

GENERAL DESCRIPTION

The High Plains aquifer in Kansas is part of a regional system that extends into Colorado, Nebraska, New Mexico, Oklahoma, South Dakota, Texas, and Wyoming. The aquifer in Kansas underlies 31,000 square miles in the western and south-central part of the State. The aquifer is a hydraulically connected assemblage of unconsolidated water-bearing deposits. In western Kansas, the High Plains aquifer consists principally of the Ogallala Formation of late Tertiary age and overlying deposits of Quaternary age. In south-central Kansas, the aquifer consists of unconsolidated deposits principally of Quaternary age. Valley alluvium of Quaternary age also is included in the deposits in both areas. The High Plains aquifer is delimited on the east by outcrops of Permian or Cretaceous rocks and by unsaturated deposits of Quaternary age.

The U.S. Geological Survey began a 5-year study of the High Plains regional aquifer during 1978 to provide: (1) Hydrologic information for evaluating the effects of continued ground-water development and (2) data for development of computer models to predict aquifer response to changes in ground-water development. The plan of study for the High Plains Regional Aquifer System Analysis is described by Weeks (1978). This report is one of a series that presents hydrologic information on the aquifer in Kansas for a specific time.

The altitude and configuration of the water table of the High Plains aquifer in Kansas during 1970 are shown. Data used in preparing the map include: (1) Water levels measured by the U.S. Geological Survey, as part of a continuing cooperative program with the Kansas Geological Survey and the Kansas State Board of Agriculture, Division of Water Resources; (2) water-level measurements published in county reports by the Kansas Geological Survey; and (3) water levels reported by private drilling contractors. In irrigated areas, measurements were made during the winter when water levels generally had recovered from withdrawals during the previous irrigation season.

The 1970 water table sloped generally from west to east at an average rate of 10 feet per mile. The altitude of the water table ranged from about 2,950 feet in the southwest corner of Sherman County, northwestern Kansas, to about 1,350 feet in northern Sedgwick County, south-central Kansas. Ground water moved perpendicular to the water-table contours from higher altitudes in the western part of the High Plains to lower altitudes in the east. Contours that crossed stream valleys without flexure may indicate that the water table was below the streambed. Upgradient flexure of water-table contours along streams indicates that ground water flowed toward, and discharged into, streams. This is most evident along the South Fork Republican River in Cheyenne County, northwestern Kansas, and the South Fork Niangua River in Pratt and Kingman Counties, south-central Kansas.

Three levels of contour reliability were recognized based on density of data available for this compilation. Contours identified as type 1 are considered to be well-controlled by data and

accurately represent water levels within ± 25 feet altitude (one-half contour interval). Type 1 contours generally coincide with areas of known ground-water irrigation potential. Contours identified as type 2 are based on a data-point density of less than one point per township, and their accuracy is somewhat decreased. Contours identified as type 3 were inferred from various indirect sources, and the accuracy is considered to be speculative. Areas that show type 3 contours are predominantly "fringe areas" of the aquifer system that have relatively small saturated thickness or little irrigation development. Altitude and configuration of land surface and bedrock, interpretations from previous reports, and water-level measurements dated other than that of the map were used to control type 3 contours. In areas where the water table is at or near the bedrock surface, contouring was not practical.

CONVERSION TABLE

The inch-pound units of measurement given in this report are listed with equivalent International System of Units (SI), using the following conversion factors:

Inch-pound unit	Multiply by	SI unit
foot	0.3048	meter
mile	1.609	kilometer
square mile	2.590	square kilometer
foot per mile	0.1894	meter per kilometer

The National Geodetic Vertical Datum of 1929 (NGVD) is a geodetic datum derived from a general adjustment of the first-order level nets of both the United States and Canada. NGVD of 1929 refers to sea level in this report.

SELECTED REFERENCES

Borman, R. G., 1979, Altitude and configuration of the water table and depth to water in the northern High Plains of Colorado, January 1978; U.S. Geological Survey Water-Resources Investigations 79-56, scale 1:500,000, 1 sheet.

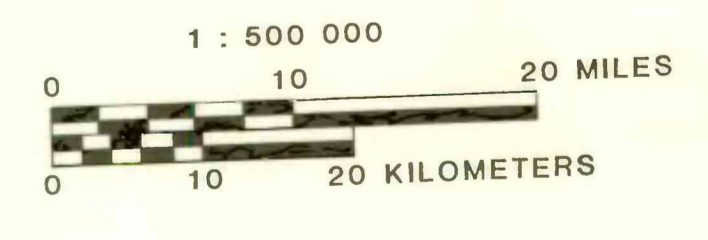
Gutentag, E. D., and Weeks, J. B., 1980, Water table in the High Plains aquifer in 1978 in parts of Colorado, Kansas, Nebraska, New Mexico, Oklahoma, South Dakota, Texas, and Wyoming; U.S. Geological Survey Hydrologic Investigations Atlas HA-642, scale 1:2,500,000, 1 sheet.

Pabst, M. E., and Stullken, L. E., 1981, Altitude and configuration of the water table in the High Plains aquifer in Kansas, 1980; U.S. Geological Survey Water-Resources Investigations, Open-File Report 81-1004, scale 1:500,000, 1 sheet.

1982a, Altitude and configuration of the water table in the High Plains aquifer in Kansas, 1980; U.S. Geological Survey Open-File Report 82-429, scale 1:500,000, 1 sheet.

EXPLANATION

- AREA OF BEDROCK OUTCROP WITHIN AQUIFER BOUNDARY
- AREA WHERE WATER TABLE IS AT OR NEAR BEDROCK SURFACE--Contours not shown
- 3500 WATER-TABLE CONTOUR--Shows altitude of water table, 1970. Solid where accurately located (type 1); long dash where approximately located (type 2); and short dash where location is speculative (type 3); Contour interval 50 feet. National Geodetic Vertical Datum of 1929
- BOUNDARY OF HIGH PLAINS AQUIFER



ALTITUDE AND CONFIGURATION OF THE WATER TABLE
IN THE HIGH PLAINS AQUIFER IN KANSAS, 1970

By
M.E. Pabst and L.E. Stullken
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