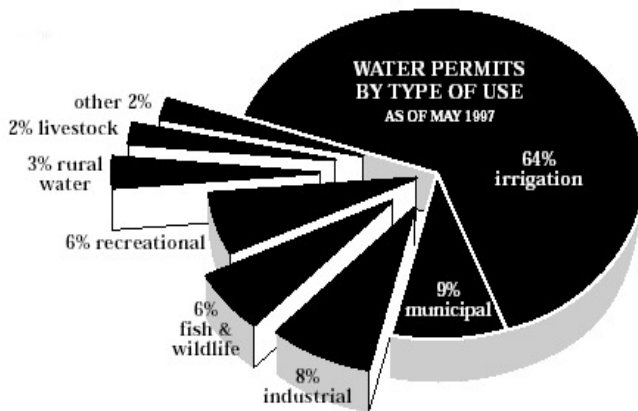


NORTH DAKOTA GROUND WATER CONDITIONS

Ground Water Importance and Location:

Ground water is one of North Dakota's most valuable resources. It is considered essential for the maintenance of sensitive aquatic ecosystems, such as rivers, lakes, and wetlands, industry and agriculture, and small communities and private homes. Sixty percent of the state's population utilizes ground water to meet their domestic water supply needs. Ninety-four percent of the state's 365 incorporated communities rely on ground water, either from municipal systems, rural water systems, or private wells. In addition, ground water is the only source of water supply for nearly all farm families and their livestock, and residents of small communities that are not served by public water systems. In addition, emphasis on value-added agriculture has resulted in increased demand for ground water used for irrigation in recent years.



Ground water resources in North Dakota occur in two principal aquifer types: (1) unconsolidated glacial deposits and (2) sedimentary bedrock. The bedrock geology of North Dakota is dominated by the Williston Basin, a sedimentary basin centered southeast of Williston, North Dakota, where its maximum depth is approximately 15,000 feet deep.

There are four major bedrock aquifer units within the Williston Basin. Water quality varies considerably within the aquifer units, with the deeper units generally considered highly saline and the shallower units exhibiting saline to brackish to moderately low total dissolved solids (TDS). The best quality water in the bedrock aquifer units almost always occurs in

the shallowest unit at any given location. In some near-surface bedrock aquifers in southwestern North Dakota, TDS may occasionally be as low as 1,000 mg/L.

The majority of high quality ground water (less than 2,000 mg/L TDS) in North Dakota is contained within glacial drift aquifers. These aquifers are generally composed of sand and/or gravel deposited by glacial activity. Most of the glacial drift aquifers are located at or near the surface, though some are buried by till deposits from subsequent glacial advances.

Ground water quality in the glacial drift aquifers generally ranges from as low as 200 mg/L TDS to several thousand mg/L TDS. Some areas that discharge ground water mainly through evapotranspiration processes may have TDS in excess of 10,000 mg/L.

The ground water resources of North Dakota have been extensively studied and catalogued. Every county in the state has had a geology and ground water resource study completed through a cooperative effort by the USGS, the North Dakota Geological Survey and the North Dakota State Water Commission. More than 15,000 geological test holes were drilled through the state for these studies, with almost 6,000 completed as observation wells. Several state and federal agencies continue to characterize and survey the quality and quantity of North Dakota's water resources.

Threats to Ground Water Quality: The degradation of ground water in the state results from a variety of sources involving both natural processes and manmade activities. Because natural impacts to water quality are usually widespread and occur over long periods of time, cost-effective remedies are usually limited. However, when land use activities accelerate the natural degradation rate, overwhelm natural attenuation processes, or introduce contaminants not native to the environment resulting in adverse impacts, these sources are considered to be contaminants of concern. North Dakota citizens, through the enactment of legislation, have mandated that contaminants of concern are regulated for the protection of public health and the environment,

and to safeguard social, economic, and industrial development associated with the water resource. The primary sources of water contamination in North Dakota are associated with domestic, municipal, agricultural, surface mining, oil and gas extraction, and industrial sectors, as well as nonpoint surface soil erosion and atmospheric deposition of chemical contaminants.

Ground Water Quality Monitoring:

Starting in 1992, the North Dakota Department of Health (NDDH) initiated routine sampling of approximately 1,000 monitoring wells located in 50 aquifers identified as being most susceptible to contamination. Approximately 10 aquifers a year are monitored for general mineral chemistry and more than 50 different agricultural chemicals. Each year the results are presented in a report identifying the detections of pesticide compounds, discussing general water quality, and suggesting possible sources of contamination. Of the samples collected since 1992, approximately 5 percent exceeded the maximum contaminant level for nitrates, while approximately 4 percent tested positive for one or more pesticide compounds. None of the pesticides detected exceeded their respective health based standards, and most were at trace levels.

Ground Water Protection - The 1996 Amendments to the Safe Drinking Water Act established the Source Water Protection Program to serve as an overall umbrella of protection efforts for all public water systems, including ground water- and surface water-dependent systems. The Wellhead Protection Program continues for ground water-dependent systems. The Source Water Protection Program for surface water-dependant systems involves the delineation of a protection area along rivers or lakes that provide source water for the system, and an inventory of potential contaminant sources within the protection area. Under both wellhead and source water protection, the NDDH assesses the system's susceptibility to potential contaminant sources found in the protection area.

Progress continues on the minimum elements of wellhead and source water protection (delineation, contaminant source inventory, and susceptibility). The 1996 Amendments to the

Safe Drinking Water Act require all states to complete the minimum elements by May 2003. The NDDH has completed the mandatory elements for all (100%) of the Community Water Systems in the state, and is on track to complete the mandatory elements for non-community water systems by the required deadline.

Underground Injection Control:

North Dakota has primacy for regulation of the Underground Injection Control Program. Injection wells in the state are used for a variety of purposes ranging from deep injection of oil field or other non-hazardous industrial waste water, to shallow disposal of wastes from many small businesses. North Dakota has recently updated rules regulating motor vehicle waste disposal systems. These systems receive fluids from vehicle repair or maintenance activities, such as auto body repair, engine repair, motor vehicle service or other motorized vehicle work. Commonly, a floor drain in a shop or garage is connected to a dry well or a septic tank-drain field system. New systems that receive motor vehicle waste fluid are now prohibited. Existing wells in regulated areas will be phased out, but operators in some areas may seek a permit.

To enhance the ongoing efforts to protect ground water in North Dakota, additional financial resources are needed in the following areas:

- Pollution prevention technical assistance in source water assessment areas.
- Enhancement of the ambient water quality monitoring program.
- Technical assistance to small communities to assist in implementation of comprehensive source water protection plans.
- Funding to address nonsuperfund remedial activities where responsible parties cannot be identified or who do not have sufficient resources.
- Implementation of new underground injection control rules for motor vehicle waste disposal systems.