

PREPARED BY THE UNITED STATES GEOLOGICAL SURVEY IN COOPERATION WITH THE
NORTH DAKOTA STATE WATER COMMISSION, NORTH DAKOTA GEOLOGICAL SURVEY,
AND GRIGGS AND STEELE COUNTIES WATER MANAGEMENT DISTRICTS

INTRODUCTION

This investigation is part of a statewide program to determine the location, extent, and hydrologic characteristics of the ground-water reservoirs (aquifers).

The investigation was made cooperatively by the U. S. Geological Survey, North Dakota State Water Commission, North Dakota Geological Survey, and Griggs and Steele Counties Water Management Districts.

This preliminary map is the first product of an intensive study of Griggs and Steele Counties. A well inventory provided data on depth, construction, and productivity of private and public wells. Test drilling by the North Dakota State Water Commission, Federal agencies, and commercial well drillers provided information regarding the thickness, grain size, and extent of the aquifers. Potential well yields were estimated from the thickness and hydraulic conductivity of the water-bearing materials logged at each test hole, and from aquifer tests. Generally, the yield of a well is proportional to the hydraulic conductivity and thickness of the aquifer.

OCCURRENCE AND POTENTIAL YIELD OF AQUIFERS

Aquifers occur both in glacial drift and in underlying bedrock formations in Griggs and Steele Counties (see location map). However, the availability map shows only the extent and potential yields of the major glacial-drift aquifers.

Glacial drift, which covers most of Griggs and Steele Counties, is as much as 550 feet (152 meters) thick in pre-existing bedrock valleys. The drift may be divided into two types — till and glaciofluvial deposits. Till is a nonsorted mixture of clay, silt, sand, gravel, cobbles, and boulders deposited directly by glaciers. It has a low hydraulic conductivity and generally will yield only small quantities of ground water to wells. Glaciofluvial deposits are stratified deposits of silt, sand, and gravel that were deposited by glacial melt-water streams. They commonly have high hydraulic conductivities and form the principal aquifers in the two counties.

Thin deposits of water-bearing sand and gravel buried within the glacial drift are common; however, they are too small to be shown on the map. These deposits generally yield enough water for average farm use. Some of the larger deposits may yield as much as 50 gal/min (gallons per minute; 3 l/s (liters per second)) for a short time; however, long-term yields would be much less because of the limited recharge to the deposits. Most sustained yields probably would be less than 10 gal/min (0.6 l/s).

The aquifers in Griggs and southwestern Steele Counties are formed in glaciofluvial materials deposited within and overlying valleys deeply incised in the bedrock. Where the valleys are deep and the glacial drift is thick, two or more saturated sand and (or) gravel layers may be interbedded with, and confined by, layers of till and (or) silt and clay. Many of the confining beds are local, and sand and gravel deposits that are separated in one place may merge and be hydraulically connected in another. These aquifers may yield as much as 1,500 gal/min (95 l/s) to wells.

The aquifers in eastern Steele County are parts of two deltaic deposits. The northern aquifer is mostly silt and fine-grained sand. Yields from the aquifer are generally not much greater than 10 gal/min (0.6 l/s). In south-eastern Steele County, the aquifer materials range from silt to fine gravel. Yields from the aquifer vary considerably, but may be as much as 1,000 gal/min (63 l/s) in the thicker parts.

The availability map should be used with the understanding that the estimated yields are for properly screened and developed wells that fully penetrate the aquifer. The map is designed as a guide to the location of major aquifers and not to locate specific wells. Few aquifers are so uniform in their water-bearing properties that production wells may be drilled in them without preliminary test drilling. If the map is used with an understanding of its limitations, it will be useful in the future development of the ground-water resources of the area.

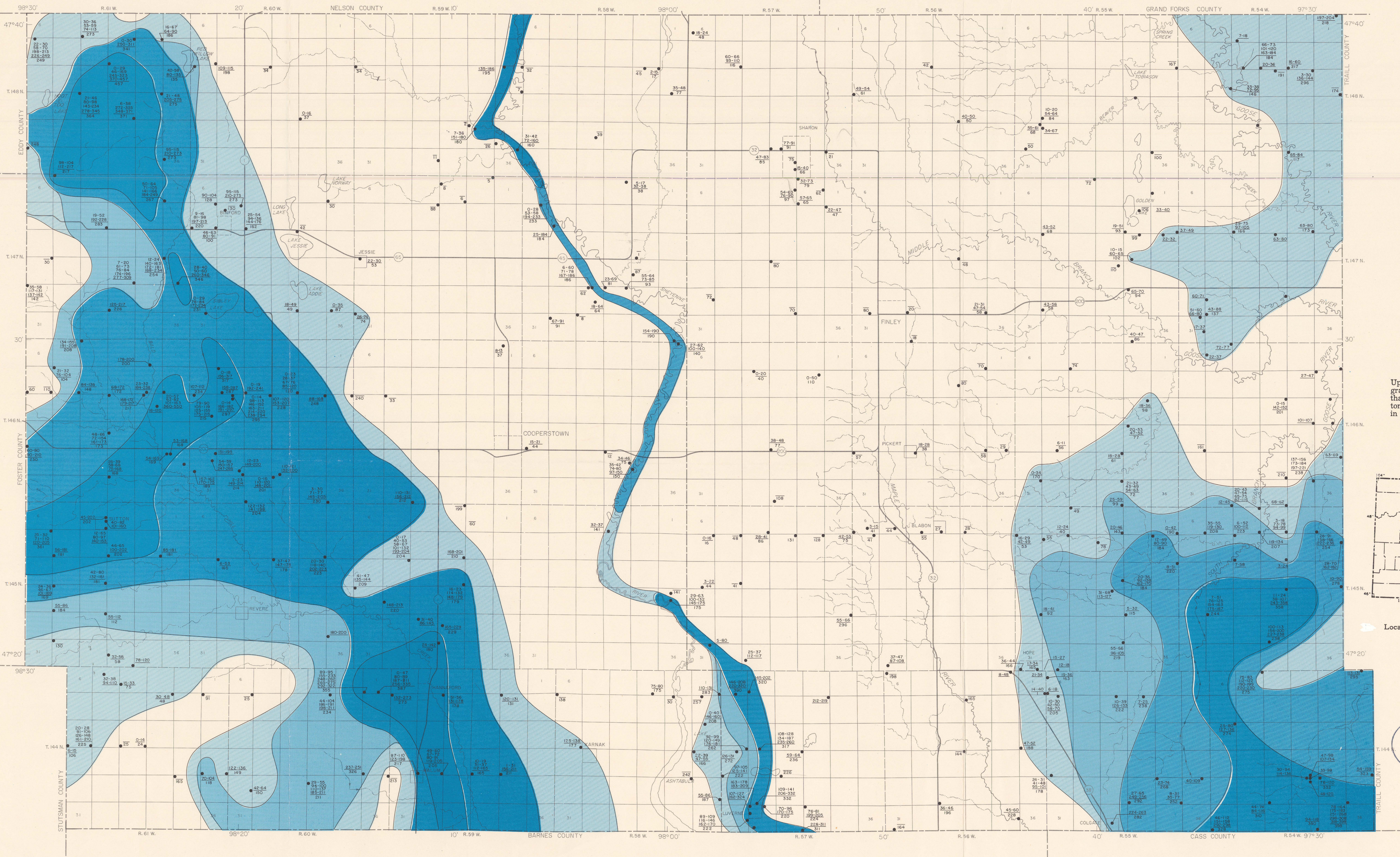
REFERENCES

Adolphson, D. G., 1962, Ground Water in the Hatton area, Traill and Steele Counties, North Dakota: North Dakota State Water Comm. Ground Water Studies no. 39, 23 p.

Dennis, P. E., 1947, Ground Water in the Sharon area, Steele County, North Dakota: North Dakota State Water Comm. Ground Water Studies no. 8, 32 p.

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Base prepared from North Dakota State Highway Department county highway maps

EXPLANATION

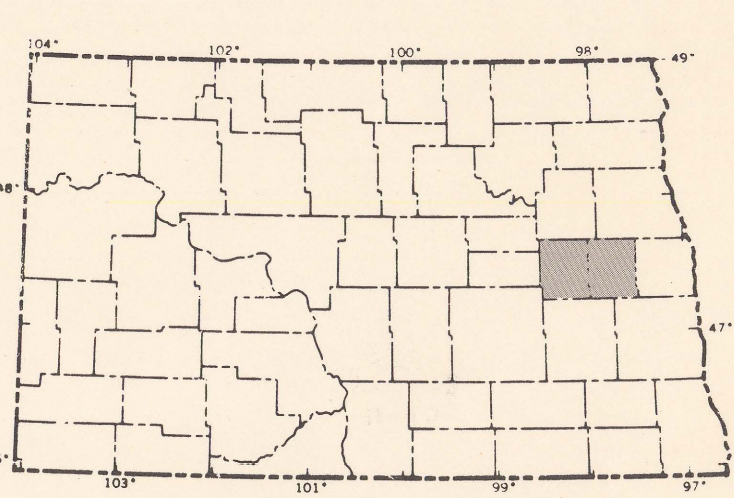
Estimated well yields,
in gallons per minute
(liters per second)

- 1000-1500
(63-95)
- 500-1000
(32-63)
- 250-500
(16-32)
- 50-250
(3.2-16)
- 10-50
(0.6-3.2)
- 0-10
(0-0.6)

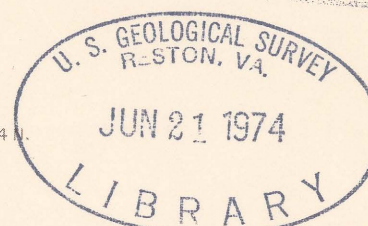
Selected test-hole and well data

0-15
142-152
201
Control point

Upper numbers are thickness of sand and gravel penetrated, in feet. Increments of less than 5 feet (1.5 meters) are not shown. Bottom number is depth to consolidated rock, in feet below land surface.



Location of Griggs and Steele Counties (shaded)



PRELIMINARY MAP SHOWING AVAILABILITY OF GROUND WATER FROM MAJOR GLACIAL-DRIFT AQUIFERS IN GRIGGS AND STEELE COUNTIES, NORTH DAKOTA

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North Dakota (Griggs and Steele Cos.) Ground water. 1:26,720. 1974.
Cp. 1

