | 17 |
| Wells Sampled in 2020 | 8 |
| Samples Collected in 2020 | 9 |

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

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

- Rural Water
- Municipal
- Irrigation
- Industrial

2019 Water Used (Millions of Gallons)

2019 Missouri River aquifer permitted water use (from 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.
- 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

Water Chemistry

<table>
<thead>
<tr>
<th>Analyte</th>
<th>Result</th>
<th>2020 Median Concentration</th>
<th>Potential Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arsenic</td>
<td>Locally</td>
<td>0.007 mg/L</td>
<td>Skin or circulatory system damage, increased cancer risk</td>
</tr>
<tr>
<td>Iron</td>
<td>YES</td>
<td>0.77 mg/L</td>
<td>Metallic taste/odor, discoloration of surfaces</td>
</tr>
<tr>
<td>Manganese</td>
<td>YES</td>
<td>0.14 mg/L</td>
<td>Taste, people with certain health conditions may need to limit intake</td>
</tr>
<tr>
<td>Sodium</td>
<td>YES</td>
<td>131 mg/L</td>
<td>Taste/odor, laxative effect for people not used to the water</td>
</tr>
<tr>
<td>Sulfate</td>
<td>NO</td>
<td>171 mg/L</td>
<td></td>
</tr>
</tbody>
</table>

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
- Sodium-Bicarbonate

### Water Hardness
- Very Hard

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

- **No Nitrate MCL Exceedances**

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#### 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 1995**: 1 of 17 Total Wells

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**2020 Pesticide Detections**
- **No Pesticide Detections**

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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. Feel free to use this information, but please credit the North Dakota Department of Environmental Quality.*