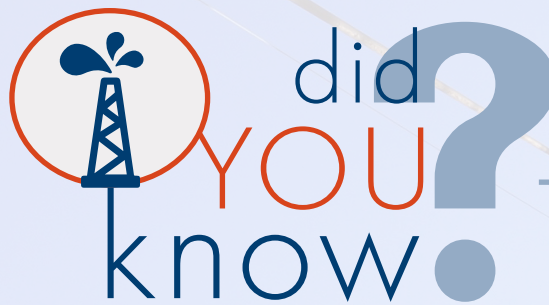


# NORTH DAKOTA HYDRAULIC FRACTURING & WATER USE

# FACTS



## ON AVERAGE

the hydraulic fracturing process in North Dakota uses approximately 26 acre-feet of water per well, which is equivalent to 201,717 barrels or 8,472,126 gallons of water.

## IN 2020

records indicated that 15,998 acre-feet of water was used for hydraulic fracturing purposes. That amounted to 4.3% of North Dakota's Consumptive water use in 2020. [Please note, the graphic on page 3 indicates 5.7%, which includes all industrial-water depot related uses.]

## ONE DAY

of the average daily flow of the Missouri River at Bismarck (45,104 acre-feet) is enough water to frack 1,734 wells.

## EVAPORATION

from Lake Sakakawea is, on average, 2,416 acre-feet per day, or enough to frack over 92 wells.

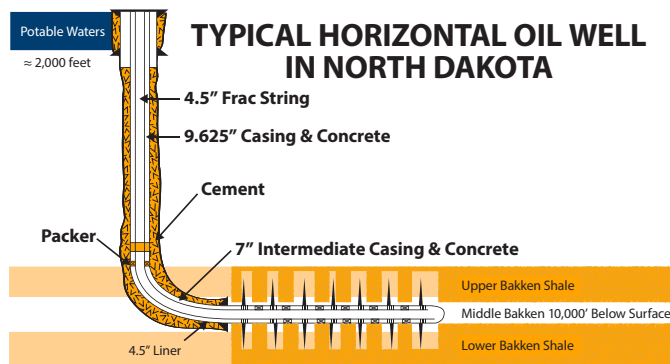
In response to ongoing growth of the energy industry, and the development of water dependent technologies that allow the capture of previously inaccessible oil, the public has expressed interest about how oil development may be affecting the availability of North Dakota's water resources.

This publication from the North Dakota Department of Water Resources (DWR) provides an overview of water use as it relates to hydraulic fracturing, and what that means for North Dakota.

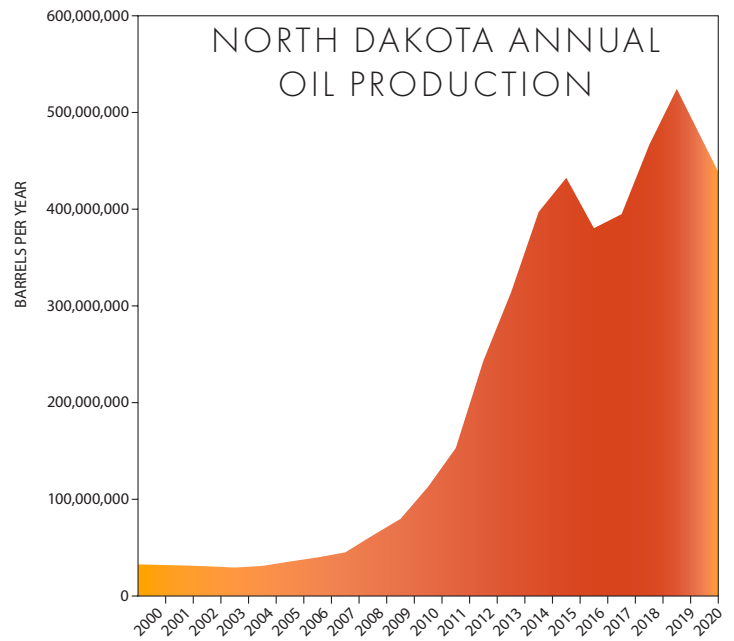
# ABOUT HYDRAULIC FRACTURING

Hydraulic fracturing for oil or gas, commonly called “fracking”, is a process where water and other materials are injected into oil-bearing formations of rock under high pressure, fracturing the rock, and releasing the oil. Oil wells of this type in North Dakota generally require approximately 26 acre-feet of fresh water for the drilling and hydraulic fracturing process, necessitating access to reliable water supplies. The effectiveness of fracking has allowed North Dakota to become a top three oil-producing State in the United States - behind only New Mexico (2) and Texas (1).

North Dakota has proven to have substantial deposits of oil-bearing rock suitable for fracking; currently in two rock formations, which are the Bakken and the Three Forks. Because the drilling process requires a fair amount of water to fracture the oil-bearing rock, both surface water and ground water sources have been used. Where ground water has been used, it has generally come from freshwater aquifers within two thousand feet of the surface. This water is managed by the Appropriation Division of the DWR. Some water for fracking comes from saline aquifers located between five and six thousand feet below the surface. The water in these saline aquifers has picked up a great deal of salts and other minerals from the surrounding rock, making the water unsuitable for human consumption, but useful for some types of fracking. Surface water is the preferred source, because the region



Even though hydraulic fracturing processes in North Dakota happen thousands of feet below potable water sources, many safety measures are implemented to protect ground water from contamination.



Oil production in North Dakota increased exponentially starting in 2007, due to the application of fracking technology. Source: ND Industrial Commission, Department of Mineral Resources, Oil & Gas Division.

where oil extraction is occurring contains the Missouri River, through which approximately 96 percent of the water in North Dakota’s rivers and streams flows annually.

The Missouri River system is an extremely valuable source of water, both in terms of quality and quantity, although ground water is used where it is difficult to get access to Missouri River water.

In other parts of the United States, fracking has been focused on shallow natural gas and oil bearing rock formations. Because these formations are so shallow, there has been concern about impacts from fracking to the shallow aquifers in those areas, which are often also used for drinking water. In North Dakota, the oil-bearing formations are much deeper, generally over 10,000 feet (nearly two miles) beneath the surface. This means oil wells are thousands of feet below potable ground water aquifers.



1951

Oil Discovered In North Dakota In Williams County Near Tioga.



1984

North Dakota’s First Major Oil “Boom” Peaks At 52 Million Barrels That Year.



1987

North Dakota’s First Horizontal Well Drilled.



2004

North Dakota’s First Middle Bakken Horizontal Well Drilled.



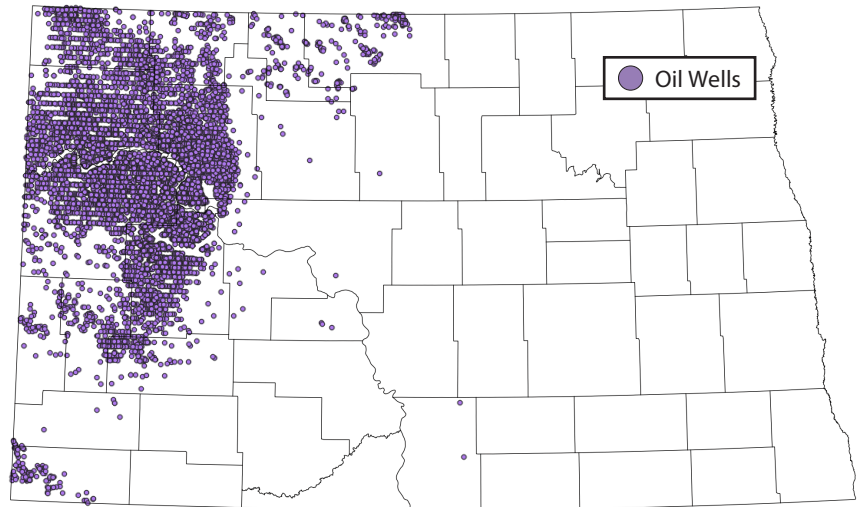
2006

North Dakota Is The Nation’s Ninth Largest Oil Producing State.

# ABOUT HYDRAULIC FRACTURING

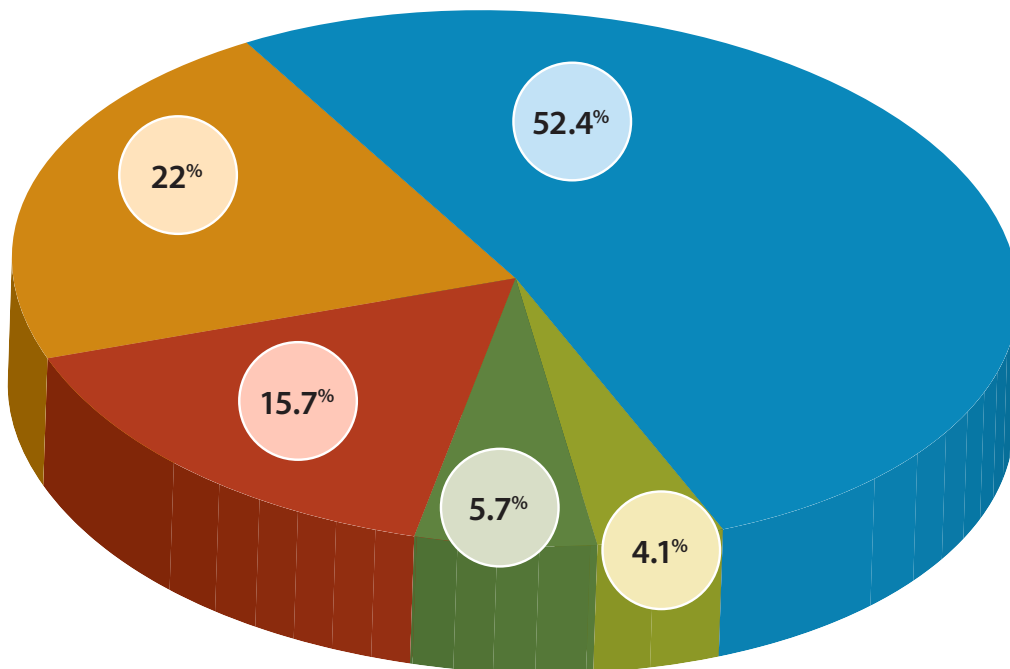
In between the potable aquifers and oil bearing rock formations, are approximately 8,000 feet (1.5 miles) of rock, separating the oil extraction process from drinking water supplies.

Within 60 days after hydraulic fracture stimulation is performed, the owner, operator, or service company shall post to the chemical disclosure registry - FracFocus.org – all chemicals used in hydraulic fracture of the well. Department of Mineral Resources rules on hydraulic fracture stimulation can be found in North Dakota Administrative Rule 43-02-03-27.1



The location of the 16,604 total wells drilled in North Dakota between 2007 and 2020. Source: ND Industrial Commission, Department of Mineral Resources, Oil and Gas Division. (Not all drilled wells end up producing oil).

## 2020 CONSUMPTIVE WATER USE IN ND



<span style="color: blue;">■</span>	<b>IRRIGATION</b> 193,165 Acre-Feet
<span style="color: orange;">■</span>	<b>MUNICIPAL</b> 81,107 Acre-Feet
<span style="color: red;">■</span>	<b>INDUSTRIAL, POWER, MULTI-USE (NON-FRACKING)</b> 57,983 Acre-Feet
<span style="color: green;">■</span>	<b>INDUSTRIAL WATER DEPOTS (INCLUDING FRACKING)</b> 21,076 Acre-Feet
<span style="color: yellow;">■</span>	<b>RURAL WATER</b> 15,210 Acre-Feet



**2007**

Bakken Oil Production Begins To Increase Dramatically.



**2012**

North Dakota Became The Nation's Second Largest Oil Producing State (242 Million Barrels in 2012) - Behind Only Texas.



**2019**

North Dakota Oil Production Reaches A New All-Time High In November At Just Over 1.5 Million Barrels Per Day.



**2021**

Near the beginning of September, North Dakota becomes the nation's third largest oil producing state, behind New Mexico and Texas, respectively.

# WATER MANAGEMENT & PERMITTING

The DWR is responsible for managing the State's water resources, and has assembled an extensive and detailed water resources data program. The depth, breadth, and quality of that data collection is unprecedented in its scope today. Perhaps most importantly, the methodology used to collect and analyze this data is uniform, consistent, and scientifically defensible. Because of this extensive and regularly updated collection of data, the DWR is able to track impacts to the water resources of the state. This is all made possible by the DWR's team of talented and dedicated hydrology professionals.

In addition to the tracking of ground and surface water resources, permitted water users are required to provide annual reports of their actual water use. Permitted water users are annually allocated a specific volume of water from a specific source, such as an aquifer or

surface water source. Users are allowed to use up to the permitted amount, but no more. Metering and periodic monitoring are conducted for all industrial water uses. In the case of water use related to hydraulic fracturing, a process has been developed to provide more frequent measurements for monitoring and metering through on-site remote telemetry.

When water use exceeds what has been permitted or conditions of the water permits have been violated, the DWR has the authority to assess fines and penalties in order to discourage such actions in the future. Further, if a user exceeds their allocated amount in a given year, the amount of overage is subtracted from their available amount the following year. Lastly, the DWR continues to work with the North Dakota Department of Mineral Resources, and others, on the potential for water reuse.



developed by

NORTH  
**Dakota** | Water Resources  
Be Legendary.

1200 Memorial Highway • Bismarck ND 58504 • 701.328.2754



[dwr@nd.gov](mailto:dwr@nd.gov)



[www.dwr.nd.gov](http://www.dwr.nd.gov)



[www.facebook.com/NDWaterResources](https://www.facebook.com/NDWaterResources)