1975

GROUND-WATER DATA FOR MICHIGAN

BY
G.C. HUFFMAN
U.S. GEOLOGICAL SURVEY

PREPARED IN COOPERATION WITH THE
MICHIGAN DEPARTMENT OF NATURAL RESOURCES
GEOLOGICAL SURVEY DIVISION

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DEPARTMENT OF THE INTERIOR

U.S. GEOLOGICAL SURVEY

WATER RESOURCES DIVISION

Prepared by the U.S. Geological Survey
in cooperation with the
State of Michigan
Department of Natural Resources
H. A. Tanner, Director
Geological Survey Division
A. E. Slaughter, State Geologist

1976

METRIC EQUIVALENTS

Conversion Factors

The following factors may be used to convert the English units published in this report to the International System of Units (SI).

Multiply English units	By	To obtain SI units
acres	0.4047	hectares (ha)
feet (ft)	.3048	meters (m)
inches (in)	25.4	millimeters (mm)
miles (mi)	1.609	kilometers (km)
million gallons (10^6 gal)	3,785	cubic meters (m^3)
gallons (gal)	3.785	liters (l)

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INTRODUCTION

Purpose of this report

The purpose of this report is to make available the records of water levels in principal aquifers of the State through 1975 and to compile other related data, such as records of ground-water pumpage. Also included in the report are data on municipal, public, and industrial water-supply facilities. Records of water levels in areas of heavy pumpage and in areas where changes are principally due to natural influences are illustrated or tabulated to allow comparison between these types of water-level fluctuations. The water levels and related data provide a record for the evaluation of available ground-water supplies. The long-term records serve as a framework to which short-term records may be related.

This report is written for persons, municipalities, industries, institutions, consultants, drillers, and hydrologists interested in the ground-water resources of the State.

What this report contains

Table 1 contains records of measurements of water levels in observation wells, well locations, depths, elevations, aquifers tapped, and water level extremes for the past and for 1975. Figure 1 shows density of observation wells in the State. Table 2 contains records of pumpage by most major ground-water users in the State in 1975.

Many hydrographs are included in the report to illustrate changes in water levels. Most illustrations also show the effects of ground-water pumpage on water levels.

Supplementary data on the yield of wells, pumpage, quality of water, and trends of ground-water levels for 1975 and for part of the previous record are shown in summary form in the text. Yield data are given as they were reported by water departments and consultants.

Uses of data in this report

In areas where ground water is used for municipal or industrial supplies, hydrographs of water levels show the effects of pumpage from wells and natural, induced, and artificial recharge to aquifers. Declines, except those

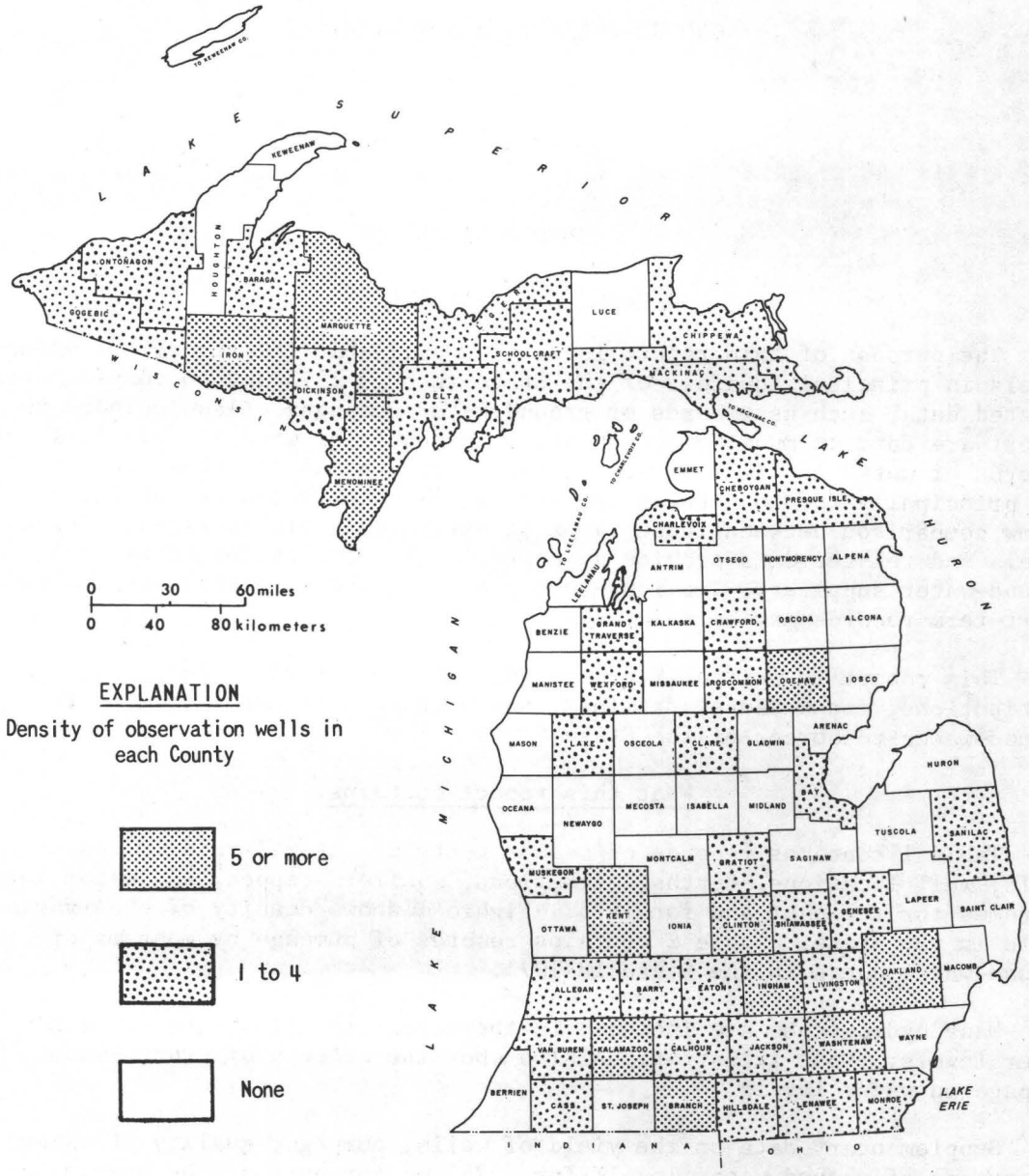


Figure 1.-- In 1975, water levels were monitored in 172 observation wells.

caused by precipitation deficiencies and evapotranspiration, generally indicate depletion of storage in aquifers as caused by pumping. An effective method of determining the amount of water available from an aquifer is the analysis of long-term records of water levels and pumpage.

Many of the water-level records in pumped areas are obtained by means of recorders. These water-level records serve to indicate day-to-day and long-term effects of pumping. This information can be used by municipalities, industries, and institutions or their consultants to estimate the capacity of aquifers to meet present and future demands for water and whether expansion of present ground-water supply systems is practicable.

When a well is installed in an area where water levels are declining because of pumping, a projection of future water levels can be made. The well then can be drilled deep enough to take advantage of the full thickness of an aquifer, and the drop pipe, jet, or submersible pump can be installed far enough below the water level in the well to account for probable lowering of water levels and thereby extend the life of the installation. Future expense can thus be eliminated.

Water problems often are encountered when a basement or septic tank is constructed for a building or home. The water table fluctuates an average of 2 to 3 feet (0.6 to 0.9 m) annually and about 5 feet (1.5 m) over a period of years (figs. 5 and 6). Thus, if an excavation is made in the fall, when the water table is low, good construction practices would allow for the probable higher water levels in the spring. If construction is made after several years of drought, the allowance for the subsequent rise in water levels would be larger. If a site is at all questionable, borings would be made to determine the depth to water table, and allowances for the probable rise in water levels would be made.

Good construction of farm ponds and artificial lakes would also take into account the fluctuations of the water table, where these bodies of water depend on the height of the water table for their levels.

Other ground-water reports

From 1935 to 1974, records of ground-water levels in Michigan were published in U.S. Geological Survey Water-Supply Papers (WSP), as shown on page 51. Since 1975, records of ground-water levels are published in U.S. Geological Survey Water-Data Reports (WDR) as shown on page 51.

To supplement the Water-Supply Paper and Water-Data Report series, publications of annual reports, titled "Summary of Ground-Water Conditions in Michigan," was begun in 1956. Beginning in 1967, the title of the reports was changed to "Summary of Ground-Water Hydrological Data in Michigan," and in 1973 to "Ground-Water Data for Michigan."

Reports that describe ground-water conditions in Michigan are shown in Figures 2 and 3. In addition, many publications dealing with ground water are listed in the selected references at the end of this report.

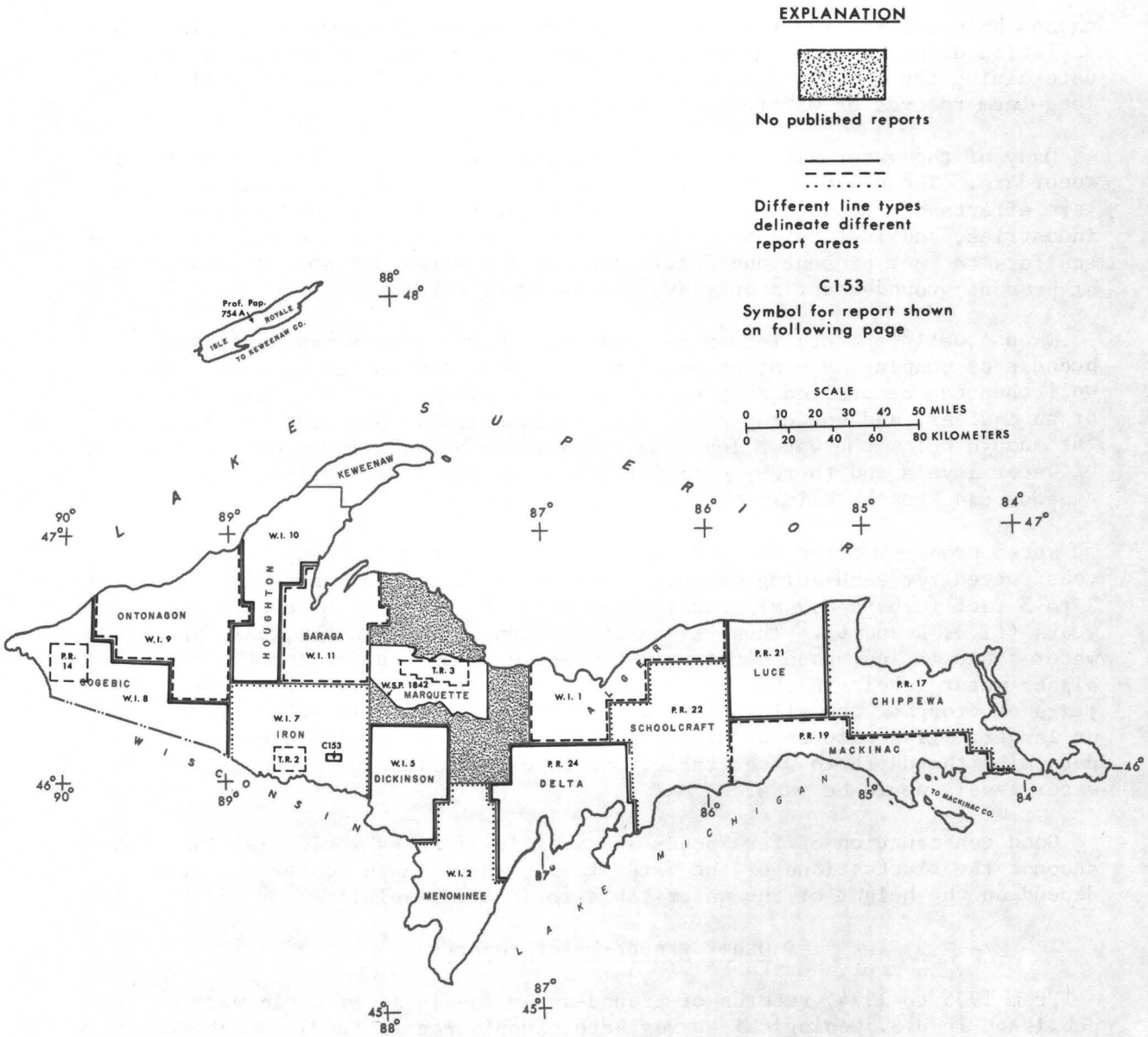


Figure 2.--Areas in the Upper Peninsula where ground-water conditions are described in published reports.

PUBLISHED REPORTS

Upper Peninsula

Circulars

C 153 -- Pettijohn, F. J., 1952, Geology of the northern Crystal Falls area, Iron County, Michigan: U.S. Geol. Survey Circ. 153.

Professional Papers

Prof. Pap. 754A -- Huber, N. K., 1973, Glacial and postglacial geologic history of Isle Royale National Park, Michigan: U.S. Geol. Survey Prof. Paper 754-A.

Progress Reports

PR 14 -- Brown, E. A., and Stuart, W. T., 1951, Ground-water resources of the glacial deposits in the Bessemer area, Michigan: Michigan Geol. Survey Prog. Rept. 14.

PR 17 -- Vanlier, K. E., and Deutsch, Morris, 1958, Reconnaissance of the ground-water resources of Chippewa County, Michigan: Michigan Geol. Survey Prog. Rept. 17.

PR 19 -- _____, 1958, Reconnaissance of the ground-water resources of Mackinac County, Michigan: Michigan Geol. Survey Prog. Rept. 19.

PR 21 -- Vanlier, K. E., 1959, Reconnaissance of the ground-water resources of Luce County, Michigan: Michigan Geol. Survey Prog. Rept. 21.

PR 22 -- Sinclair, W. C., 1959, Reconnaissance of the ground-water resources of Schoolcraft County, Michigan: Michigan Geol. Survey Prog. Rept. 22.

PR 24 -- _____, 1960, Reconnaissance of the ground-water resources of Delta County, Michigan: Michigan Geol. Survey Prog. Rept. 24.

Technical Reports

TR 2 -- Stuart, W. T., Theis, C. V., and Stanley, G. M., 1948, Ground-water problems in the Iron River district, Michigan: Michigan Geol. Survey Tech. Rept. 2.

TR 3 -- Stuart, W. T., Brown, E. A., and Rhodehamel, E. C., 1954, Ground-water investigations of the Marquette iron-mining district, Michigan: Michigan Geol. Survey Tech. Rept. 3.

Water Investigations

WI 1 -- Vanlier, K. E., 1963, Ground water in Alger County: Michigan Geol. Survey Water Inv. 1.

WI 2 -- _____, 1963, Ground water in Menominee County: Michigan Geol. Survey Water Inv. 2.

WI 5 -- Hendrickson, G. E., and Doonan, C. J., 1966, Ground-water resources of Dickinson County, Michigan: Michigan Geol. Survey Water Inv. 5.

WI 7 -- Doonan, C. J., Hendrickson, G. E., 1967, Ground water in Iron County, Michigan: Michigan Geol. Survey Water Inv. 7.

WI 8 -- _____, 1968, Ground-water in Gogebic County, Michigan: Michigan Geol. Survey Water Inv. 8.

WI 9 -- _____, 1968, Ground-water in Ontonagon County, Michigan: Michigan Geol. Survey Water Inv. 9.

WI 10 -- Doonan, C. J., Hendrickson, G. E., and Byerlay, J. R., 1970, Ground water and geology of Keweenaw Peninsula, Michigan: Michigan Geol. Survey Water Inv. 10.

WI 11 -- Doonan, C. J., and Byerlay, J. R., 1973, Ground water and geology of Baraga County, Michigan: Michigan Geol. Survey Water Inv. 11.

Water Supply Papers

WSP 1842 -- Wiitala, S. W., Newport, T. G., and Skinner, E. L., 1967, Water resources of the Marquette Iron Range area, Michigan: U.S. Geol. Survey Water-Supply Paper 1842.

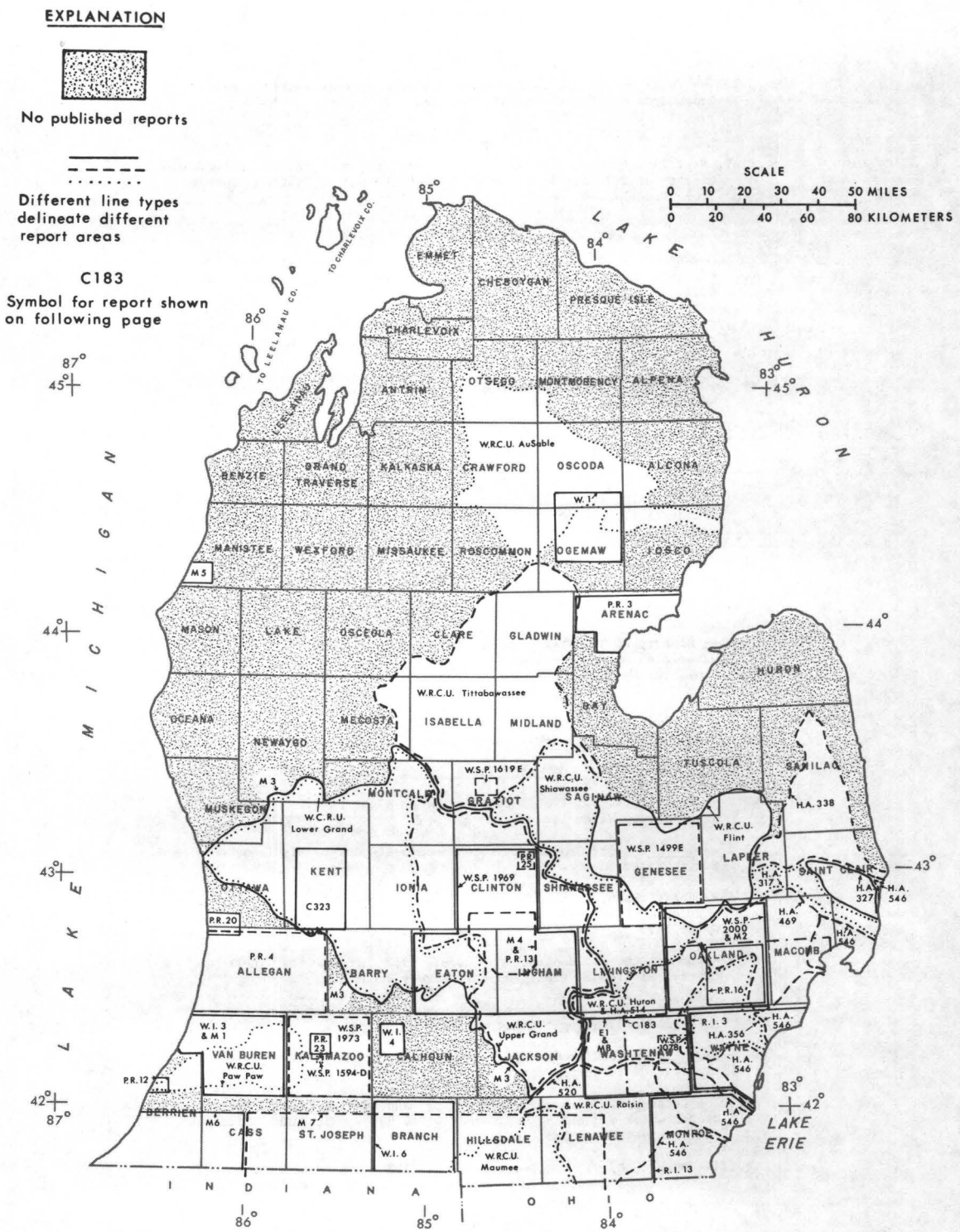


Figure 3.--Areas in the Lower Peninsula where ground-water conditions are described in published reports.

PUBLISHED REPORTS

Lower Peninsula

Circulars

C 183 -- Wisler, C. O., Stramel, G. J., and Laird, L. B., 1952, Water resources of the Detroit area, Michigan: U.S. Geol. Survey Circ. 183.

C 323 -- Stramel, G. J., Wisler, C. O., and Laird, L. B., 1954, Water resources of the Grand Rapids area, Michigan: U.S. Geol. Survey Circ. 323.

Environmental Geology Series Reports

E 1 -- Fleck, W. B., 1974, Geology and hydrology for environmental planning in Washtenaw County, Michigan: Michigan Geol. Survey Environmental Geol. Series Rept. 1.

Hydrologic Atlases

HA 317 -- Knutilla, R. L., 1969, Water resources of the Belle River basin, southeastern Michigan: U.S. Geol. Survey Hydrol. Inv. Atlas HA-317.

HA 327 -- _____, 1969, Water resources of the Pine River basin, southeastern Michigan: U.S. Geol. Survey Hydrol. Inv. Atlas HA-327.

HA 338 -- _____, 1970, Water resources of the Black River basin, southeastern Michigan: U.S. Geol. Survey Hydrol. Inv. Atlas HA-338.

HA 356 -- _____, 1971, Water resources of the River Rouge basin, southeastern Michigan: U.S. Geol. Survey Hydrol. Inv. Atlas HA-356.

HA 469 -- Nowlin, J. O., 1973, Water resources of the Clinton River basin, southeastern Michigan: U.S. Geol. Survey Hydrol. Inv. Atlas HA-469.

HA 514 -- Larson, R. W., Allen, W. B., and Hanson, S. D., 1975, Water resources of the Huron River basin, southeastern Michigan: U.S. Geol. Survey Hydrol. Inv. Atlas HA-514.

HA 520 -- Knutilla, R. L., and Allen, W. B., 1975, Water resources of the River Raisin basin, southeastern Michigan: U.S. Geol. Survey Hydrol. Inv. Atlas HA-520.

HA 546 -- Twenter, F. R., Knutilla, R. L., Cummings, T. R., 1975, Water resources of basins for minor streams draining into St. Clair River, Lake St. Clair, Detroit River, and Lake Erie, southeastern Michigan: U.S. Geol. Survey Hydrol. Inv. Atlas HA-546.

Miscellaneous Reports

M 1 -- Terwilliger, F. W., 1954, The glacial geology and ground-water resources of Van Buren County, Michigan, pt. 1 of Occasional papers for 1954 on the geology of Michigan: Michigan Geol. Survey Pub. 48.

M 2 -- Mozola, A. J., 1953, A survey of ground-water resources in Oakland County, Michigan, pt. 2 of Occasional papers for 1954 on the geology of Michigan: Michigan Geol. Survey Pub. 48.

M 3 -- Vanlier, K. E., 1968, Appendix E of the report on the Grand River Comprehensive Basin Study: U.S. Army Eng. District, Detroit, Michigan.

M 4 -- Vanlier, K. E., and Wheeler, M. L., 1968, Analog simulation of ground-water development of the Saginaw Formation, Lansing Metropolitan area, Michigan: Tri-County Planning Commission, Lansing Ground- Water Rept.

M 5 -- Childs, K. E., 1970, History of the salt, brine, and paper industries and their probable effect on the ground-water quality in the Manistee Lake area, Michigan: Michigan Dept. Nat. Resources.

M 6 -- Schneider, A. F., and Keller, S. J., 1970, Indiana Geological Survey regional geological map number 4: Indiana Dept. Nat. Resources.

M 7 -- Johnson, G. H., and Keller, S. J., 1972, Indiana Geological Survey regional geological map number 8: Indiana Dept. Nat. Resources.

M 8 -- Twenter, F. R., Knutilla, R. L., and Nowlin, J. O., 1973, Water resources of Washtenaw County, Michigan: open-file report.

Progress Reports

PR 3 -- Pringle, G. H., 1937, Geology of Arenac County, Michigan: Michigan Geol. Survey Prog. Rept. 3.

PR 4 -- Riggs, C. H., 1938, Geology of Allegan County, Michigan: Michigan Geol. Survey Prog. Rept. 4.

PR 12 -- Stuart, W. T., and Stallman, R. W., 1945, Ground-water resources of the Benton Harbor area, Michigan: Michigan Geol. Survey Prog. Rept. 12.

PR 13 -- Stuart, W. T., 1945, Ground-water resources of the Lansing area, Michigan: Michigan Geol. Survey Prog. Rept. 13.

PR 16 -- Ferris, J. G., and others, 1954, Ground-water resources of southeastern Oakland County, Michigan: Michigan Geol. Survey Prog. Rept. 16.

Progress Reports--Continued

PR 20 -- Deutsch, Morris, Burt, E. M., and Vanlier, K. E., 1958, Summary of ground-water investigations in the Holland area, Michigan: Michigan Geol. Survey Prog. Rept. 20.

PR 23 -- Deutsch, Morris, Vanlier, K. E., and Giroux, P. R., 1960, Ground-water hydrology and glacial geology of the Kalamazoo area, Michigan: Michigan Geol. Survey Prog. Rept. 23.

PR 25 -- Vanlier, K. E., 1962, Summary of ground-water investigations in the Elsie area, Michigan: Michigan Geol. Survey Prog. Rept. 25.

Reports of Investigations

RI 3 -- Mazola, A. J., 1969, Geology for land and ground-water development in Wayne County, Michigan: Michigan Geol. Survey Rept.

RI 13 -- _____, 1970, Geology for environmental planning in Monroe County, Michigan: Michigan Geol. Survey Rept. Inv. 13.

Water Information Series

W 1 -- Knutilla, R. L., Twenter, F. R., and Larson, R. W., 1971, Upper Rifle River Basin -- An Evaluation of its Water Resources and Hydrologic Environment: Michigan Geol. Survey Water Information Series Rept. 1.

Water Investigations

WI 3 -- Giroux, P. R., Hendrickson, G. E., Stoimenoff, L. E., and Whetstone, G. W., 1964, Water resources of Van Buren County, Michigan: Michigan Geol. Survey Water Inv. 3.

WI 4 -- Vanlier, K. E., 1966, Ground-water resources of the Battle Creek area, Michigan: Michigan Geol. Survey Water Inv. 4.

WI 6 -- Giroux, P. R., Stoimenoff, L. E., Nowlin, J. O., and Skinner, E. L., 1966, Water resources of Branch County, Michigan: Michigan Geol. Survey Water Inv. 6.

Michigan Water Resources Commission Reports

WRCU Au Sable -- Water resource conditions and uses in the Au Sable River Basin, 1966: Michigan Water Resources Comm. Rept.

WRCU Flint -- Water resource conditions and uses in the Flint River Basin, 1956: Michigan Water Resources Comm. Rept.

WRCU Huron -- Water resource conditions and uses in the Huron River Basin, 1957: Michigan Water Resources Comm. Rept.

WRCU Lower Grand -- Water resource conditions and uses in the Lower Grand River Basin, 1967, (open file): Michigan Water Resources Comm. Rept.

WRCU Maumee -- Water resource conditions and uses in the Maumee River Basin, 1964: Michigan Water Resources Comm. Rept.

WRCU Paw Paw -- Water resource conditions and uses in the Paw Paw River Basin, 1955, (revised report in 1964): Michigan Water Resources Comm. Rept.

WRCU Raisin -- Water resource conditions and uses in the River Raisin Basin, 1965: Michigan Water Resources Comm. Rept.

WRCU Shiawassee -- Water resource conditions and uses in the Shiawassee River Basin, 1963: Michigan Water Resources Comm. Rept.

WRCU Tittibawassee -- Water resource conditions and uses in the Tittibawassee River Basin, 1960: Michigan Water Resources Comm. Rept.

WRCU Upper Grand -- Water resource conditions and uses in the Upper Grand River Basin, 1961: Michigan Water Resources Comm. Rept.

Water Supply Papers

WSP 1078 -- McGuinness, C. L., Poindexter, O. F., and Otten, E. G., 1949, Ground-water supplies of the Ypsilanti area, Michigan: U.S. Geol. Survey Water-Supply Paper 1078.

WSP 1499E -- Wiitala, S. W., Vanlier, K. E., and Krieger, R. A., 1960, Water resources of the Flint area, Michigan: U.S. Geol. Survey Water-Supply Paper 1499-E.

WSP 1594D -- Reed, J. E., Deutsch, Morris, and Wiitala, S. W., 1966, Induced recharge of an artesian glacial-drift aquifer at Kalamazoo, Michigan: U.S. Geol. Survey Water-Supply Paper 1594-D.

WSP 1619E -- Vanlier, K. E., 1963, Ground-water resources of the Alma area, Michigan: U.S. Geol. Survey Water-Supply Paper 1619-E.

WSP 1969 -- Vanlier, K. E., Wood, W. W., and Brunett, J. O., 1973, Water-supply development and management alternatives for Clinton, Eaton, and Ingham Counties, Michigan: U.S. Geol. Survey Water-Supply Paper 1969.

WSP 1973 -- Allen, W. B., Miller, J. B., and Wood, W. W., 1972, Availability of water in Kalamazoo County, Michigan: U.S. Geol. Survey Water-Supply Paper 1973.

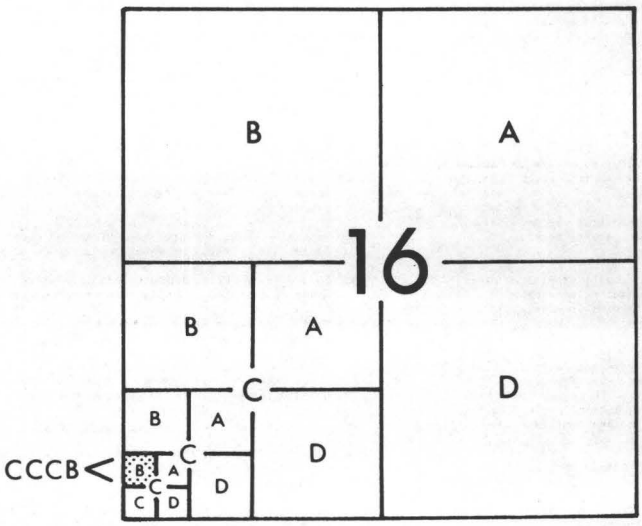
WSP 2000 -- Twenter, F. R., and Knutilla, R. L., 1972, Water for a rapidly growing urban community -- Oakland County, Michigan: U.S. Geol. Survey Water-Supply Paper 2000.

How records can be obtained

Complete tabulations of water-level measurements, hydrographs for observation wells, records of chemical quality, water-temperature measurements, well records and logs, aquifer tests, records of pumping for public and industrial supplies, and water-resources reports are on file for public inspection. They may be examined at the Geological Survey Division, Michigan Department of Natural Resources, Mason Building, Lansing, Michigan 48926; or at the U.S. Geological Survey, 2400 Science Parkway, Okemos, Michigan 48864. Records for the Northern Peninsula are also kept on file in the State and Federal Geological Survey Offices, State Office Building, Escanaba, Michigan 49829.

Well-numbering system

The well-numbering system for Michigan indicates the location of wells within the rectangular subdivision of the land with reference to the Michigan meridian and base line. The first two segments of the well number designate township and range, the third segment of the number designates the section and the letters A thru D designate successively smaller subdivisions of the section as shown below. Thus, a well designated as 32N 6E 16CCCB would be located to the nearest 2.5 acres (1 hectare) and would be within the shaded area in section 16.



For this report, well locations are given to the nearest 40 acres (16 hectares), for example, 16CC. In the event that two or more wells are located in the same 40-acre (16 hectares) tract, a sequential number designation follows the letter designations--for example, 16CC1, 16CC2, 16CC3, etc. The Michigan Geological Survey uses a similar system except that numbers are used in lieu of letters.

GROUND-WATER LEVELS IN 1975

During 1975, measurements of water levels were made in 172 observation wells, 75 of which were equipped with continuous recording gages (table 1). Record high levels occurred in 22 of the wells as a result of above-normal precipitation in most climatological regions (fig. 4). Only 6 wells were at record low levels, and most of these are in areas influenced by pumping. Overall, levels were generally above average in most areas (fig. 5), and year-end levels were higher than in 1974.

Although precipitation is one of the major climatic factors affecting ground-water levels, annual total rainfall may not always bear a direct relationship to the amount of recharge received by an aquifer. Many factors affect this relationship, such as (1) soil conditions; (2) time, duration, and intensity of precipitation; (3) nature of underlying rocks; and (4) slope of land surface.

Hydrographs of natural fluctuations of water levels in wells (figs. 5, 6, 7, 20, 21, and 22) show that water levels are highest in the spring. In the spring, snowmelt and rain normally result in large additions to ground-water reservoirs. However, ice cover or frost in the ground can impede infiltration. Under these conditions, most water from snowmelt and precipitation runs off rapidly and very little goes to recharge the ground-water reservoirs. There is little recharge during the growing season, as most rainfall is evaporated, is transpired by vegetation, or runs off overland after heavy showers. In the fall, evapotranspiration (return of water to the atmosphere as a vapor from water surfaces, soil, and plants) is reduced by cold weather. Thus, rises in water levels usually follow fall rains. Frozen ground impedes the infiltration of water during the winter.

In addition to changes in water levels from precipitation, temporary changes in levels may be caused by earth tides, variation in barometric pressure, and earthquakes. Evapotranspiration causes small daily declines in water levels in some wells.

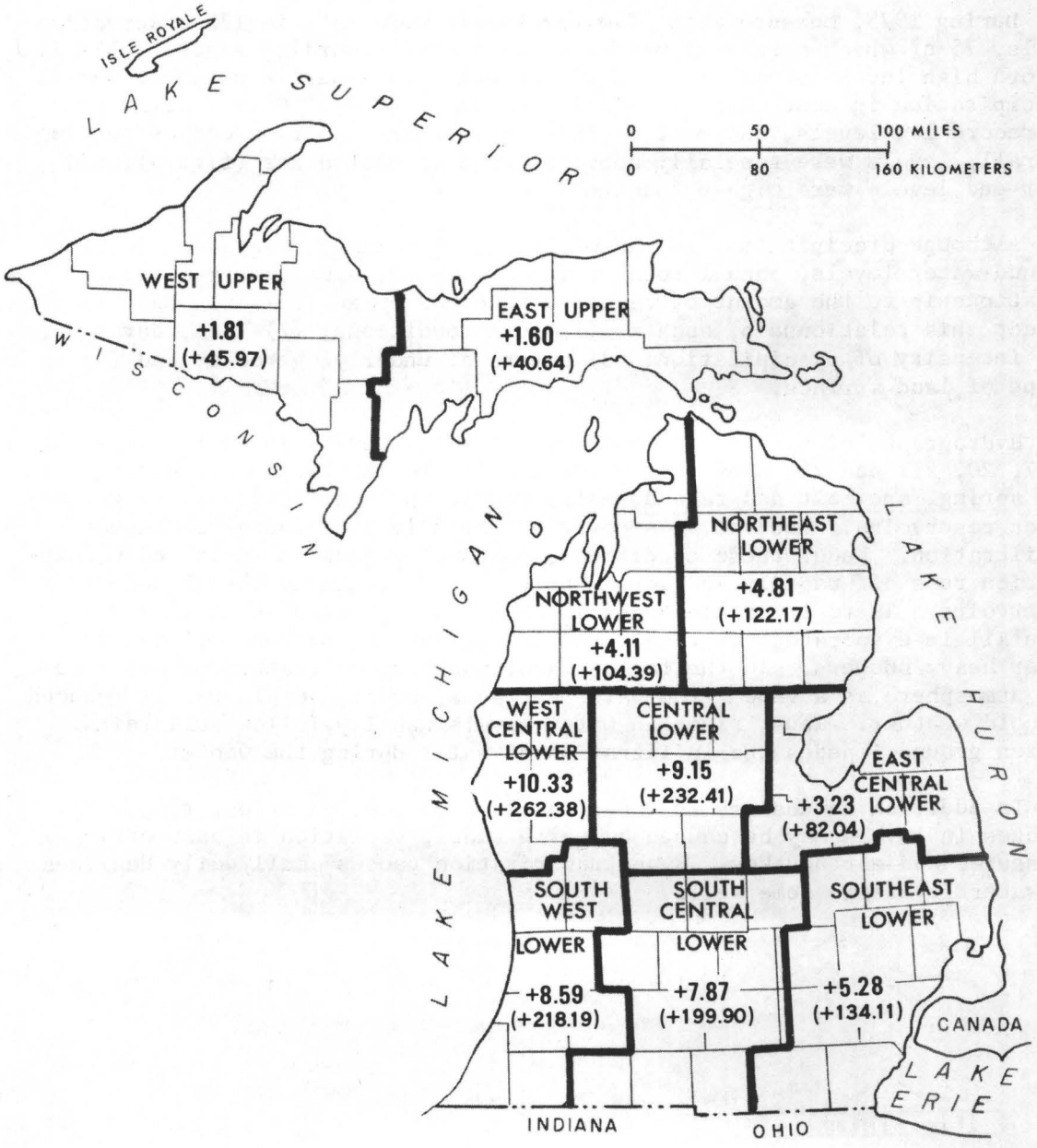


Figure 4.--Deviation of precipitation from normal during 1975 by climatological regions. Figures are in inches and, millimeters in parenthesis. Normals are based on data for 1931-60.

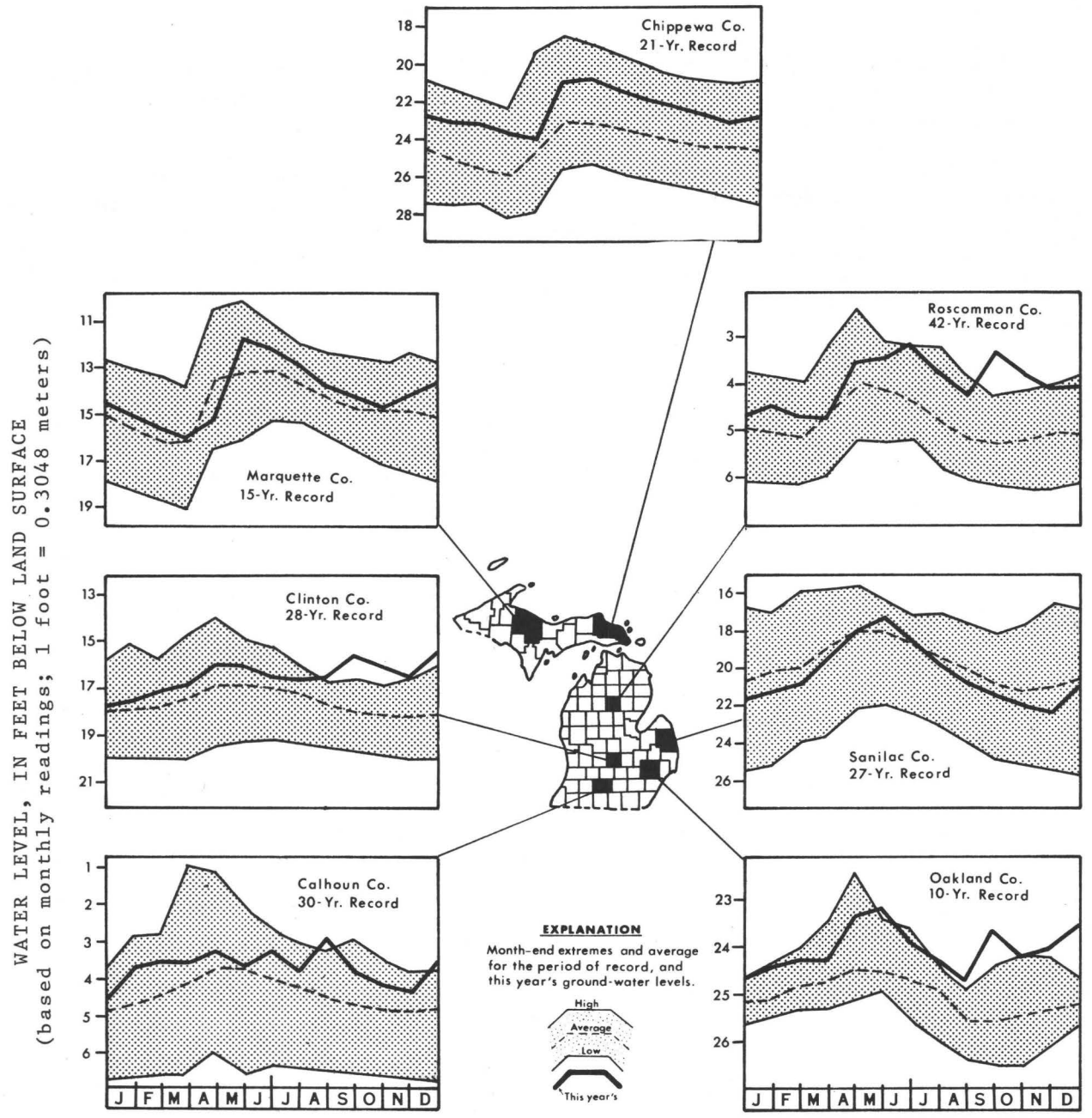


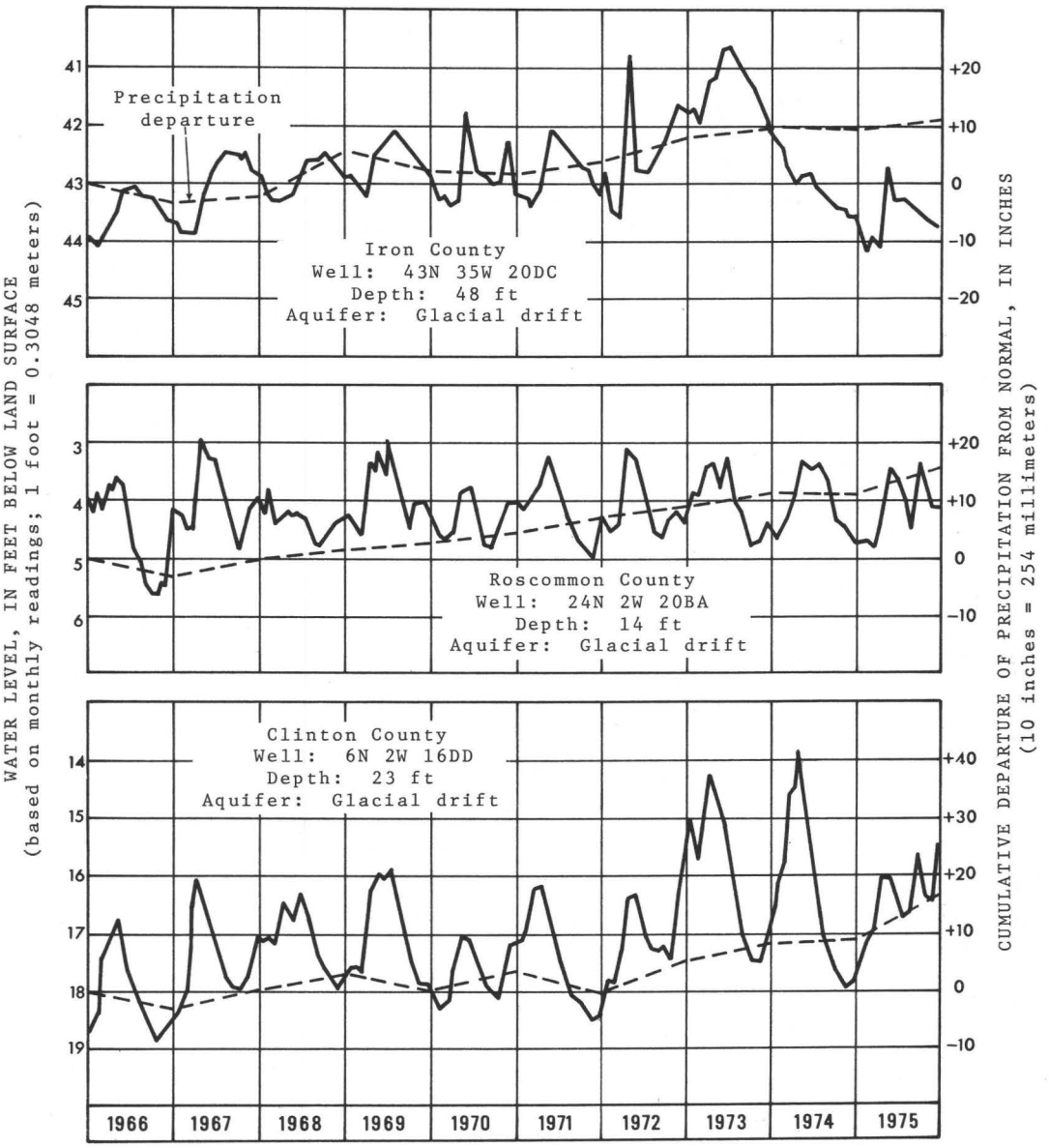
Figure 5.-- Water levels during 1975 were generally above average in most wells throughout the state.

AREA GROUND-WATER LEVELS

Descriptions of some of Michigan's municipal, institutional, industrial, and areal ground-water supplies follow alphabetically, by counties. Most descriptions are supplemented by illustrations.

The descriptions include a few data on the chemical quality of water, based on latest analyses made by the Michigan Department of Health. Where more than one well is involved, a range in quality is generally given. In this report, the unit milligrams per liter (mg/l) can be considered to be numerically equal to parts per million (ppm).

Figure 6.--Long-term records of water levels in three wells whose levels respond principally to natural climatic conditions. Precipitation departures (dashed lines) are cumulative totals for the climatological divisions in which the wells are located.


WATER LEVEL, IN FEET BELOW LAND SURFACE
(based on monthly readings; 1 foot = 0.3048 meters)
CUMULATIVE DEPARTURE OF PRECIPITATION FROM NORMAL, IN INCHES
(10 inches = 254 millimeters)
Precipitation departure
Iron County
Well: 43N 35W 20DC
Depth: 48 ft
Aquifer: Glacial drift
Roscommon County
Well: 24N 2W 20BA
Depth: 14 ft
Aquifer: Glacial drift
Clinton County
Well: 6N 2W 16DD
Depth: 23 ft
Aquifer: Glacial drift
41
42
43
44
45
3
4
5
6
14
15
16
17
18
19
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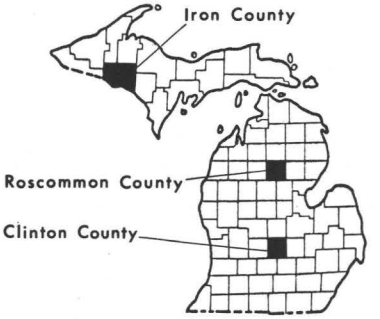
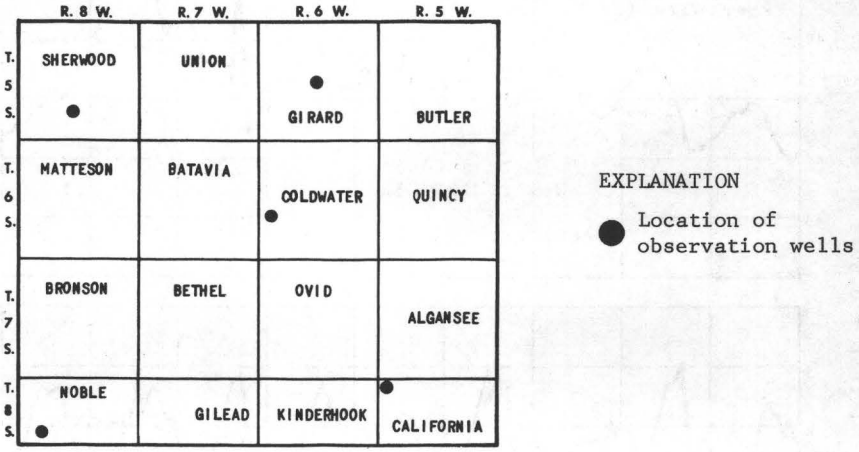

Iron County
Roscommon County
Clinton County



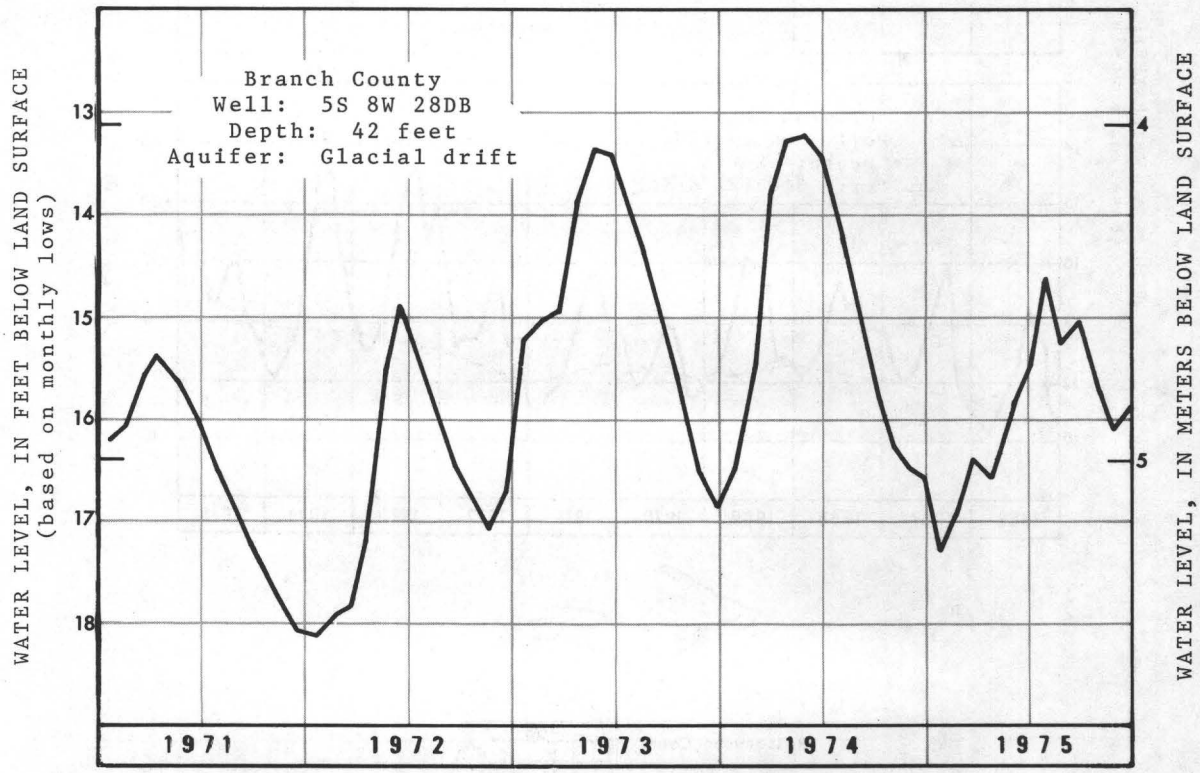


Figure 7.--In Branch County, water levels in the hydrograph for well 5S 8W 28DB are typical of levels in the 5 observation wells in the County.

BRANCH COUNTY - CITY OF COLDWATER

SUPPLY AND SOURCE -- 4 wells, 121 to 132 feet deep, tap the glacial drift.

YIELD OF WELLS -- No. 3 - 1,200; No. 4 - 1,400; No. 5 - 2,250; No. 6 - 2,850 gal/min; specific capacity -- 80 to 190 gal/min/ft of drawdown.

PUMPAGE -- Total annual pumpage, in million gallons, for past 5 years.

1975 -	965
1974 -	1,024
1973 -	1,023
1972 -	969
1971 -	944

QUALITY OF WATER -- Hardness 300-330 mg/1
Iron 1.9-3.2 mg/1
Total Solids 343-390 mg/1

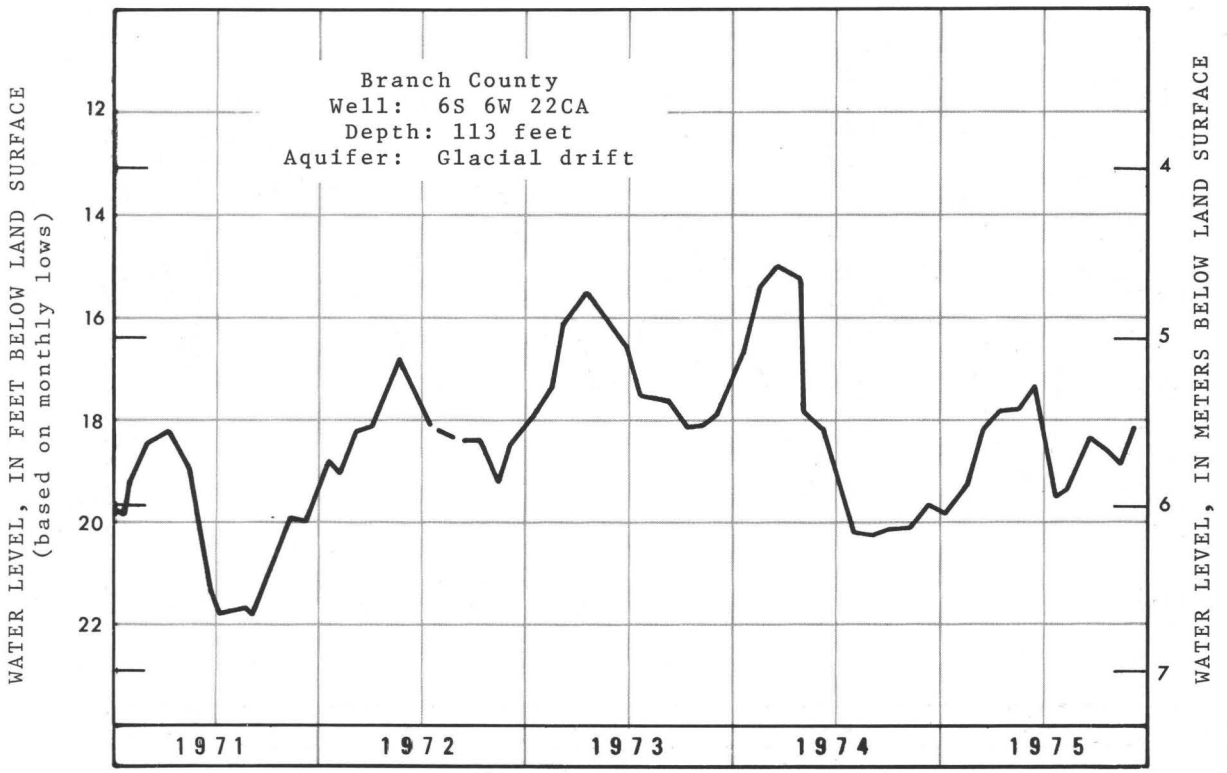


Figure 8 -- At Coldwater, water levels showed little fluctuation, however, year-end levels were above last year's.

CALHOUN COUNTY - CITY OF BATTLE CREEK

SUPPLY AND SOURCE -- 29 wells, 120 to 160 feet deep, tap sandstones of the Marshall Formation. All are located at the Verona Field.

YIELD OF WELLS -- 300 to 1,000 gal/min; specific capacity -- 50 to 650 gal/min/ft of drawdown.

PUMPAGE -- Total annual pumpage, in million gallons, for past 5 years.

1975	2,224
1974	2,168
1973	2,685
1972	2,749
1971	2,566

QUALITY OF WATER --

Hardness	245-345 mg/1
Iron	0.05-1.3 mg/1
Total Solids	300-413 mg/1

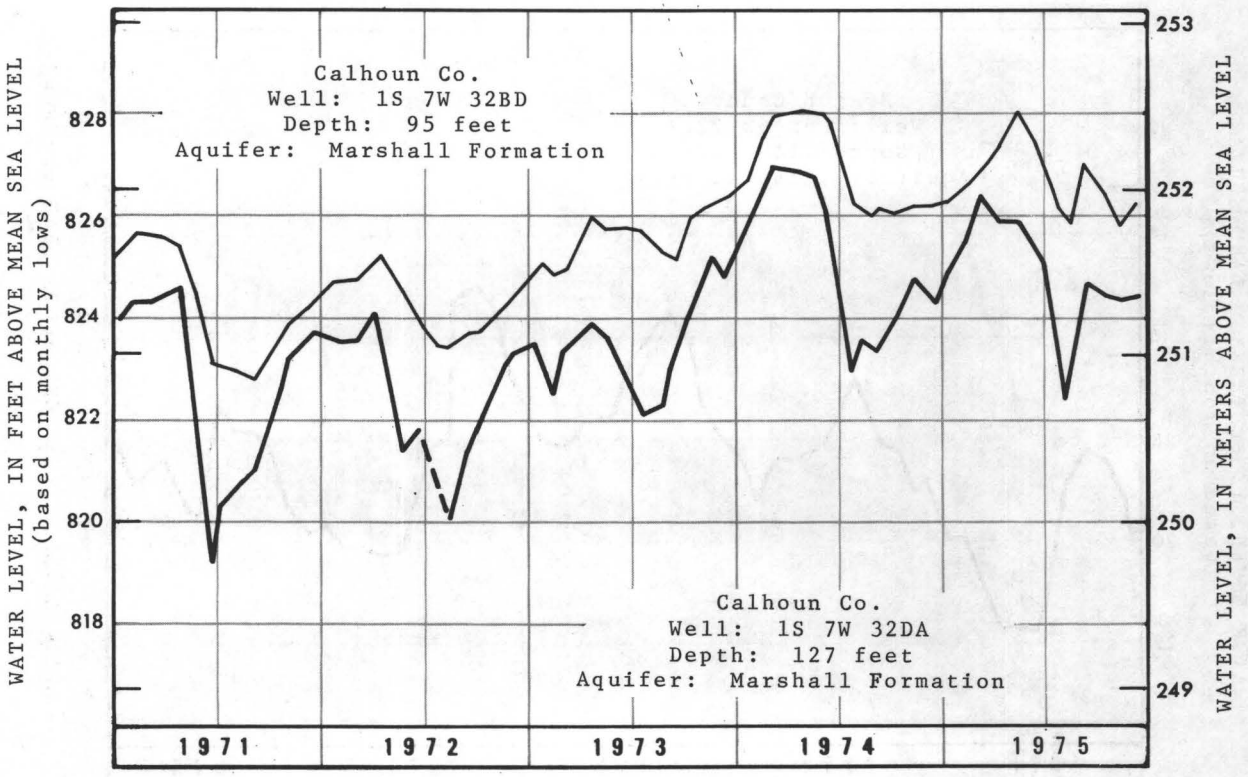


Figure 9 -- At Battle Creek, water levels varied little from 1974.

CLINTON COUNTY - CITY OF ST. JOHNS

SUPPLY AND SOURCE -- 7 wells, about 500 feet deep, tap sandstones of the Saginaw Formation.

YIELD OF WELLS -- 250 to 500 gal/min; specific capacity -- 3 to 12 gal/min/ft of drawdown

PUMPAGE -- Total annual pumpage, in million gallons, for past 5 years.

1975	559
1974	576
1973	583
1972	486
1971	535

QUALITY OF WATER --

Hardness	260-310 mg/1
Iron	0.15-1.0 mg/1
Total Solids	360-390 mg/1

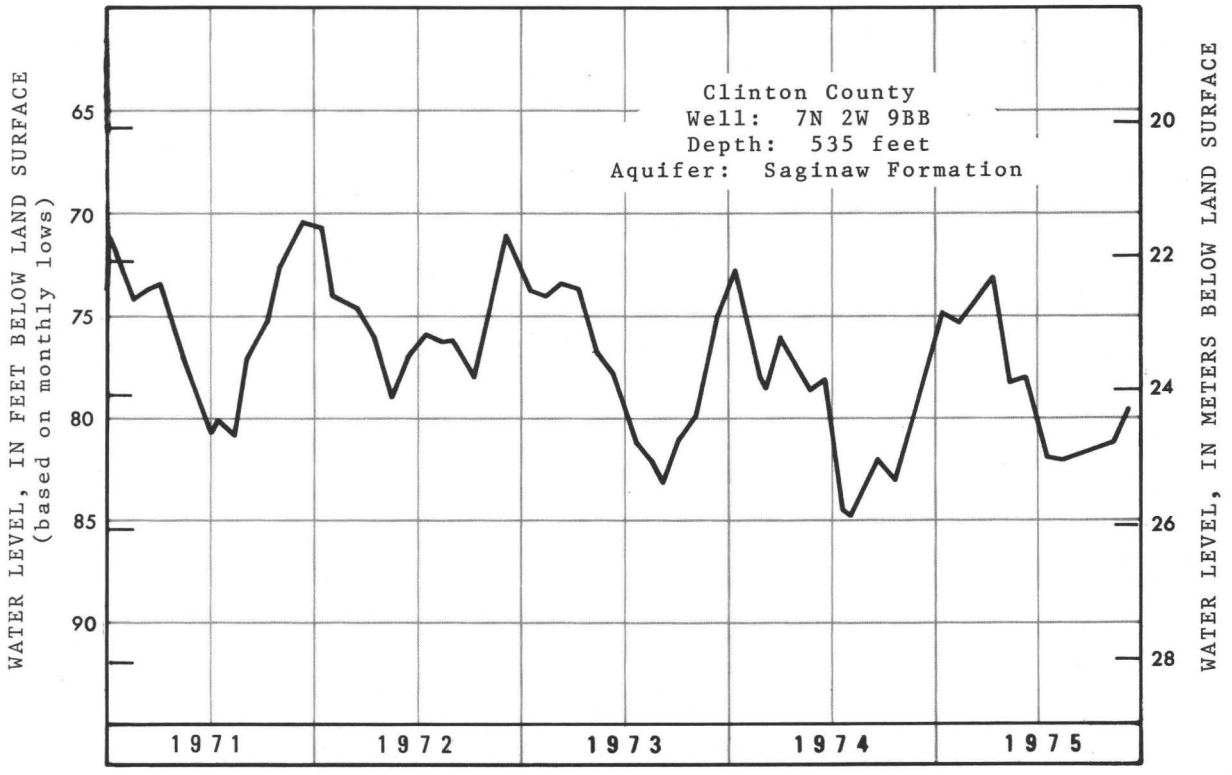


Figure 10.--At St. Johns, water levels in the observation well did not fall to the record lows set in 1974. Total pumpage was less in 1975.

EATON COUNTY - DELTA TOWNSHIP

SUPPLY AND SOURCE -- 4 wells, 370 to 450 feet deep, tap the Saginaw Formation.

YIELD OF WELLS -- 160 to 700 gal/min.

PUMPAGE -- Total annual pumpage, in million gallons, for past 5 years.

1975	541
1974	520
1973	435
1972	405
1971	384

QUALITY OF WATER --

Hardness	275-429 mg/1
Iron	0.5-3.1 mg/1
Total Solids	334-539 mg/1

REMARKS -- Pumpage in the township has doubled since 1969.

GENESEE COUNTY
FISHER BODY, GMC, AT GRAND BLANC

WATER SUPPLY AND SOURCE -- 4 wells, 200 to 285 feet deep, tap sandstones of the Saginaw Formation. Three of the four Fisher Body Plant wells have been added to the City of Grand Blanc water system since 1968.

YIELD OF WELLS -- 250 to 300 gal/min; specific capacity 3 to 6 gal/min/ft of drawdown.

PUMPAGE -- Total annual pumpage, in million gallons, for past 5 years.

1975 -	60
1974 -	39
1973 -	12
1972 -	89
1971 -	183

QUALITY OF WATER -- Hardness 330 mg/1
Iron 0.80 mg/1
Total solids 628 mg/1

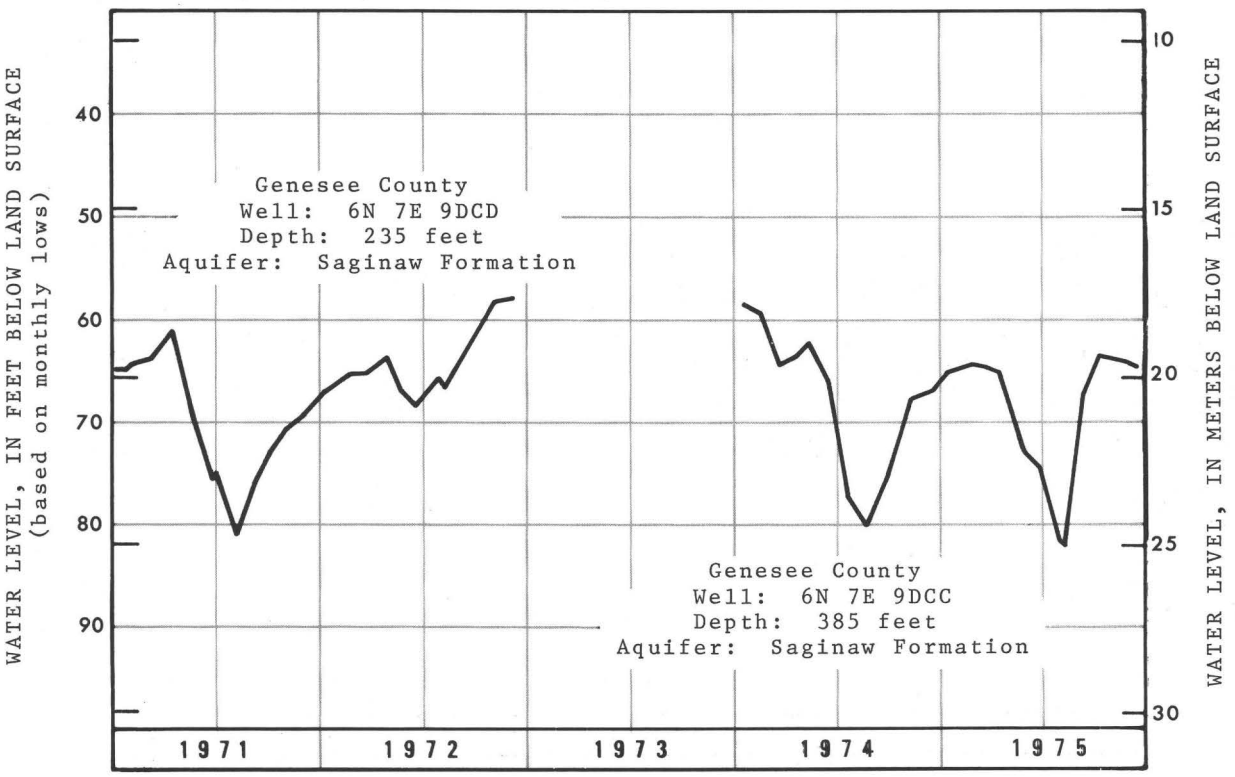


Figure 11.--At the Fisher Body well field, observation well 6N 7E 9DCD was discontinued in 1972. In 1974, a continuous recorder was installed on well 6N 7E 9DCC.

GRATIOT COUNTY - CITY OF ST. LOUIS

SUPPLY AND SOURCE -- 6 wells, 136 to 223 feet deep, tap buried outwash deposits in glacial drift.

YIELD OF WELLS -- 350 to 500 gal/min; specific capacity -- 8 to 15 gal/min/ft of drawdown

PUMPAGE -- Total annual pumpage, in million gallons, for past 5 years.

1975	500
1974	530
1973	547
1972	570
1971	525

QUALITY OF WATER --

Hardness	240-450 mg/1
Iron	0.3-0.8 mg/1
Total Solids	410-725 mg/1

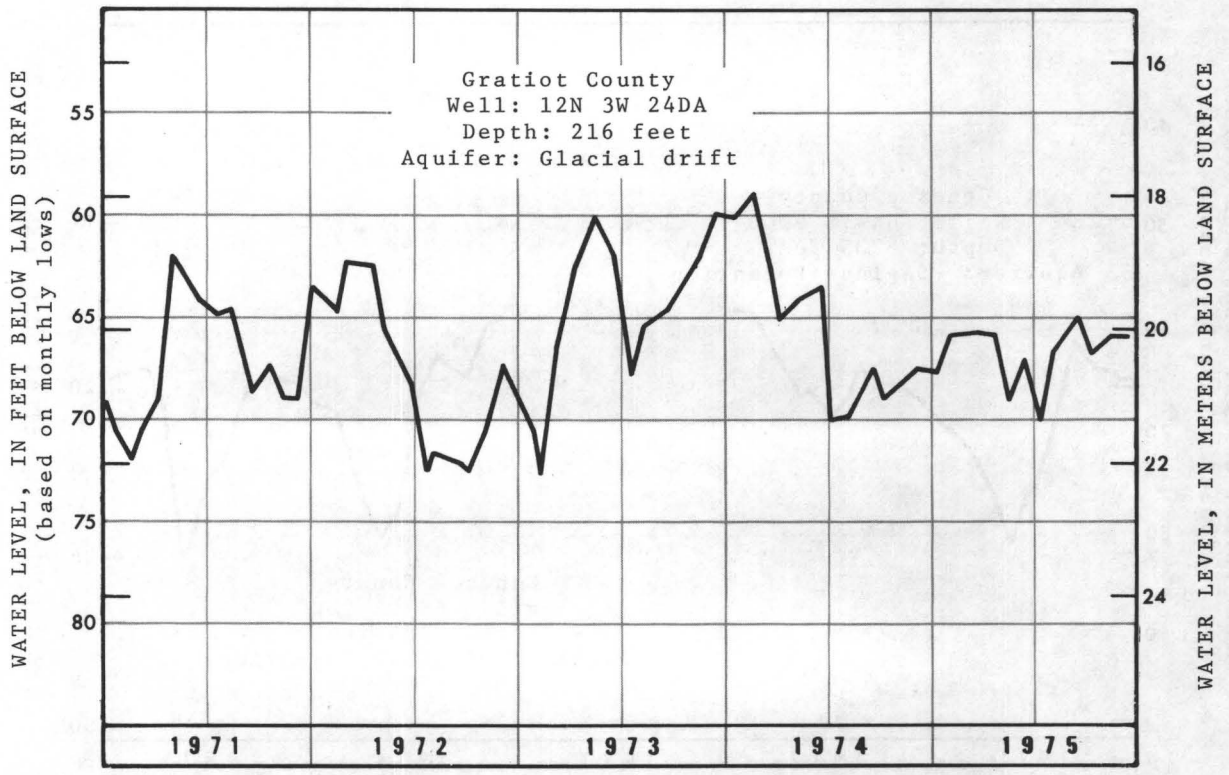


Figure 12.--At St. Louis, water levels in the observaiton well remained fairly stable during 1975.

INGHAM COUNTY - CITY OF LANSING

SUPPLY AND SOURCE -- 125 wells, 400 to 425 feet deep, tap sandstones of the Saginaw Formation; 3 wells, 85 to 105 feet deep, tap sand beds in glacial drift.

YIELD OF WELLS -- Sandstone - 100 to 700 gal/min; specific capacity - 3 to 10 gal/min/ft of drawdown.
-- Glacial drift - 790 to 1200 gal/min, specific capacity - 12 to 80 gal/min/ft of drawdown.

PUMPAGE -- Total annual pumpage, in million gallons, for past 5 years.

1975	8,099
1974	8,053
1973	8,850
1972	8,559
1971	8,404

QUALITY OF WATER -- Composite at Plant

Hardness	385 mg/1
Iron	0.88 mg/1
Total Solids	456 mg/1

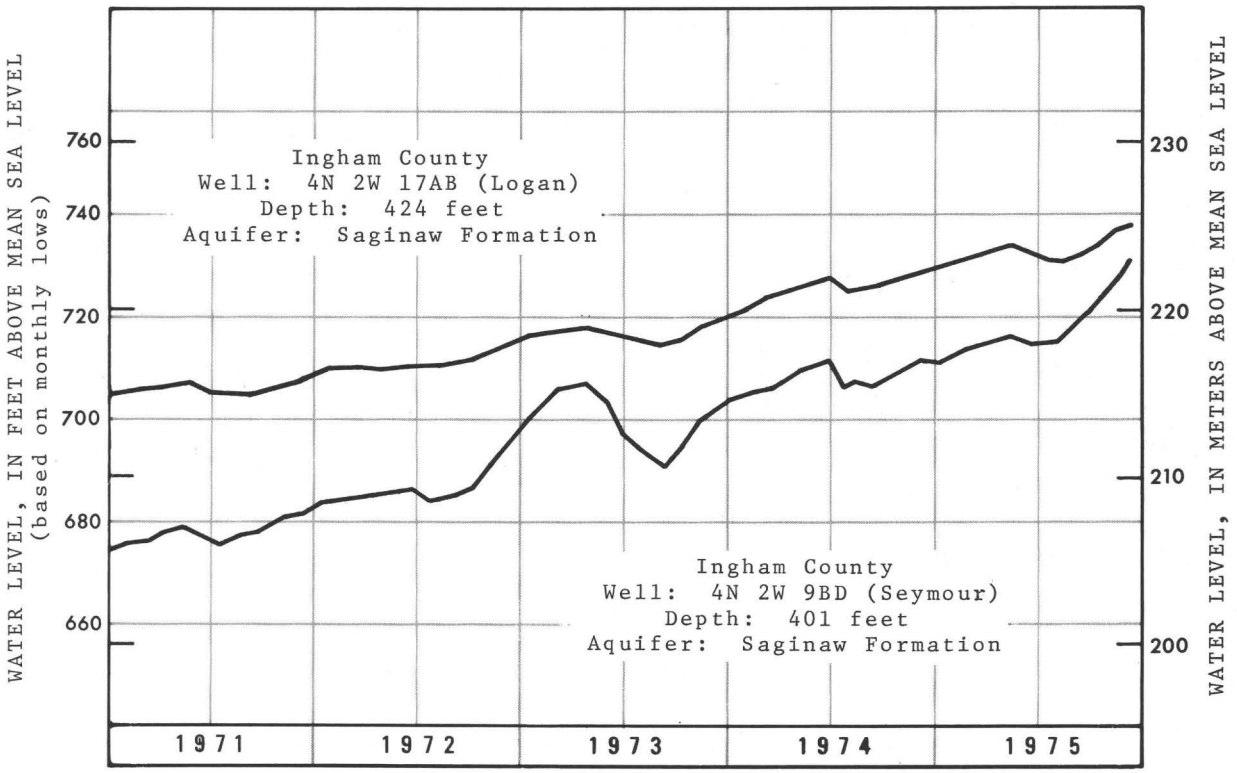


Figure 13.--At Lansing, water levels rose sharply in the Seymour observation well during the latter part of 1975 as pumpage decreased in that area.

INGHAM COUNTY - CITY OF MASON

SUPPLY AND SOURCE -- 1 well, about 50 feet deep, taps the glacial drift; 1 well, 223 feet deep, taps sandstones of the Saginaw Formation.

YIELD OF WELLS -- 675 to 700 gal/min; specific capacity -- No. 3 yields 30 gal/min/ft of drawdown from the glacial drift.

PUMPAGE -- Total annual pumpage, in million gallons, for past 5 years.

1975	211
1974	222
1973	179
1972	192
1971	206

QUALITY OF WATER --

Hardness	315-430 mg/1
Iron	0.0-0.37 mg/1
Total Solids	386-898 mg/1

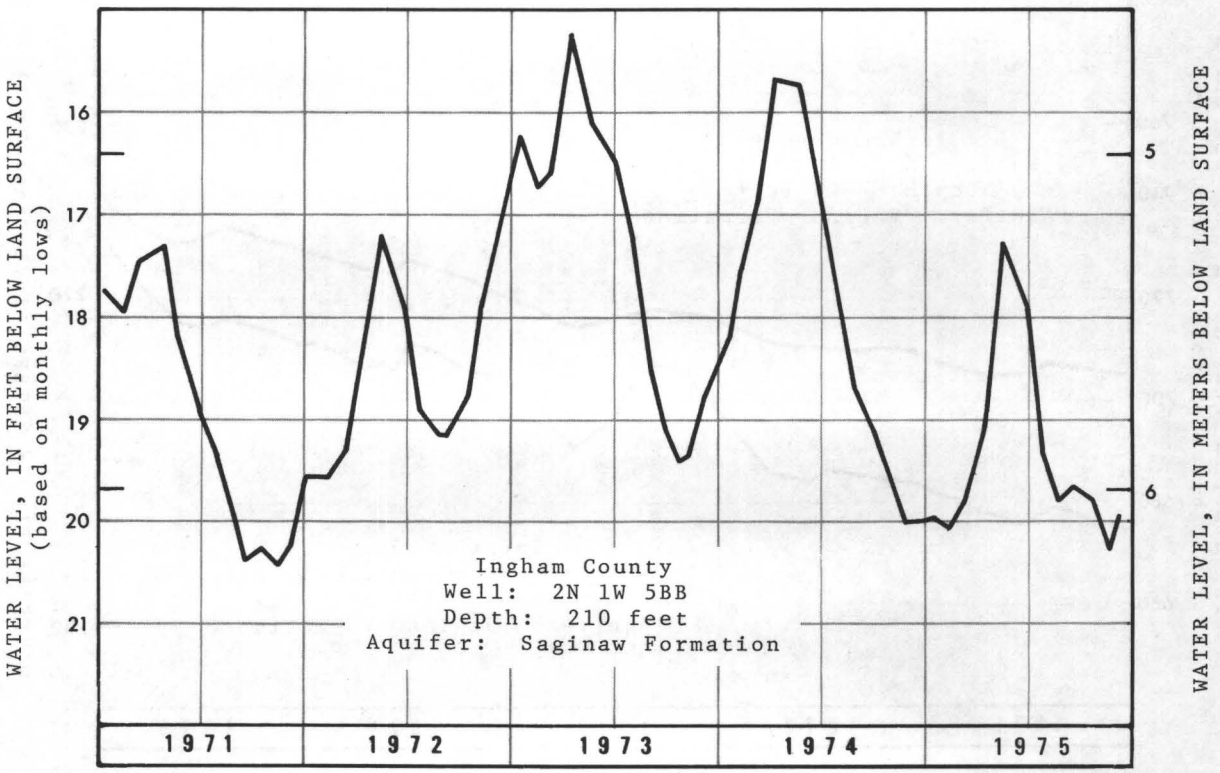


Figure 14.--At Mason, water levels in the observation well show a declining trend since 1973.

INGHAM COUNTY
EAST LANSING-MERIDIAN TOWNSHIP

SUPPLY AND SOURCE -- 24 wells, 295 to 422 feet deep, tap the Saginaw Formation, and 1 well taps the glacial deposits.

YIELD OF WELLS -- About 280 to 1,000 gal/min; specific capacity 2 to 12 gal/min/ft of drawdown.

PUMPAGE -- Total annual pumpage, in million gallons.

1975	1,566
1974	1,487

QUALITY OF WATER --

Hardness	310-505 mg/l
Iron	0.9-3.8 mg/l
Total Solids	345-662 mg/l

REMARKS -- In July 1973, the City of East Lansing and Meridian Township combined water systems forming the East Lansing-Meridian Township Water and Sewer Authority.

SUPPLY AND SOURCE -- 7 wells, 399 to 417 feet deep, tap sandstones of the Saginaw Formation.

YIELD OF WELLS -- 260 to 500 gal/min; specific capacity -- 3 to 8 gal/min/ft of drawdown.

PUMPAGE -- Total annual pumpage, in million gallons, for past 5 years.

1975	725
1974	631
1973	750
1972	717
1971	742

QUALITY OF WATER --

Hardness	274-435 mg/1
Iron	0.35-13.0 mg/1
Total Solids	320-528 mg/1

REMARKS -- Most ground-water pumped by the township is used to supply industrial plants in the area.

INGHAM COUNTY
MICHIGAN STATE UNIVERSITY

SUPPLY AND SOURCE -- 17 wells, 353 to 435 feet deep, tap sandstones of the Saginaw Formation; 2 wells are on a standby basis only.

YIELD OF WELLS -- 147 to 654 gal/min; specific capacity -- 1 to 11 gal/min/ft of drawdown.

PUMPAGE -- Total annual pumpage, in million gallons, for past 5 years.

1975	1,800
1974	1,800
1973	1,805
1972	1,712
1971	1,666

QUALITY OF WATER --

Hardness	315-350 mg/1
Iron	0.15-1.20 mg/1
Total Solids	361-405 mg/1

SUPPLY AND SOURCE -- 14 wells, 380 to 400 feet deep, tap sandstones of the Saginaw and Marshall Formations.

YIELD OF WELLS -- 1,000 to 2,800 gal/min; specific capacity -- No. 12 well is 56; reported average of all wells is 100 gal/min/ft of drawdown.

PUMPAGE -- Total annual pumpage, in million gallons, for past 5 years.

1975	4,077
1974	4,634
1973	4,864
1972	4,919
1971	4,487

QUALITY OF WATER --

Hardness	260-630	mg/l
Iron	0.2-1.0	mg/l
Total Solids	394-1072	mg/l

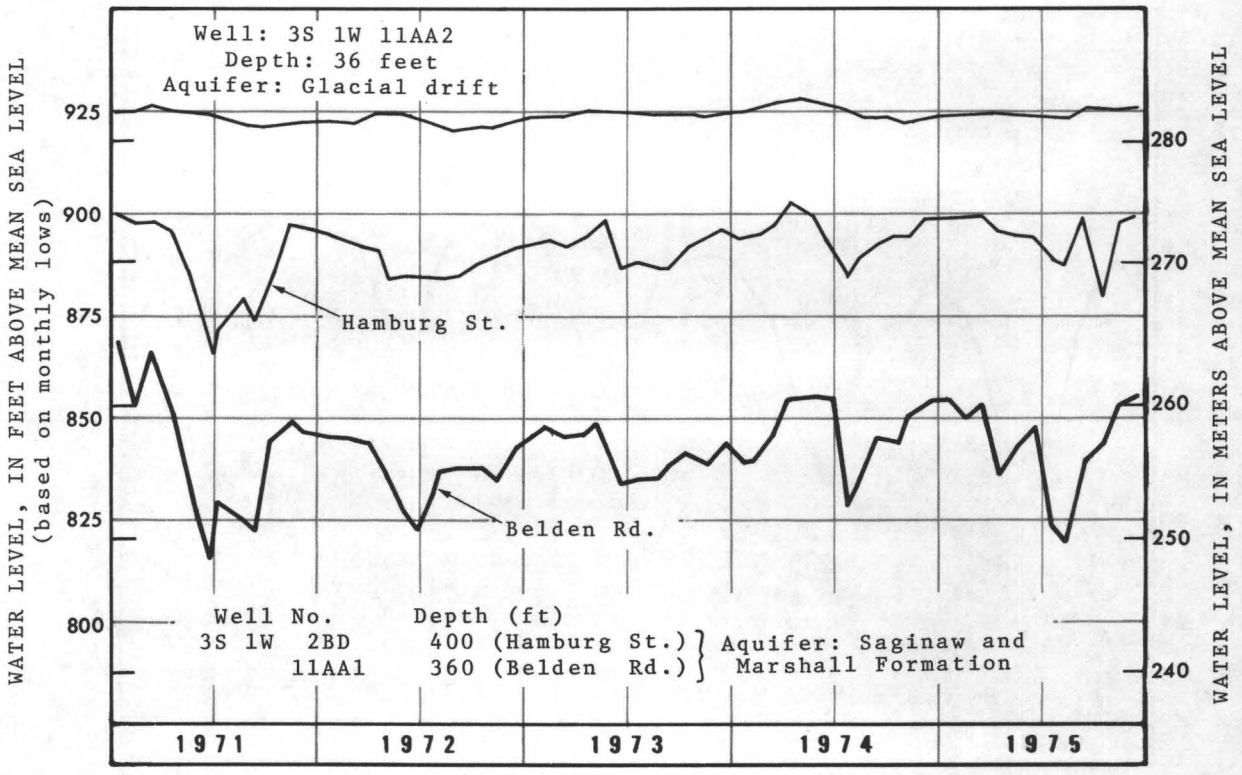


Figure 15.--At Jackson, levels in the two bedrock observation wells were at their lowest since 1971.

SUPPLY AND SOURCE -- 84 wells, 130 to 254 feet deep, tap the glacial drift.

YIELD OF WELLS -- 200 to 2,000 gal/min; specific capacity -- 7 to 100 gal/min/ft of drawdown.

PUMPAGE -- Total annual pumpage, in million gallons, for past 5 years.

1975	6,336
1974	6,454
1973	6,689
1972	6,032
1971	6,771

QUALITY OF WATER -- Composite of 2 pumping stations:

Hardness	385-420 mg/1
Iron	0.49-3.10 mg/1
Total Solids	499-530 mg/1

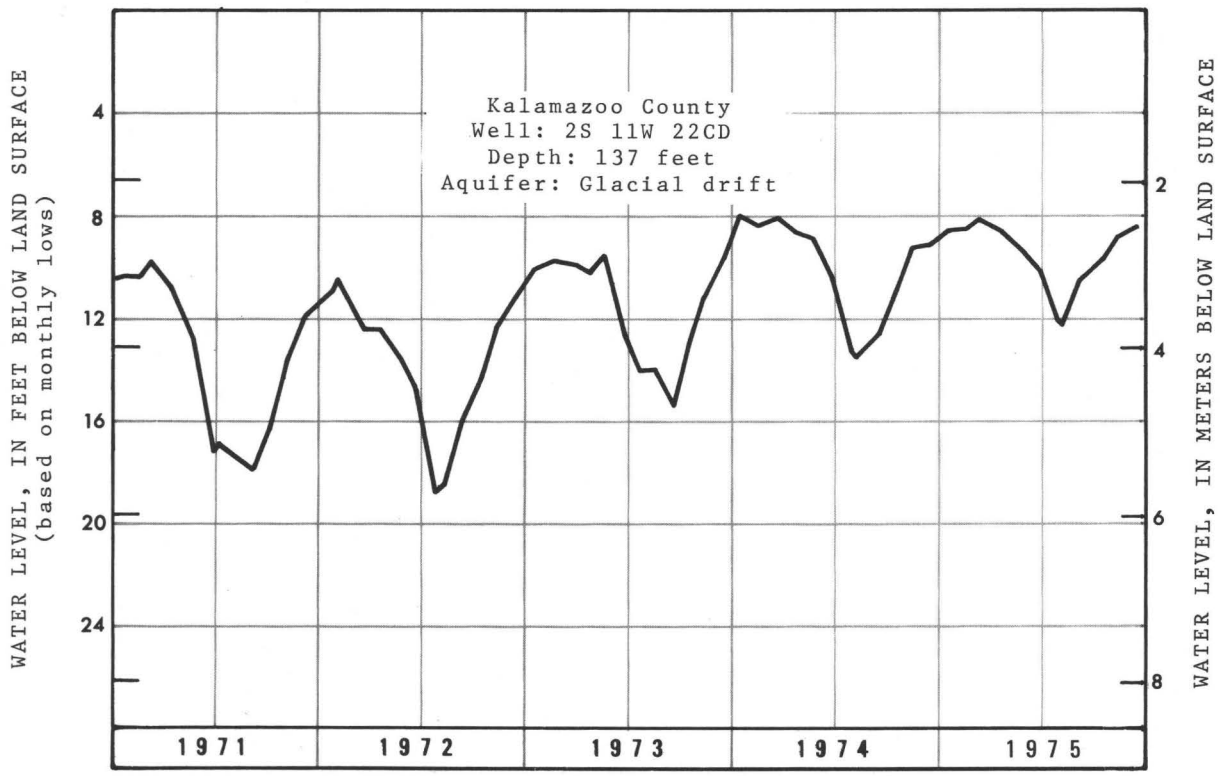


Figure 16.--At Kalamazoo, levels at the Stockbridge well field continue to show a gradual rising trend.

KALAMAZOO COUNTY - CITY OF PORTAGE

SUPPLY AND SOURCE -- 15 wells, 95 to 185 feet deep, tap the glacial drift.

YIELD OF WELLS -- 300 to 1,000 gal/min; specific capacity -- 25 gal/min/ft of drawdown.

PUMPAGE -- Total annual pumpage, in million gallons, for past 5 years.

1975 - 631
1974 - 647
1973 - 582
1972 - 526
1971 - 565

QUALITY OF WATER -- Hardness 165-345 mg/1
Iron 0.0-1.5 mg/1
Total Solids 200-469 mg/1

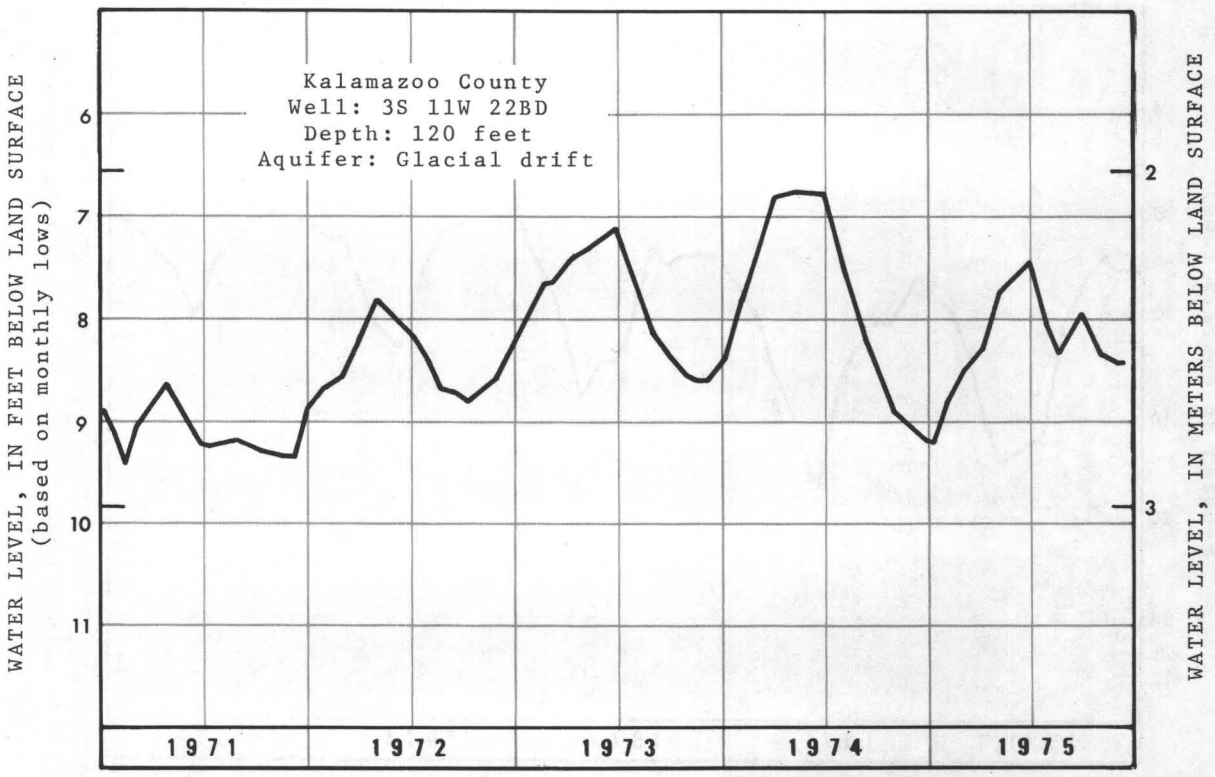


Figure 17.--At Portage, levels in the observation well respond to areal pumpage.

KENT COUNTY - KENT COUNTY AIRPORT

SUPPLY AND SOURCE -- 3 wells, 180 to 203 feet deep, tap the glacial drift.

YIELD OF WELLS -- 100 to 360 gal/min; specific capacity -- 2.3 gal/min/ft of drawdown.

PUMPAGE -- Estimated total annual pumpage, in million gallons, for past 5 years.

1975 - 12.0
1974 - 12.0
1973 - 11.2
1972 - 11.2
1971 - 9.0

Beginning in 1971, airport wells were used only to supply water for air conditioning.

REMARKS -- The City of Grand Rapids supplies the airport water for public use.

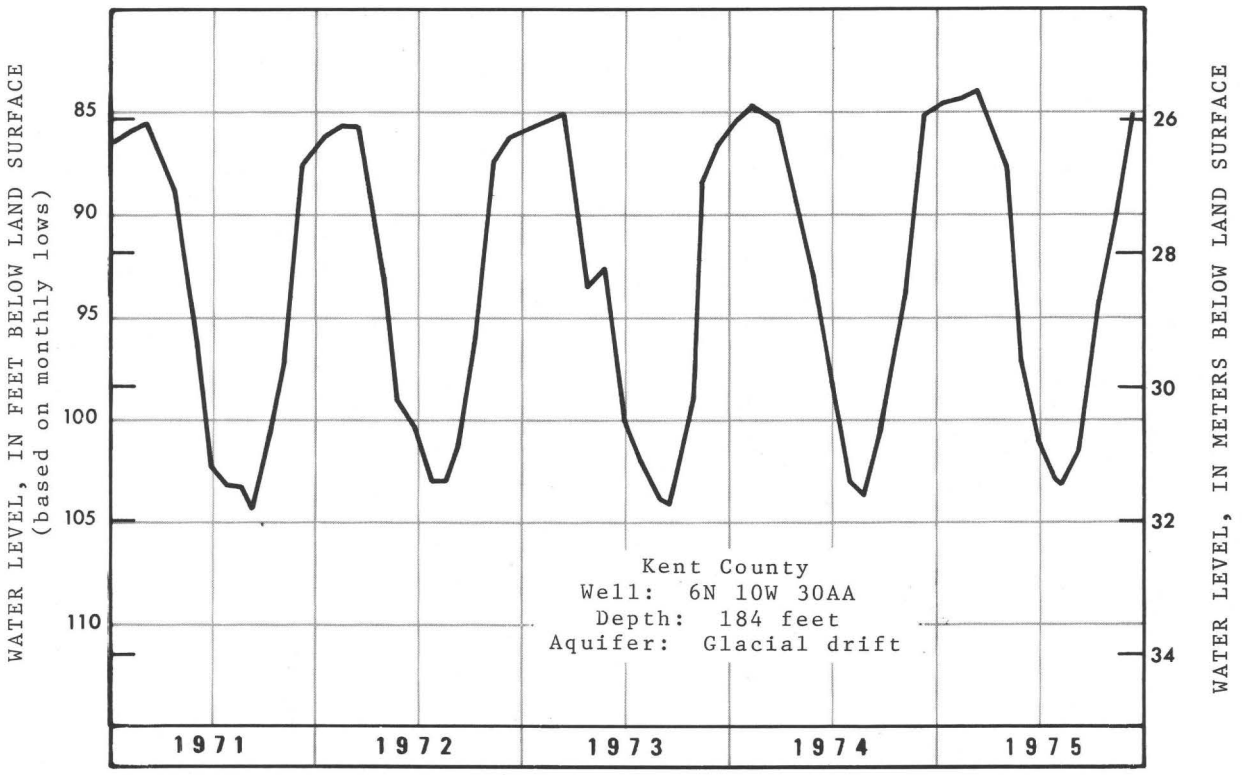


Figure 18.--At Kent County Airport, lowered water levels reflect increased withdrawals during summer months to supply water for air conditioning.

LENAWEE COUNTY
FISHER BODY, GMC, NEAR TECUMSEH

SUPPLY AND SOURCE -- 3 wells, 76 to 89 feet deep, tap the glacial drift.

YIELD OF WELLS -- About 500 gal/min; specific capacity -- 25 to 30 gal/min/ft of drawdown.

PUMPAGE -- Total annual pumpage, in million gallons, for past 5 years.

1975	16.3
1974	17.4
1973	23.8
1972	22.7
1971	20.7

QUALITY OF WATER --

Hardness	415-505 mg/l
Iron	2.2-4.4 mg/l
Total Solids	506-660 mg/l

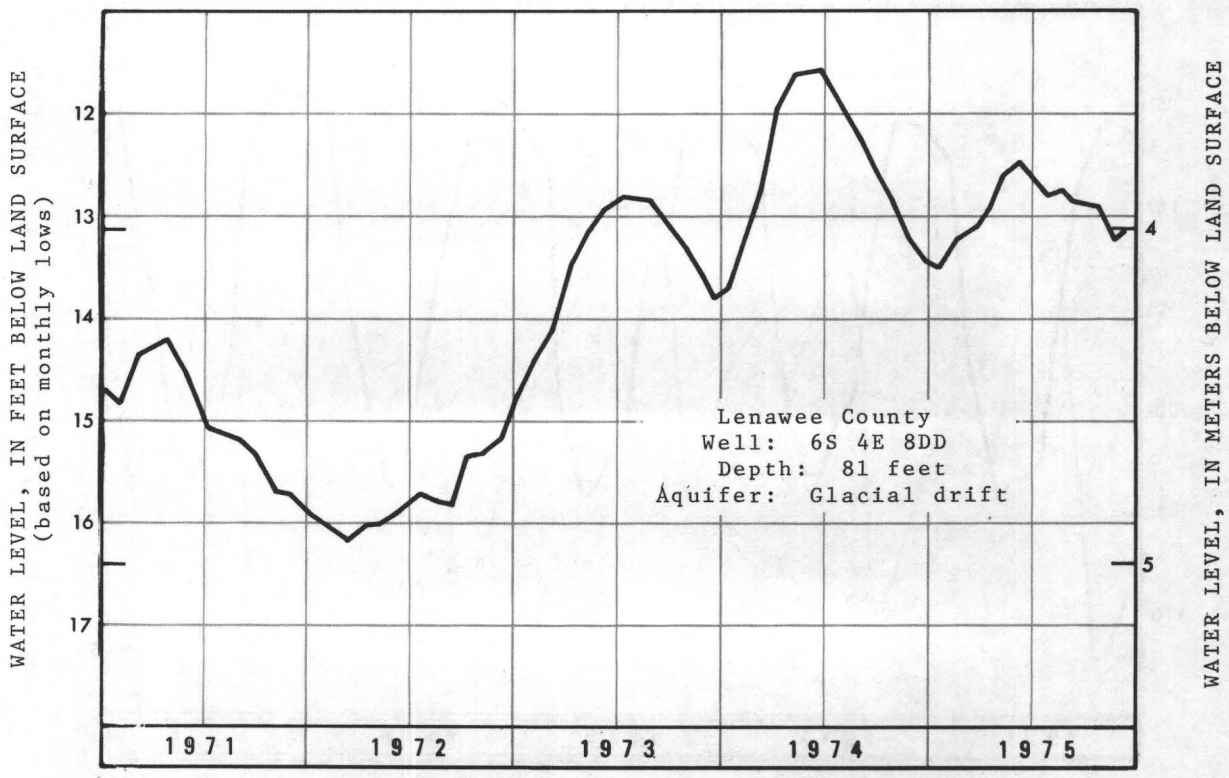
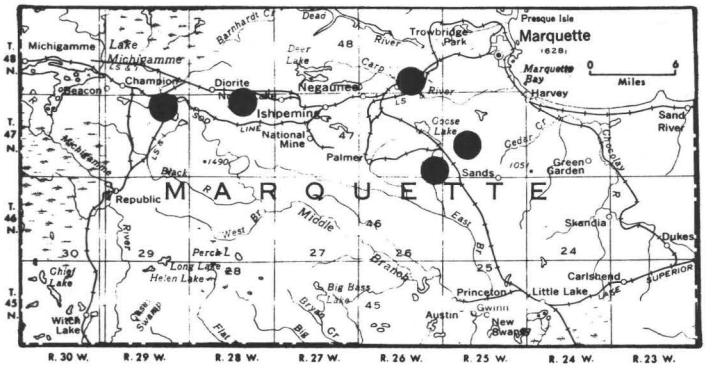


Figure 19.--At the Fisher Body well field near Tecumseh, water levels in the observation well were below the record high levels of 1974.



EXPLANATION

● Location of observation wells

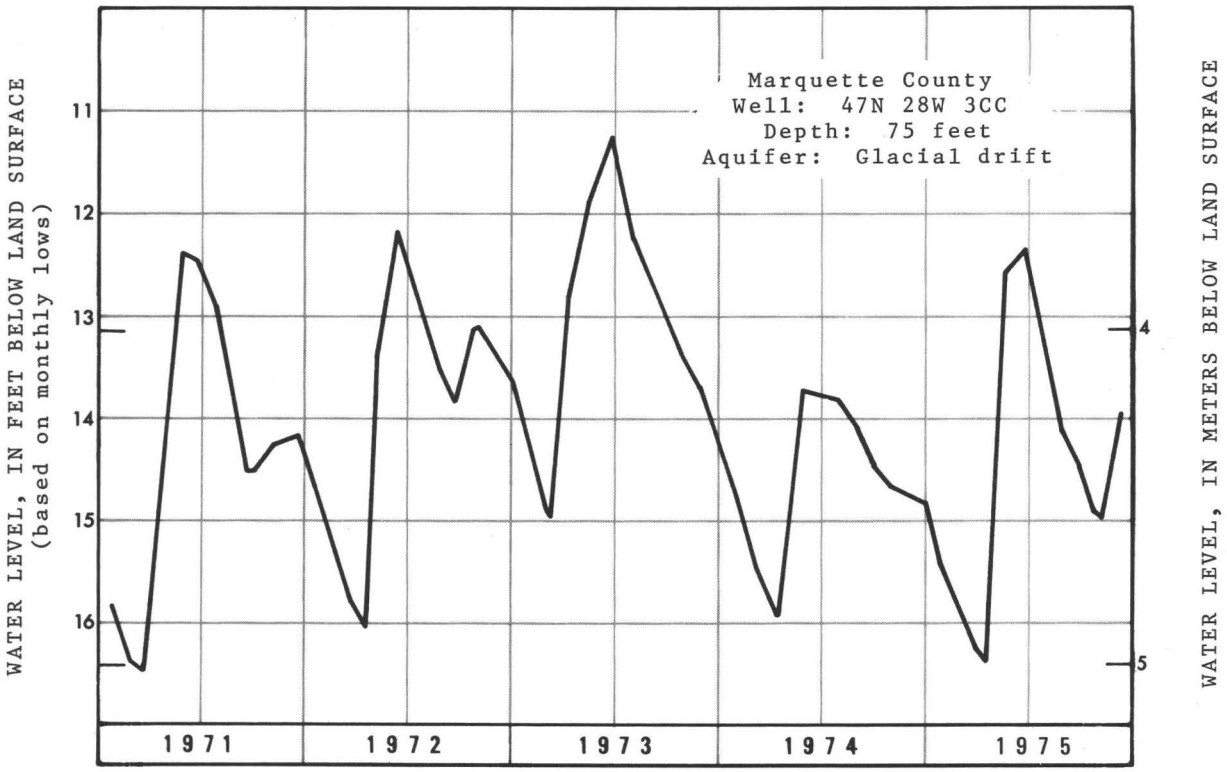


Figure 20.--Observation well map and hydrograph showing typical water levels of wells in the Marquette Iron Range.

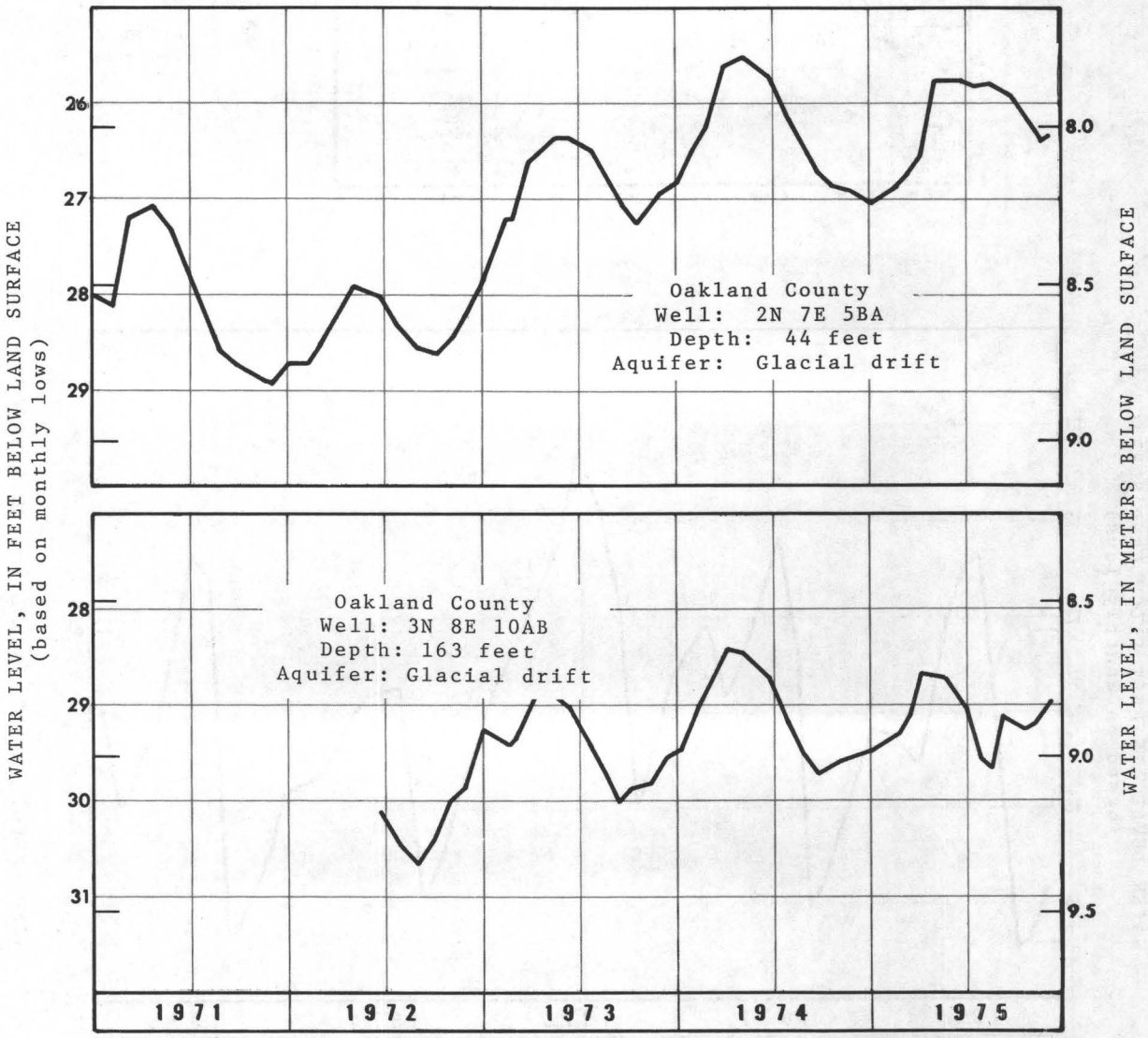
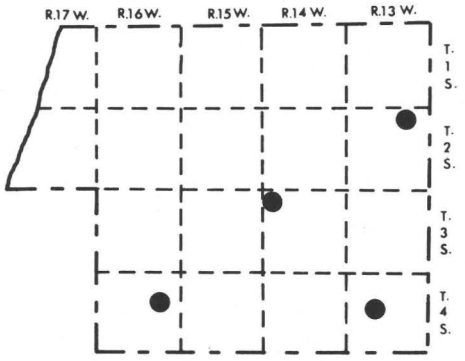


Figure 21.--Hydrograph showing water levels in observation wells in a shallow and a deep aquifer in Oakland County. Levels in both wells respond to natural climatic conditions.



EXPLANATION

● Location of observation wells

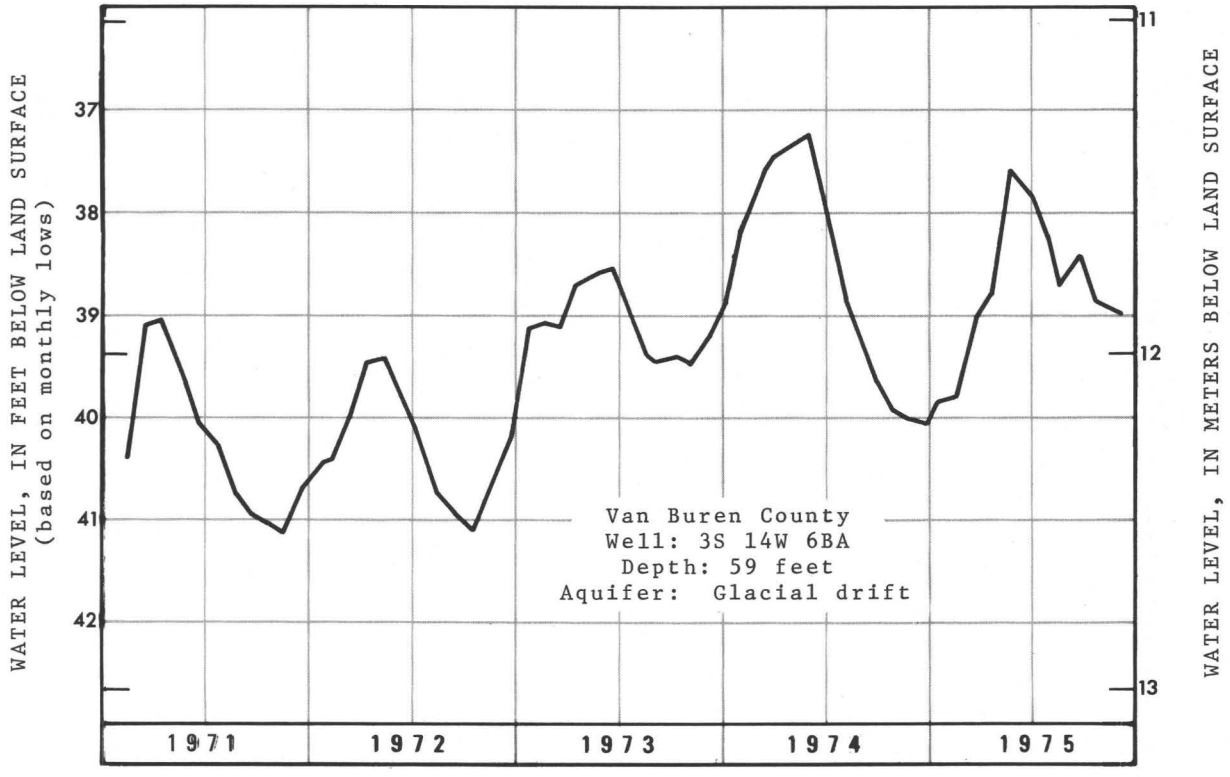


Figure 22.--In Van Buren County water levels in well 3S 14W 6BA are typical of other wells shown in the above map.

SUPPLY AND SOURCE -- 3 wells, 91 to 196 feet deep, tap the glacial drift; most water is pumped from the Huron River.

YIELD OF WELLS -- 1,050 to 4,860 gal/min; specific capacity -- 20 to 600 gal/min/ft of drawdown.

PUMPAGE -- Total annual ground-water pumpage, in million gallons, for past 5 years (only 15 to 20 percent of total pumpage is from ground-water sources).

1975 -	878
1974 -	958
1973 -	899
1972 -	938
1971 -	1,180

QUALITY OF WATER -- Ground water:

Hardness	355-585 mg/1
Iron	0.25-2.4 mg/1

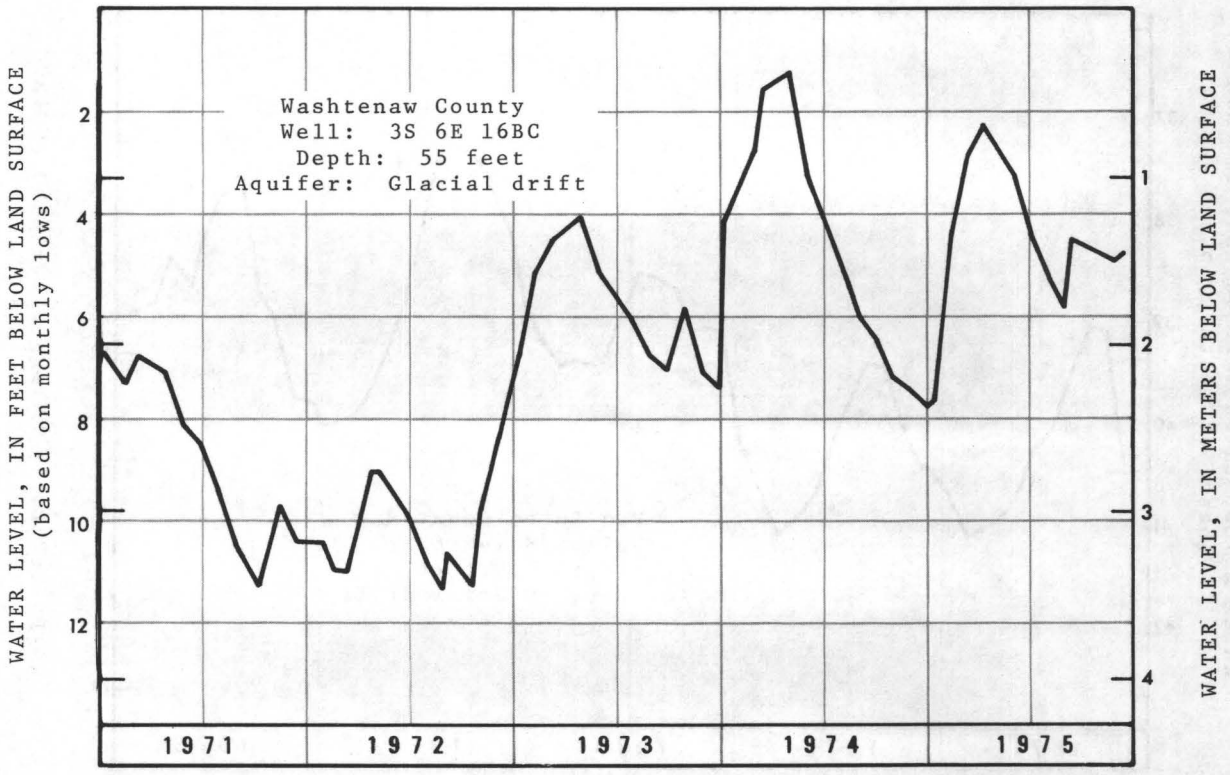


Figure 23.--At Ann Arbor, water levels in the airport well respond principally to pumpage at the Steere Farm well field. In 1975, pumpage decreased resulting in higher year-end levels.

WASHTENAW COUNTY - CITY OF YPSILANTI

SUPPLY AND SOURCE -- 7 wells, 87 to 102 feet deep, tap the glacial drift.

YIELD OF WELLS -- Average 450 gal/min; specific capacity -- 25 to 180 gal/min/ft of drawdown.

PUMPAGE -- Total annual pumpage, in million gallons, for past 5 years.

1975	1,462
1974	1,958
1973	1,920
1972	1,759
1971	1,669

QUALITY OF WATER --

Hardness	305-320 mg/l
Iron	1.2-5.0 mg/l
Total Solids	400-764 mg/l

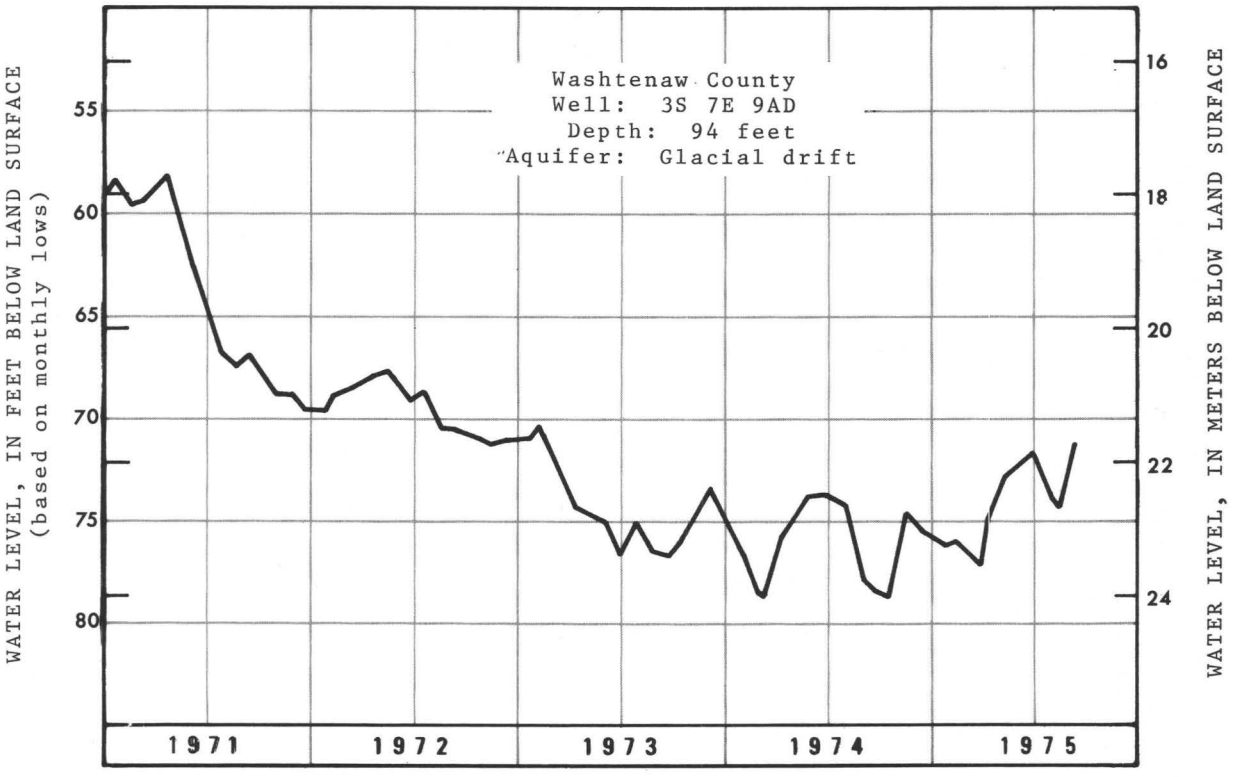


Figure 24.--At Ypsilanti, water levels in the observation well showed a rising trend in 1975.

SUPPLY AND SOURCE -- 8 wells, 50 to 95 feet deep, tap the glacial drift.

YIELD OF WELLS -- 700 to 3,500 gal/min

PUMPAGE -- Total annual pumpage, in million gallons, for past 5 years.

1975 -	854
1974 -	1,715
1973 -	2,284
1972 -	2,361
1971 -	2,942

QUALITY OF WATER -- Composite

Hardness	370 mg/l
Iron	0.5 mg/l
Total Solids	496 mg/l

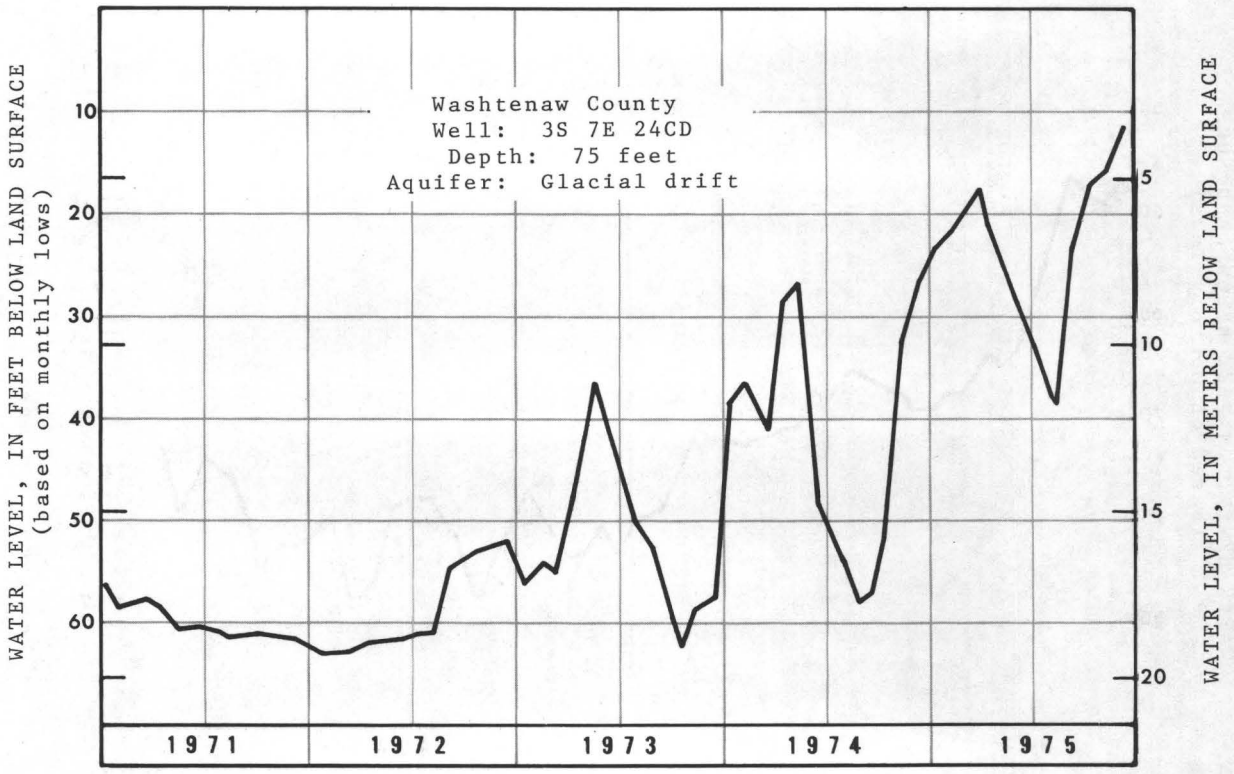


Figure 25.--At Ypsilanti Township's well field, water levels in the observation well respond to pumpage from a nearby production well. Since 1973, the production well has been used only intermittently.

TABLE 1. RECORDS OF MICHIGAN OBSERVATION WELLS.

COUNTY AND WELL NUMBER: For explanation of well numbers, see text under - Introduction "Well numbering system":
OWNER: MDNR - Michigan Department of Natural Resources; WMP - Wisconsin-Michigan Power Company; MSHD - Michigan State Highway Department; USFS - U.S. Forest Service; HCMA - Huron-Clinton Metropolitan Authority; BCRC - Branch County Road Commission.
AQUIFER:

- Qgd - Glacial drift deposits of Pleistocene (Quaternary) age
- IPs - Saginaw Formation of Pennsylvanian age
- Mb - Bayport Limestone of Mississippian age
- Mm - Marshall Formation of Mississippian age
- Dt - Traverse Group of Middle and Late Devonian age
- Ss - Salina Formation of Late Silurian age
- Sm - Manistique Dolomite of Middle Silurian age
- pЄf - Freda Sandstone of Keweenawan age (Precambrian)
- IPgr - Grand River Formation of Pennsylvania age
- Or - Limestones of Richmondian age (Late Ordovician)
- Otb - Black River and Trenton Limestones of Middle Ordovician age
- Op - Prairie du Chien Group of Early Ordovician age (previously designated as Au Train Formation)
- Єm - Munising Sandstone of Cambrian age
- pЄj - Jacobsville Sandstone of Precambrian age

ALTITUDE: Land-surface datum in feet above mean sea level.
MEASUREMENT, 1975 (frequency): R - Continuous recorder; D - Daily; W - Weekly; M - Monthly; Q - Quarterly; S - Semiannually; A - Annually; I - Intermittent.
OBSERVED WATER-LEVEL EXTREMES: In feet below or above (+) land surface. 1975 measurements underscored are extremes for entire record.
REMARKS: P - Water levels affected by pumping. Water-level measurements are made by the U.S. Geological Survey unless otherwise noted.

WELL NUMBER AND COUNTY (TWP. RANGE. SECTION)	OWNER OR OTHER DESIGNATION	DEPTH (ft)	DIAMETER (in)	AQUIFER	ALTITUDE	YRS. RECORD	MEAS. 1975	OBSERVED WATER-LEVEL EXTREMES THROUGH 1974 MAXIMUM	THROUGH 1974 MINIMUM	IN 1975 MAXIMUM	IN 1975 MINIMUM	REMARKS
ALGER												
45N 19W 25BD	USFS (Former CCC camp)	66	6	Qgd	850	17	Q	6.4 June 1960	14.2 Apr 1964	11.1 May	11.8 Aug	
ALLEGAN												
3N 14W 23DD	Allegan State Game Area	41	1	Qgd	700	10	M	9.5 Dec 1965	14.1 Sep 1971	10.0 Feb	11.0 Mar	Discontinued 3-75
BARAGA												
48N 32W 12DD	MSHD (WMP 14)	10	1	Qgd	1,630	28	M	3.3 Apr 1965	8.1 Sep 1969	5.2 Apr	7.5 July	Measured by WMP
BARRY												
4N 9W 5DA	MDNR (Solomon Road)	131	2	Qgd	860	12	Q	115.3 July 1974	122.0 Mar 1965	114.4 Aug	115.8 Nov	
BAY												
17N 4E 22DC	Pinconning Twp. (2nd Street)	110	6	IPs	620	14	R	0.6 Apr 1970	10.5 Aug 1963	0.8 Apr	3.8 Aug	
BRANCH												
5S 6W 22BB	MSHD (U.S. 27)	27	1	Qgd	950	12	M	10.5 Mar 1974	16.3 Nov 1964	12.0 May	14.4 Oct	
8W 28DB	BCRC (Sherwood)	42	1	Qgd	880	11	M	13.2 May 1974	18.9 Nov 1965	14.6 July	17.3 Jan	
6S 6W 18CCCD	Coldwater Twp. (Test 1)	56	6	Qgd	950	12	M	21.0 July 1969	28.3 July 1964	23.0 May	24.4 Feb	
22CA	City of Coldwater (test for Number 4)	113	6	Qgd	970	12	R	9.6 Mar 1974	24.1 Aug 1964	9.0 May	19.8 Jan	P
8S 5W 6AB	Chipman (California Number 2 School)	55	4	Qgd	1,032	12	M	13.9 Feb 1968	19.4 Dec 1964	14.3 May	17.0 Jan	
8W 17CD	Bronson School (Trayer Road)	38	1	Qgd	917	12	M	13.1 May 1966	16.3 Nov 1964	13.5 July	15.2 Jan	
CALHOUN												
1S 7W 10BB	K. Sabin (M-78)	12	15	Qgd	908.0	30	W	0.9 Mar 1950	7.2 Dec 1964	2.3 Apr	4.3 Nov	Measured by owner
32BD	Penfield Twp. (Hopkins Street)	95	6	Mm	845	12	R	15.6 Apr 1974	27.0 Aug 1964	16.0 May	19.1 Nov	P
32DA	City of Battle Creek (Verona 22)	127	8	Mm	830.8	37	D	0.7 Apr 1950	16.8 July 1959	2.5 May	8.4 Aug	P, Measured by owner
2S 6W 25AA	City of Marshall (Ferguson)	59	6	Mm	904.8	26	M	5.5 May 1950	9.7 Aug 1964	6.9 Mar	8.0 Jan	P, Measured by owner
CASS												
8S 14W 17BA	T. Little (Starbrick Road)	55	28	Qgd	840	31	M	46.2 July 1950	55.0 Mar 1957	50.3 June	51.2 Dec	

TABLE 1. RECORDS OF MICHIGAN OBSERVATION WELLS. (CONTINUED)

COUNTY AND WELL NUMBER TWP., RANGE, SECTION	OWNER OR OTHER DESIGNATION	DEPTH (ft)	DIAMETER (in)	AQUIFER	ALTITUDE	YRS. RECORD	MEAS.,1975	OBSERVED WATER-LEVEL EXTREMES				REMARKS
								THROUGH 1974		IN 1975		
								MAXIMUM	MINIMUM	MAXIMUM	MINIMUM	
CHARLEVOIX												
33N 4W 2AC	MDNR (Wolverine CCC)	94	6	Qgd	970	28	Q	69.5 July 1960	75.8 Apr 1956	72.2 Oct	72.8 July	
CHEBOYGAN												
33N 1W 26DA	MDNR (Pigeon R. CCC)	164	6	Qgd	933	10	R	56.2 May 1971	61.8 Nov 1966	57.0 May	58.7 Apr	
34N 1W 1CB	MDNR (7) (M-68)	11	2	Qgd	780	30	Q	2.8 Mar 1938	5.6 Oct 1955	3.6 July	4.2 Oct	
CHIPPEWA												
46N 4W 24DA	USFS (Raco CCC camp)	54	6	Qgd	850	21	R	18.4 June 1971	28.4 Apr 1964	20.7 June	24.0 Apr	
CLARE												
17N 4W 34DCAD	City of Clare	91	4	Qgd	850	1	R			10.4 Sep	20.4 July	P
CLINTON												
5N 2W 31CB	Michigan Department of Aeronautics (Airport)	195	6	Ps	850	18	R	45.0 Mar 1949	66.4 Jan 1967	55.4 Dec	58.4 Jan	P
32DC	Michigan Health Department (Quarantine Farm)	135	4	Ps	849.2	32	M	42.0 Sep 1944	99.2 May 1966	86.0 Sep	92.3 Feb	P
6N 1W 3BB2	MDNR (Sleepy Hollow impoundment) Number 5	62	1	Qgd	814.0	10	A	39.6 Apr 1973	43.3 Nov 1966	38.2 Sep		
10BC	Do Number 2	32	1	Qgd	801.4	10	A	14.6 Apr 1973	19.8 Nov 1966	15.1 Sep		
6N 2W 16DD	MSHD (U.S. 27)	23	14	Qgd	803.3	28	M	13.8 Apr 1974	19.9 Feb 1964	15.4 Dec	17.5 Jan	Fed key well
7N 1W 34CA	MDNR (Sleepy Hollow impoundment) Number 9	39	1	Qgd	793.8	10	A	12.8 Apr 1973	21.7 Dec 1966	14.2 Sep		
34CB	Do Number 10	62	1	Qgd	787.2	10	A	19.7 Mar 1973	23.2 Nov 1966	20.5 Sep		
34CC	Do Number 7	32	1	Qgd	785.3	10	A	17.1 Mar 1973	20.3 Oct 1973	17.4 Sep		
2W 9BB	City of St. Johns (6" test)	535	6	Ps	743.4	12	R	52.2 May 1967	84.9 Aug 1974	61.4 Feb	82.0 Aug	P
CRAWFORD												
25N 1W 15DD	USFS (Eldorado)	56	6	Qgd	1,190	28	R	26.8 May 1971	36.0 Apr 1951	27.2 Oct	30.0 Apr	
26N 4W 11CB	MDNR (Game Refuge)	12	15	Qgd	1,147.6	34	Q	4.0 June 1943	9.8 Sep 1958	5.5 June	8.4 Mar	
27N 4W 23AA	MDNR (51) (U.S. 27)	17	2	Qgd	1,180	36	Q	10.9 July 1943	15.6 Dec 1964	12.2 Apr	12.7 Dec	
DELTA												
39N 23W 28AC	M. and S. Blake (Schemmel)	530	5	Cm	680	18	R	1.3 May 1960	5.1 Dec 1966	3.1 Apr	4.8 Aug	
41N 18W 31CD	C. Thompson (Isabella)	250	5	Or	615	18	Q	3.6 June 1968	6.3 Feb 1961	4.1 Sep	4.7 Aug	
42N 19W 20AA	USFS (Pollack CCC camp)	134	6	Qgd	740	18	Q	23.8 Mar 1960	28.1 Feb 1971	25.3 May	26.7 Dec	
43N 19W 24BB	H. Clarage (FFHwy-13)	405	4	Otb	860	18	Q	77.0 July 1960	88.8 Oct 1966	78.9 Aug	79.5 May	
DICKINSON												
42N 27W 33BA	E. LaFreniere (WMP 10)	12	36	Qgd	1,060	22	M	2.7 May 1960	10.8 Oct 1955	3.4 Apr	9.0 July	Measured by WMP
43N 28W 32AD	MDNR (Felch)	31	1	Qgd	1,160	10	M	13.1 May 1972	16.8 May 1968	14.0 July	16.0 Mar	
EATON												
3N 3W 2BA	City of Lansing (TW 63H) (Stiefel Farm)	66	1	Qgd	839	12	R	3.1 Mar 1965	18.0 Nov 1968	3.6 Apr	13.4 Aug	P
4N 3W 12CD	F. Wheeler (Robins Road)	381	6	Ps	861.9	23	R	67.5 Nov 1953	103.6 Aug 1969	84.6 Nov	101.2 Aug	P
11AB	City of Grand Ledge (Park)	350	8	Ps	788.9	16	R	*+4.6 Mar 1967	9.1 Aug 1966	*+4.0 Jan	7.9 Aug	P, *well flowing

TABLE 1. RECORDS OF MICHIGAN OBSERVATION WELLS. (CONTINUED)

COUNTY AND WELL NUMBER (TWP., RANGE, SECTION)	OWNER OR OTHER DESIGNATION	DEPTH (ft)	DIAMETER (in)	AQUIFER	ALTITUDE	YRS. RECORD	MEAS.1975	OBSERVED WATER-LEVEL EXTREMES				REMARKS
								THROUGH 1974		IN 1975		
								MAXIMUM	MINIMUM	MAXIMUM	MINIMUM	
GENESEE												
6N 7E 9DCC	Fisher Body Division, GMC, Number 2 (Grand Blanc)	385	10	Pls	837.0	3	R	53.5 May 1974	80.1 Aug 1974	52.3 Dec	82.3 Aug	P
GOGEBIC												
48N 47W 31DC	City of Ironwood (Big Springs)	115	1	Qgd	1,170	13	R	12.6 June 1966	44.4 Feb 1974	12.7 Dec	22.6 Feb	P
34DA	City of Ironwood (Spring Creek Gp 3)	22	6	Qgd	1,190	15	R	+0.7 Apr 1969	5.2 July 1974	0.1 Apr	6.2 Nov	P
GRAND TRAVERSE												
27N 9W 4AB	MDNR (18) (Williamsburg)	15	2	Qgd	687.0	34	M	0.2 Feb 1966	2.5 July 1935	0.9 Apr	1.6 Mar	
GRATIOT												
11N 3W 4AC	City of Alma (TW 6) (Pine River)	165	8	Qgd	733.3	20	R	+4.1 Mar 1971	31.0 July 1965	+4.1 Mar	+2.5 Jan	P, Discontinued 5-75
12N 3W 24DA	City of St. Louis (3)	216	16	Qgd	730	16	R	37.9 Jan 1964	80.7 July 1967	58.0 May	70.0 July	P
HILLSDALE												
7S 2W 10BD	Pittsford State Game Area	20	1	Qgd	1,070	10	M	7.7 May 1969	11.1 Sep 1967	8.1 May	10.1 Sep	
INGHAM												
2N 1E 34DB	MDNR (Williamston Road)	87	2	Qgd	980	12	Q	22.4 Apr 1974	29.3 Oct 1964	23.4 Apr	24.4 July	
3N 1E 7DD	M. Lotte (windmill)	184	3	Pls	900	12	M	+2.4 Apr 1974	7.0 Nov 1964	+1.4 Apr	1.1 Jan	
4N 1E 21CD	Duncan Lumber Company (Sherwood)	265	8	Pls	890	13	R	20.1 May 1967	26.6 Sep 1973	21.5 Apr	25.7 Aug	
2N 1W 5BCAB	City of Mason (Gravel Pit)	210	8	Pls	890	12	R	14.7 Mar 1973	23.8 Nov 1964	16.5 Apr	20.2 Nov	P
4N 1W 16DA	Meridian Twp. (4" test)	398	4	Pls	841.2	8	M	6.6 Mar 1973	13.1 July 1974	6.8 Sep	10.2 July	P
18AD	Marble School (Hagadorn Road)	175	3	Pls	847.8	24	M	20.1 Apr 1953	70.2 Nov 1972	50.1 May	53.9 Dec	P
4N 2W 9BD	City of Lansing (Seymour 1)	401	14	Pls	828.8	47	R	15.6 Mar 1931	179.4 Apr 1968	96.7 Dec	117.5 Jan	P
16DA	City of Lansing (Cedar)	417	12	Pls	829.1	31	R	42.0 Mar 1946	67.0 Aug 1949	44.3 May	50.3 Jan	P
17AB	City of Lansing (Logan)	424	20	Pls	858.7	45	R	34.3 Dec 1929	168.3 May 1968	118.9 Dec	128.7 Jan	P
21BA2	City of Lansing (Scott Park)	400	4	Pls	835	5	R	56.7 Dec 1974	75.8 Nov 1971	46.0 May	56.7 July	P
22BC	City of Lansing (P-5)	338	12	Pls	823.6	46	M	7.1 July 1932	80.5 Feb 1970	36.7 May	54.0 Jan	P
24CA	Michigan State University (Spartan Village)	453	10	Pls	853.4	31	R	25.5 Mar 1946	105.5 May 1972	81.2 Dec	95.3 May	P
27BB	Fenner Arboretum Park	215	6	Pls	835	8	R	52.0 July 1968	89.5 Oct 1972	66.5 July	78.0 Jan	
31CC	C. Weber (Maybel Street)	204	3	Pls	880.2	32	M	18.9 Apr 1952	42.6 Oct 1973	32.8 Apr	41.5 Mar	P

TABLE 1. RECORDS OF MICHIGAN OBSERVATION WELLS. (CONTINUED)

COUNTY AND WELL NUMBER TWP. RANGE. SECTION	OWNER OR OTHER DESIGNATION	DEPTH (ft)	DIAMETER (in)	AQUIFER	ALTITUDE	YRS. RECORD	MEAS. 1975	OBSERVED WATER-LEVEL EXTREMES				REMARKS
								THROUGH 1974		IN 1975		
								MAXIMUM	MINIMUM	MAXIMUM	MINIMUM	
IRON												
42N 31W 33DB	Iron County (WMP 7)	10	1	Qgd	1,275	28	M	+0.2 May 1960	6.3 Oct 1948	0.5 Apr	4.5 Feb	Measured by WMP
43N 35W 11AD	J. Javoroski (WMP 23)	47	36	Qgd	1,565	31	M	35.5 July 1973	47.1 Aug 1949	39.4 Sep	40.7 May	Measured by WMP
20DC	B. Henricksen (WMP 25)	48	1	Qgd	1,560	31	M	40.7 June 1973	48.3 Aug 1949	42.7 May	44.2 Feb	Do
33BD	MSHD (WMP 34)	12	1	Qgd	1,520	28	M	1.7 June 1973	8.4 Mar 1949	3.5 June	5.8 Apr	Do
44N 33W 10CC	Iron County (WMP 21)	8	1	Qgd	1,540	28	M	2.0 Apr 1954	8.0 Feb 1964	2.4 May	6.9 Sep	Do
37W 14BB	USFS (Former CCC camp)	102	6	Qgd	1,730	17	Q	91.8 Oct 1973	100.9 Aug 1974	92.8 Sep	100.9 Feb	
45N 37W 23AC	USFS (WMP 28)	8	1	Qgd	1,600	28	M	0.7 Apr 1965	4.7 Sep 1948	0.9 May	3.7 Aug	Measured by WMP
46N 33W 18BC	MSHD (WMP 17)	12	1	Qgd	1,560	28	M	2.8 Apr 1949	dry Feb 1956	5.0 June	8.1 Sep	Do
JACKSON												
3S 1W 2BD	City of Jackson (Hamburg Street)	400	12	Ps, Mm	935	10	R	16.3 Jan 1971	68.8 June 1971	20.9 Dec	55.0 Oct	P
10Dc	Summit Twp. (Francis Street)	323	12	Ps, Mm	935	16	R	14.3 Jan 1961	36.5 June 1971	18.0 Dec	32.0 July	P
11AA1	City of Jackson (4a) (Belden Road)	360	6	Ps, Mm	935	18	D	18.6 Jan 1961	119.1 June 1971	45.3 Dec	114.9 Aug	P, Measured by owner
11AA2	City of Jackson (Belden Road)	36	3	Qgd	928.8	14	R	+1.5 July 1968	18.2 Nov 1964	1.0 Oct	4.8 Aug	
KALAMAZOO												
2S 10W 4D	City of Kalamazoo (Campbell Lake)	13	4	Qgd	836.5	7	R	1.9 Apr 1974	3.4 Sep 1971	2.0 Apr	2.8 Feb	
9B	City of Kalamazoo (Schoonover Lake)	21	6	Qgd	828	7	R	+0.8 Apr 1974	0.4 Sep 1971	+1.0 Apr	+0.3 Jan	
11W 3AA	Brown Company (61)	36	6	Qgd	763.2	20	R	7.7 Mar 1974	14.0 Aug 1967	8.2 Apr	12.0 Nov	P
10DB	General Printing Ink Company	49	10	Qgd	761	8	R	12.4 July 1968	20.8 Nov 1974	12.7 Apr	19.5 Jan	P
14DC	Brown Company (East side plant) Well Number 13	90	12	Qgd	780	4	R	10.2 Jan 1973	17.5 July 1974	10.9 Apr	17.9 Feb	P
15DA	Consumers Power Company (steam plant)	64	12	Qgd	766.2	30	R	7.6 Mar 1974	19.4 Sep 1964	5.5 Apr	13.9 Jan	P
20BB2	City of Kalamazoo Kendall (Deep)	106	4	Qgd	880	8	R	17.1 Dec 1974	48.4 June 1971	16.8 Dec	45.6 July	P
22CD	City of Kalamazoo (Stockbridge)	137	4	Qgd	764.7	16	R	5.2 Nov 1974	31.1 Aug 1961	4.8 Feb	12.3 Aug	P
23AD	Allied Paper Company (King Division)	43	12	Qgd	760	8	R	1.4 Mar 1974	22.0 Feb 1970	+0.4 Apr	7.6 Aug	P
28AA	City of Kalamazoo (Maple Station)	245	4	Qgd	820	7	R	35.7 June 1974	61.6 June 1973	35.7 Mar	52.8 July	P
31CD	City of Kalamazoo (Colony Farm Station)	226	4	Qgd	910	7	R	51.1 June 1974	67.0 June 1971	53.0 Dec	65.7 Feb	P
36CB	City of Kalamazoo (Emerald Station)	226	4	Qgd	860	7	R	26.4 May 1974	50.4 June 1971	27.2 May	44.0 July	P
3S 11W 4AD1	City of Kalamazoo (A-D)	135	3	Qgd	854.0	17	R	0.5 May 1967	12.9 July 1964	1.0 Jan	9.7 July	P
4AD2	City of Kalamazoo (A-S)	40	3	Qgd	854.0	17	R	+0.1 Feb 1971	9.1 Nov 1959	+0.2 Sep	1.7 Aug	P
14AA	Upjohn Company (28)	233	16	Qgd	870	9	R	26.9 May 1974	45.1 Aug 1972	26.0 Dec	41.7 Mar	P
22BD	City of Portage (site C)	120	8	Qgd	865	9	R	5.9 June 1967	9.4 Feb 1971	7.2 June	9.2 Jan	P
12W 11BD	City of Kalamazoo (Atwater)	248	3	Qgd	880	15	R	+3.0 Sep 1969	0.3 Jan 1965	+2.7 Oct	+0.8 Jan	P
11AD1	City of Kalamazoo (Sabo-deep)	300	4	Qgd	877	3	R	4.5 July 1973	14.2 July 1973	4.5 Sep	13.9 July	P
11AD2	City of Kalamazoo (Sabo-shallow)	38	6	Qgd	877	3	R	9.2 July 1973	11.4 Oct 1973	9.1 Aug	10.8 Jan	P
4S 11W 3CD	Prairie View County Park	190	4	Qgd	870	7	R	18.3 June 1973	20.3 Sep 1971	18.9 Sep	20.1 Jan	
21CB	W. Chamberlain (16th Street)	21	1	Qgd	863	10	W	9.7 May 1974	13.8 Dec 1968	12.1 July	13.6 Jan	Discontinued 9-75

TABLE 1. RECORDS OF MICHIGAN OBSERVATION WELLS. (CONTINUED)

COUNTY AND WELL NUMBER TWP. RANGE. SECTION	OWNER. OR OTHER DESIGNATION	DEPTH (ft)	DIAMETER (in)	AQUIFER	ALTITUDE	YRS. RECORD	MEAS. 1975	OBSERVED WATER-LEVEL EXTREMES				REMARKS
								THROUGH 1974		IN 1975		
								MAXIMUM	MINIMUM	MAXIMUM	MINIMUM	
KENT												
5N 12W 4DC	City of Wyoming (Wobma)	86	6	Qgd	686.0	14	R	8.3 Apr 1974	12.9 Aug 1964	8.9 May	10.5 Aug	
6N 10W 30AA	Kent C. Airport	184	10	Qgd	800	10	R	83.6 Mar 1974	108.0 Sep 1967	83.3 Feb	103.1 Aug	P
12W 17AD1	Harman Int'l Industry	30	12	Qgd	606	26	M	6.8 Apr 1965	16.4 Feb 1954	8.6 Apr	10.1 Aug	P, Measured by owner
17AD2	Harman Int'l Industry	26	6	Qgd	606.0	26	M	6.8 Apr 1965	16.3 Feb 1954	9.3 July	9.8 Apr	P, Measured by owner
27BB	City of Wyoming (44th Street)	265	14	Mn	707.2	14	R	46.4 May 1974	56.0 Aug 1964	46.7 Dec	47.9 Jan	P
10N 12W 13DD	Rogue R. State Game Area	30	1	Qgd	785	10	M	1.0 May 1973	9.2 Oct 1969	0.8 Jan	4.1 Aug	
LAKE												
17N 13W 4AD	C and O Railroad (West Well)	83	8	Qgd	840	19	Q	15.2 July 1969	20.4 May 1958	16.3 Oct	17.6 Oct	
LENAWEE												
5S 1E 12DD	Onsted State Game Area	39	1	Qgd	1,000	10	M	16.6 May 1969	19.3 Sep 1971	16.1 May	17.5 Aug	
6S 4E 8DD	Fisher Body Division (GMC) (Tecumseh Plant)	81	8	Qgd	800	11	R	11.3 May 1974	18.4 Feb 1965	12.2 May	13.5 Jan	P
LIVINGSTON												
1N 6E 13DB	American Aggregate Corporation	29	2	Qgd	930	6	R	12.1 Apr 1974	18.1 Feb 1972	14.4 May	16.1 Jan	
2N 6E 31BA2	City of Brighton	83	10	Qgd	935	2	R	29.2 Oct 1974	51.6 Oct 1974	27.2 Sep	53.4 July	P
MACKINAC												
41N 5W 23BC	MDNR (Round L. CCC camp)	47	6	Ss	610	20	Q	4.3 May 1959	17.5 Mar 1959	8.7 May	13.5 Oct	
42N 2W 7AA	USFS (Pontchartrain CCC)	102	6	Sm	680	20	R	13.1 May 1960	32.2 Nov 1963	15.1 Apr	27.4 Nov	
MARQUETTE												
46N 25W 16DD	G. Johnson (Sands Sta.)	48	1	Qgd	1,198.4	13	M	27.1 July 1969	37.7 May 1964	31.2 June	32.6 Apr	
28W 12CB	Mrs. S. Hill (Ishpeming gage)	19	1	Qgd	1,410	14	M	1.3 May 1973	3.6 Jan 1972	2.2 Dec	2.5 Oct	
47N 25W 19CC	MDNR (Cascade Junction)	86	1	Qgd	1,222.1	13	M	25.0 July 1973	39.0 Feb 1965	28.3 June	32.1 Apr	
20CC	MDNR (East of Cascade Junction)	103	1	Qgd	1,229.8	13	M	78.5 Oct 1973	90.6 June 1965	80.4 Mar	81.3 June	
32CA	MDNR (Gentian)	122	1	Qgd	1,239.2	11	M	89.4 Feb 1974	100.0 Oct 1964	90.6 Mar	91.4 Oct	
26W 27BC	A. E. Laitala	31	1	Qgd	1,290	8	M	+0.6 May 1971	10.1 Oct 1969	1.4 June	5.4 Dec	
36BB	Cleveland Cliffs Iron Company (test)	56	8	Qgd	1,210	11	R	3.6 Apr 1969	7.5 Sep 1965	4.5 Apr	6.8 Aug	
27W 8BA	Cleveland Cliffs Iron Company (near Rock Lake)	33	1	Qgd	1,430	8	M	3.6 May 1969	7.1 Aug 1970	5.0 June	7.1 Apr	
28W 3CC	Ely Township (U.S. 41)	75	8	Qgd	1,572.0	15	R	9.7 May 1973	19.3 Apr 1964	11.7 May	16.4 Apr	Federal Key Well
35CB	Triangle Intersection	52	1	Qgd	1,481.8	8	M	31.8 June 1973	37.9 June 1964	34.6 July	36.6 Apr	
29W 2DA	Marquette County Commission (near Humboldt)	19	1	Qgd	1,527.3	13	M	1.9 May 1973	5.5 Aug 1963	2.2 June	3.7 Oct	
34CB	Do (near Black River School)	23	1	Qgd	1,494.4	14	M	2.0 Apr 1966	7.1 Sep 1969	2.3 May	5.6 Sep	
48N 26W 34DA	Do (near Eagle Mills)	31	1	Qgd	1,279.6	13	M	2.0 Apr 1967	7.0 Apr 1964	3.4 June	4.8 Oct	
29W 30CC	Van Riper State Park	78	6	Qgd	1,560	7	M	9.6 May 1973	14.7 Mar 1970	10.9 June	14.0 Apr	
49N 30W 22AC	Marquette County Commission (WMP 13)	17	1	Qgd	1,680	28	M	0.6 May 1951	13.3 Sep 1948	9.0 June	10.4 Sep	Measured by WMP

TABLE 1. RECORDS OF MICHIGAN OBSERVATION WELLS. (CONTINUED)

COUNTY AND WELL NUMBER TWP., RANGE, SECTION	OWNER OR OTHER DESIGNATION	DEPTH (ft)	DIAMETER (in)	AQUIFER	ALTITUDE	YRS. RECORD	MEAS.-1975	OBSERVED WATER-LEVEL EXTREMES THROUGH 1974 MAXIMUM	THROUGH 1974 MINIMUM	IN 1975 MAXIMUM	IN 1975 MINIMUM	REMARKS
MENOMINEE												
37N 26W 19DA	MSHD (Carney)	17	4	Otb	800	17	M	3.6 May 1973	7.7 July 1967	3.7 Apr	6.8 Aug	
41N 25W 34AD1	Hanna Mining Company (LB 69-7 Lower)					7	A	+11.8 Apr 1971	+6.9 Oct 1969	+10.7 June		
34AD2	Do (LB 69-7 Upper)					7	A	+2.0 Apr 1971	+0.3 Oct 1969	--		
34AD3	Do (LB 68-1)					8	A	+7.6 Apr 1971	+4.3 Oct 1969	+7.5 June		
34DA1	Do (LB 67-1)					8	M	+10.9 May 1972	+5.7 Sep 1969	+9.7 Apr	+6.1 Nov	
34DA2	Do (Auger 68-2)		1	Qgd	920	7	M	2.0 May 1973	7.4 Sep 1969	2.4 Apr	8.4 Aug	
34DA3	Do (Auger 68-1)		1	Qgd	920	7	R	1.5 Apr 1971	8.0 Sep 1969	1.9 Apr	7.7 Aug	
34DA4	Do (LB 68-4)					7	A	0.8 Apr 1971	3.1 Feb 1970	1.7 June		
35BA	Do (LB 69-4)					7	A	+0.9 July 1969	0.6 Aug 1969	+0.1 June		
35BB	Do (LB 69-5)					7	A	3.3 May 1969	4.7 Aug 1969	3.8 June		
35BC	Do (LB 69-1)					7	A	0.2 Apr 1971	4.8 Nov 1970	0.8 June		
MONROE												
7S 6E 15AD	Petersburg State Game Area	17	1	Qgd	675	10	M	3.0 Feb 1966	6.7 Dec 1971	4.9 Apr	6.0 Jan	
MUSKEGON												
11N 15W 34AD	Muskegon State Game Area	31	1	Qgd	595	10	M	0.0 May 1974	4.7 Sep 1972	0.1 Sep	3.3 Aug	
OAKLAND												
2N 7E 5BA	American Aggregates (Honeywell Lake Road)	44	2	Qgd	1,020	8	R	25.3 Apr 1974	28.9 Dec 1971	25.4 May	27.0 Jan	
8E 18DA	Proud Lake State Park	45	6	Qgd	910	7	R	2.8 May 1974	6.4 Sep 1971	3.6 May	5.3 Aug	P
3N 7E 5DA	American Aggregates (Fish Lake Road)	49	2	Qgd	1,055	7	R	31.5 June 1974	38.7 Dec 1972	31.0 May	33.8 Feb	
8E 3AB	HCMA (White Lake Road)	163	6	Qgd	1,000	4	R	7.3 May 1974	11.0 Sep 1972	7.6 Apr	9.7 Aug	
10AB	HCMA (Teggerdine Road)	163	6	Qgd	1,000	4	R	27.9 May 1974	30.7 Sep 1972	27.9 Apr	29.6 Aug	
10E 13AC	Oakland University	183	6	Qgd	940	15	R	58.3 Sep 1974	93.5 July 1963	57.5 Nov	59.1 Jan	P
32AB	City of Pontiac (LS 6) (Hayes-Jones Recreation Center)	184	12	Qgd	923.1	13	S	25.1 Apr 1974	99.4 Oct 1963	25.0 Jan	25.5 Nov	
5N 8E 8AC	Holly State Recreation Area	42	1	Qgd	930	10	M	22.3 Apr 1974	26.5 Sep 1966	23.1 May	24.7 Aug	
OGEMAW												
23N 1E 2BA1	Ogemaw Co. Road Comm. (Rose City Road)	105	1	Qgd	1,265	8	Q	75.1 July 1974	78.2 Apr 1969	75.1 Dec	75.5 Apr	
2BA2	Do (Rose City Road)	20	1	Qgd	1,265	8	Q	8.7 July 1969	13.6 Dec 1972	10.2 Dec	12.1 Apr	
4AD	MDNR (Fire suppression well Number 15)	21	4	Qgd	1,230	22	Q	0.7 Apr 1971	4.4 Oct 1964	1.7 Dec	2.2 July	
2E 6AA	Ogemaw Co. Road Comm. (Fairview Road)	133	1	Qgd	1,270	8	Q	99.8 Aug 1971	103.6 Apr 1969	100.6 Dec	102.1 Apr	
24N 2E 35CD	Jim Kelley	70	1	Qgd	1,130	8	Q	6.1 Apr 1974	12.7 Feb 1969	6.6 Apr	6.8 July	
3E 8BB	Ogemaw Co. Road Comm. (Beechwood Road)	89	1	Qgd	1,215	8	Q	84.4 Oct 1974	87.8 Apr 1969	85.0 Apr	85.3 Dec	
ONTONAGON												
46N 38W 30AD	USFS	65	1	Qgd	1,530	9	M	16.0 June 1973	19.1 Apr 1970	17.3 July	19.1 Apr	
51N 41W 8BD	Michigan Corrections Department (Silver City)	100	6	pCf	620	18	Q	8.2 Apr 1959	18.9 Oct 1963	8.5 May	20.0 Sep	

TABLE 1. RECORDS OF MICHIGAN OBSERVATION WELLS. (CONTINUED)

COUNTY AND WELL NUMBER TWP., RANGE, SECTION	OWNER OR OTHER DESIGNATION	DEPTH (ft)	DIAMETER (in)	AQUIFER	ALTITUDE	YRS. RECORD	MEAS. 1975	OBSERVED WATER-LEVEL EXTREMES				REMARKS
								THROUGH 1974		IN 1975		
								MAXIMUM	MINIMUM	MAXIMUM	MINIMUM	
PRESQUE ISLE												
33N 2E 30DA	MDNR (19) (Truck trail)	14	2	Qgd	800	39	Q	0.6 July 1960	5.7 Jan 1956	2.4 July	4.4 Apr	
6E 8BB	A. Styma (farm)	61	6	Dt	800	17	Q	5.4 Apr 1967	18.8 Mar 1963	8.2 Dec	11.4 Oct	
21AA	M. Ardycan (M-65)	43	5	Dt	790	17	Q	1.1 Apr 1963	7.6 Oct 1966	4.4 May	5.7 July	
ROSCOMMON												
24N 2W 20BA	MDNR (1) (Exp. sta.)	14	8	Qgd	1,145.3	42	R	2.3 Apr 1971	6.2 Dec 1949	2.7 Sep	4.8 Mar	Federal key well
SANILAC												
12N 13E 33DD	MSHD (at Elmer)	150	3	Mn	800	28	W	15.4 Apr 1951	25.6 Jan 1965	17.2 May	22.3 Nov	
SCHOOLCRAFT												
45N 13W 16CC	U.S. Fish and Wildlife (Seney)	154	4	Or	710	24	R	4.6 Apr 1971	6.5 Oct 1963	5.1 Feb	5.8 Aug	
47N 16W 30BB	MDNR (Cusino CCC)	57	6	Op	900	19	R	5.7 May 1960	16.3 Oct 1963	6.9 May	15.3 Oct	
VAN BUREN												
2S 13W 2BB	Co. Road Commission (8) (26th Street)	23	1	Qgd	740	13	M	2.0 Dec 1966	5.1 Sep 1964	1.6 Apr	4.1 Oct	
3S 14W 6BA	R. Martin (3) 45th Street	59	1	Qgd	740	13	M	37.2 May 1974	43.3 Nov 1964	37.5 May	39.8 Jan	
4S 16W 14CD	O. Klett (Keeler)	170	14	Qgd	800	13	M	16.7 May 1974	27.6 Aug 1964	16.5 July	19.5 Jan	P
13W 16DD	Porter Twp. (1) (Twp. Hall)	83	1	Qgd	930	13	M	40.4 June 1974	50.4 Oct 1964	41.0 May	42.5 Feb	
WASHTENAW												
2S 3E 9DA	Waterloo State Park	48	6	Qgd	970	7	R	4.1 May 1974	7.0 Aug 1971	4.6 July	6.4 Jan	P
3S 6E 16BC	City of Ann Arbor (Airport)	55	10	Qgd	821.5	13	R	0.7 Mar 1974	15.9 Oct 1964	1.5 May	7.6 Jan	P
7E 5BB	City of Ypsilanti (Superior Road)	69	8	Qgd	720	14	R	1.8 Feb 1965	21.4 Dec 1965	5.5 July	15.5 Oct	P
9AD	City of Ypsilanti (GP) (Gilbert Park)	94	6	Qgd	710	25	R	29.1 Nov 1945	78.8 Oct 1974	68.2 Sep	77.0 Mar	P
24CA1	Ypsilanti Twp. (104) (Water Works)	87	4	Qgd	665.6	30	R	5.8 Jan 1950	22.7 Feb 1971	13.7 Nov	19.0 Jan	P
24CD	Do (117)	75	6	Qgd	657.8	29	R	5.7 Feb 1950	63.2 Feb 1970	8.3 Dec	38.4 Aug	P
WEXFORD												
21N 9W 4AB	City of Cadillic (Lakeside)	277	6	Qgd	1,291.1	27	Q	20.0 July 1953	27.6 June 1964	20.4 Dec	22.7 Apr	P
22N 12W 13BA	Harrietta State Fish Hatchery	141	4	Qgd	1,060	15	R	+13.8 Mar 1970	+1.5 Jan 1966	+6.6 Feb	+2.6 Feb	P

TABLE 2. REPORTED GROUND-WATER PUMPAGE, IN 1975. (IN MILLIONS OF GALLONS)

COUNTY AND WATER USER	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	1975 TOTAL	MAX DAY	MIN DAY
ALGER															
Burt Township	e) 2.0	e) 2.0	e) 2.0	e) 2.5	e) 2.5	3.5	3.9	4.9	2.2	2.0	1.9	1.9	e) 31.3	--	--
Chatham	.6	.7	.6	.5	.5	.5	.8	.5	.5	.5	.5	.5	6.7	--	--
ALLEGAN															
Allegan	21.6	24.7	22.1	21.7	28.7	35.3	39.1	39.8	42.7	34.5	27.1	24 9	362.2	2.295	.405
Douglas	2.6	2.0	2.4	2.6	4.1	7.0	7.3	6.1	3.4	3.4	2.5	2.6	46.0	.330	.071
Otsego	24.1	22.4	28.8	28.5	32.3	37.2	37.7	35.5	27.0	27.7	27.8	27.4	356.4	1.545	.545
ANTRIM															
Bellaire	3.1	2.8	3.0	3.0	4.1	4.3	5.0	4.5	3.6	3.8	3.4	3.9	44.5	.260	.065
Central Lake	2.8	2.4	2.8	2.5	3.1	2.5	5.2	4.8	4.3	4.4	4.2	2.1	41.1	--	--
Ellsworth	1.0	.9	.9	1.3	1.3	2.2	3.2	1.3	1.0	.9	1.0	1.0	16.0	--	--
Mancelona													e) 179.4	--	--
BARRY															
Hastings	26.5	22.3	27.1	27.7	33.2	35.1	44.0	36.2	30.0	29.2	26.3	28.3	365.9	2.035	.530
Middleville	12.8	11.1	13.1	12.4	14.3	13.5	16.4	15.6	14.2	14.1	11.9	12.7	162.1	.775	.164
Nashville													e) 42.4	.228	.041
BENZIE															
Frankfort	7.2	6.1	7.0	6.6	8.5	9.2	12.7	9.6	8.5	8.4	6.4	6.5	96.7	.575	.164
BERRIEN															
Berrien Springs	9.5	9.9	9.9	10.3	11.5	13.1	20.1	15.8	11.8	11.8	10.3	12.8	146.8	.894	--
Buchanan	74.2	67.1	69.1	68.6	73.8	71.9	82.5	76.3	68.0	71.9	67.4	65.7	856.5	3.206	1.566
Coloma	11.0	9.6	11.1	11.0	14.1	13.8	15.4	14.4	12.9	18.3	16.2	10.9	158.7	.698	.114
Niles	84.6	75.0	79.8	76.1	90.0	96.6	112.3	98.4	92.5	90.7	81.7	94.7	1,072.4	5.330	1.630
Niles Township	2.6	2.7	4.0	3.6	7.7	7.6	15.7	8.4	4.6	4.1	3.7	3.1	67.8	--	--
BRANCH															
Bronson	18.1	17.2	10.5	19.6	21.1	20.9	26.9	23.2	23.7	21.7	16.6	17.4	236.9	1.144	.176
Coldwater	81.7	67.3	73.9	70.5	82.9	84.5	111.7	89.7	79.5	78.1	73.5	71.9	965.2	5.465	1.508
Quincy													e) 70.0	--	--
State Training School	9.8	8.9	9.7	9.0	8.0	8.4	8.9	8.9	8.3	8.8	8.3	8.1	105.1	--	--
CALHOUN															
Albion	108.0	115.2	126.2	133.3	128.1	128.6	139.3	120.6	99.8	103.0	97.4	95.8	1,395.3	5.992	2.285
American Legion Hospital													e) 4.6	--	--
Athens	3.5	3.3	3.0	4.1	4.3	4.1	4.7	3.1	2.7	2.3	3.0	2.6	e) 40.7	.292	.035
Battle Creek	157.9	144.6	154.3	163.9	190.0	210.7	260.0	249.8	176.2	180.3	163.7	171.5	2,223.8	12.940	3.580
Battle Creek Township	40.5	33.9	40.2	39.1	50.0	49.5	82.4	54.9	41.2	43.7	38.7	41.7	555.8	4.688	.978
Homer	5.3	4.1	3.7	3.6	4.3	4.3	5.5	5.1	4.5	4.8	4.4	4.5	54.1	.237	.093
Marshall	41.2	32.4	33.2	32.6	36.6	37.1	44.4	37.9	34.7	38.7	32.9	32.0	433.7	2.148	.639
CASS															
Cassopolis	3.7	5.1	5.2	5.6	6.0	7.1	7.9	7.3	7.0	5.0	4.6	e) 4.0	68.5	.362	--
Dowagiac	26.5	25.2	25.1	25.3	27.1	31.0	38.6	36.8	29.5	29.3	25.3	26.0	345.7	2.350	.396
CHARLEVOIX															
Boyne City	6.6	6.4	7.1	8.4	10.5	12.8	14.6	13.1	11.7	8.1	6.8	6.8	112.9	.611	.214
Boyne Falls	2.3	1.7	1.8	2.3	3.4	2.2	1.4	1.4	1.4	1.2	1.8	1.8	22.7	--	--
East Jordan	12.9	11.7	11.6	11.5	12.1	15.0	16.9	21.9	21.7	17.1	14.3	13.3	180.0	1.210	.300
CHEBOYGAN															
Mackinaw City	2.9	2.7	2.1	3.2	8.2	7.1	10.3	11.7	5.6	4.4	2.4	2.3	62.9	.465	.056
CHIPPEWA															
Kincheloe AFB	24.9	22.5	22.0	21.7	29.6	31.8	48.4	40.3	22.1	21.5	21.9	24.7	331.4	2.410	.556
CLARE															
Clare	18.5	17.3	20.9	22.6	25.7	26.3	39.1	36.6	17.9	17.1	15.1	16.8	273.9	1.904	.467
Farwell	2.7	2.4	2.6	2.8	3.4	3.8	5.9	5.3	2.6	3.7	3.6	2.6	41.4	--	.074
Harrison	6.0	5.3	5.6	5.2	6.6	6.8	10.8	9.3	5.3	5.3	5.9	6.4	78.5	.530	.131

TABLE 2. REPORTED GROUND-WATER PUMPAGE, IN 1975. (IN MILLIONS OF GALLONS)-CONTINUED

COUNTY AND WATER USER	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	1975 TOTAL	MAX DAY	MIN DAY
CLINTON															
Fowler	1.8	1.8	2.6	2.5	2.5	2.0	2.3	1.9	2.3	2.2	1.8	1.7	25.4	--	--
Maple Rapids	1.5	1.5	1.5	1.4	1.5	1.7	1.8	1.4	1.6	1.7	1.6	1.6	18.8	.058	--
Ovid	3.5	3.3	3.7	3.5	3.9	3.9	4.2	4.6	3.9	3.6	3.8	4.2	46.1	.415	.050
St. Johns	43.6	39.1	41.3	43.3	46.8	46.7	55.8	54.1	48.7	49.6	44.7	45.4	559.1	2.194	.781
Westphalia	1.4	1.5	1.7	1.8	1.6	1.6	1.8	2.0	1.5	1.6	1.6	1.5	19.6	.081	.027
CRAWFORD															
Grayling	12.4	13.3	13.7	12.2	15.3	17.9	20.3	18.9	13.4	12.4	11.5	11.7	173.0	.902	.273
DICKINSON															
Breitung Township	1.7	1.9	1.8	1.8	2.2	2.4	3.4	1.7	2.1	2.0	1.9	2.8	25.7	.207	.031
EATON															
Bellevue	4.5	4.5	3.5	4.2	4.7	4.7	4.2	4 1	5.4	6.0	6.1	3.7	55.6	.250	.070
Charlotte	41.6	35.0	37.6	35.8	39.4	41.7	51.3	40.9	42.5	41.8	36.4	34.9	478.9	2.185	.776
Delta Township	38.1	35.0	42.1	40.4	48.1	48.6	67.0	55.0	41.1	41.4	40.1	44.2	541.1	3.551	1.049
Eaton Rapids	25.1	21.2	23.7	24.5	26.7	29.4	33.7	25.5	35.7	36.9	25.4	27.0	334.8	1.704	.471
Grand Ledge	16.6	14.1	15.8	16.0	18.0	17.5	25.5	21.4	18.3	19.2	16.3	17.0	215.7	--	--
Olds Warehouse	2.1	1.0	1.5	1.4	1.2	2.3	1.7	2.2	2.6	.7	.9	2.3	19.9	--	--
Olivet	3.3	3.0	3.0	3.4	3.0	3.7	2.9	3.0	3.3	3.6	3.4	3.4	39.0	--	--
Sunfield	1.8	1.6	1.4	1.4	1.9	1.7	2.4	2.1	1.8	1.7	1.6	1.4	20.8	.088	.027
EMMET															
Harbor Springs	10.3	9.1	10.0	9.9	12.8	18.3	29.6	27.4	13.4	11.9	10.1	10.5	173.3	1.720	.312
Petosky	39.2	35.8	40.2	39.3	43.8	47.2	56.4	51.0	39.2	38.9	34.7	35.8	501.5	2.309	--
GENESEE															
Beecher Metropolitan District	33.7	30.9	34.9	35.1	38.3	36.6	40.7	42.0	35.5	38.4	35.3	37.1	438.5	1.952	.957
Burton	18.8	16.9	18.6	18.4	18.2	19.0	17.0	18.2	18.2	22.1	22.6	20.3	228.3	--	--
Davison	15.7	16.1	19.1	18.7	20.4	22.1	25.8	25.6	21.2	20.5	19.5	20.8	245.5	3.026	.001
Fenton	25.0	19.3	22.2	22.2	25.6	24.1	30.3	27.1	23.8	24.4	23.3	22.9	290.2	1.761	.442
Grand Blanc	26.9	25.0	27.2	27.2	29.4	33.5	36.3	39.1	34.3	30.2	29.0	29.6	367.7	2.008	.641
Grand Blanc Township													17.7	--	--
Linden	3.3	3.6	3.9	3.5	4.1	5.1	6.5	5.4	5.8	5.4	e) 4.5	e) 4.0	55.1	--	--
Montrose	3.6	3.3	3.7	3.7	4.2	4.1	4.9	4.7	5.2	5.0	4.0	4.3	50.7	.249	.096
Otisville	1.1	1.0	1.2	1.1	1.2	1.4	1.5	2 1	.8	1.1	1.1	1.1	14.7	.101	.021
GLADWIN															
Beaverton	3.0	2.7	3.0	3.2	3.0	3.1	3.5	3.2	3.1	3.0	2.9	3.1	36.8	.154	.047
GOGEBIC															
Bessemer	11.1	11.1	13.1	13.2	11.6	16.1	11.0	12.1	12.4	11.1	11.3	12.2	146.3	--	--
Ironwood	30.0	29.1	31.6	30.8	30.9	30.7	33.5	38.1	34.7	34.2	32.5	38.3	394.4	--	--
Marenisco Township	5.6	5.2	6.4	5.3	5.8	6.1	6.9	6.7	5.2	4.8	5.0	5.7	68.7	.364	.094
Wakefield	9.3	7.9	8.9	8.9	8.6	9.0	9.6	10.0	9.5	9.0	8.8	9.2	108.7	--	--
Wakefield Township													e) 4.4	--	--
GRATIOT															
a) Alma	--	--	--	--	--	--	--	--	23.8	--	--	.6	24.4	--	--
Ashley	2.0	2.0	2.1	1.9	2.0	2.0	2.4	2.4	1.8	1.8	1.9	2.0	24.3	.120	.050
Breckenridge	2.9	3.2	3.8	3.8	4.5	5.5	4.3	4.1	5.0	3.3	3.5	3.7	47.6	.329	.069
Ithaca	7.8	6.5	7.4	8.3	8.1	8.6	8.6	10.0	10.3	11.3	10.4	11.8	109.1	.511	.191
St. Louis	42.6	35.9	42.4	43.6	42.1	40.7	46.0	37.5	43.2	43.1	40.8	41.9	499.8	1.999	1.062
HILLSDALE															
Hillsdale	44.1	39.5	43.1	40.8	39.6	39.7	50.2	46.3	40.6	41.1	38.7	42.1	505.8	1.920	1.005
Jonesville	10.1	9.8	11.3	11.3	11.7	10.0	11.4	11.9	11.1	12.0	11.5	12.8	134.9	.877	.102
Litchfield	3.4	3.1	3.1	3.5	3.9	3.9	4.5	4.7	4.3	4.0	4.6	3.3	46.3	.273	.064
Waldron	1.8	1.6	1.8	1.9	.2	1.8	2.3	2.9	2.5	2.1	.2	2.0	21.1	.242	.020
HOUGHTON															
b) Adams Township - S. Range Water Authority	58.1	55.8	55.2	56.8	58.0	53.0	64.7	59.0	58.1	57.8	54.6	55.1	e) 686.2	2.418	1.404
c) Adams Township - S. Range Water Authority	10.2	10.2	10.4	9.1	9.6	8.9	9.7	9.3	8.3	9.8	8.4	9.1	e) 113.0	.445	.221
Chassell Township	2.6	2.4	3.1	3.0	3.2	3.5	4.4	3.7	3.4	3.3	3.0	3.1	38.7	.156	.085
Houghton	32.6	31.1	32.4	32.1	33.2	28.5	34.6	32.4	32.4	33.7	29.9	29.9	382.8	1.068	.585
d) N. Michigan Water Co.	34.9	33.2	37.4	37.2	34.0	38.9	44.1	43.1	38.4	41.1	38.7	40.9	461.9	1.765	.778

TABLE 2. REPORTED GROUND-WATER PUMPAGE, IN 1975. (IN MILLIONS OF GALLONS)-CONTINUED

COUNTY AND WATER USER	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	1975 TOTAL	MAX DAY	MIN DAY
HURON															
Elkton	1.8	2.3	1.7	3.0	2.5	2.9	2.8	2.9	2.2	2.1	3.0	2.9	30.1	.154	.056
Q) Pigeon			8.3			7.8			7.8			7.7	31.6	--	--
Sebewaing	7.3	8.0	6.3	6.9	6.4	6.9	8.6	9.0	7.8	9.2	9.0	7.3	92.7	--	--
INGHAM															
f) East Lansing - Meridian Township	133.3	106.1	123.3	112.4	152.7	146.5	179.1	137.4	117.5	127.3	117.0	113.7	1,566.3	8.605	2.440
Lansing	649.8	601.9	623.7	631.8	697.3	724.4	805.2	741.6	661.2	684.0	640.8	637.7	8,099.4	33.430	16.460
Mason	17.3	15.1	17.0	15.5	19.2	19.5	23.1	15.0	15.3	20.7	16.4	16.9	211.0	.784	.004
Michigan State University	156.2	144.9	142.2	160.0	177.5	154.8	143.6	144.5	135.2	173.9	150.4	117.0	1,800.2	e)6.936	e)2.674
Oldsmobile Forge Number 2	14.0	10.1	14.5	6.2	10.1	9.7	14.4	11.6	11.8	13.8	8.3	8.1	132.6	--	--
Stockbridge	2.8	2.6	2.4	2.9	3.5	3.2	4.3	3.9	3.5	3.3	2.9	2.8	38.1	.199	.083
Webberville	2.6	2.6	2.6	2.7	3.2	3.1	4.9	3.8	2.8	3.0	2.6	2.9	36.8	.713	.010
Williamston	9.0	10.2	13.0	11.4	12.3	13.9	15.0	13.4	12.0	12.6	12.0	12.6	147.4	--	--
IONIA															
Belding	69.9	59.4	35.5	72.3	45.8	40.8	75.8	53.3	43.3	49.9	126.2	77.5	749.7	2.614	.220
Michigan Reformatory, Ionia	14.3	14.8	14.8	14.7	14.8	18.7	19.7	18.4	16.1	16.9	16.4	15.1	194.7	--	--
Michigan Training Unit, Ionia	5.9	5.0	5.3	5.1	5.4	5.1	7.6	6.3	4.8	4.8	4.5	4.8	64.6	--	--
Muir													24.1	.145	.060
Pewamo	1.4	1.0	1.3	1.3	1.3	1.5	1.9	1.9	1.2	.8	1.0	1.1	15.7	.129	0
Portland	14.3	15.1	13.2	14.1	14.0	15.1	15.9	16.0	12.9	13.7	13.8	11.3	169.4	--	--
Saranac	7.0	7.0	7.7	7.8	7.9	10.6	12.8	10.6	6.9	6.4	6.6	9.3	100.6	.559	.094
State Hospital, Ionia	3.5	3.2	3.4	3.2	3.0	3.2	4.1	3.5	2.9	2.7	2.8	3.1	38.6	.324	.077
IOSCO															
Oscoda Township	9.6	8.7	10.7	10.7	14.0	12.9	17.9	15.6	13.6	15.3	13.1	15.7	157.8	--	--
Wurtsmith AFB	24.6	17.4	18.2	17.8	31.3	27.4	33.6	32.5	19.2	18.5	16.9	17.9	275.3	1.633	.242
IRON															
Alpha	.9	.8	.9	.8	.9	.9	.9	.9	.9	.9	8	.9	e) 10.5	--	--
Caspian	11.4	10.4	13.4	13.3	14.9	15.4	16.9	15.4	12.6	11.9	11.2	11.1	157.9	.679	.271
Crystal Falls	14.8	13.7	14.8	14.1	14.9	14.9	19.5	17.7	12.9	9.8	12.0	13.0	172.1	.829	.233
Crystal Falls Township	5.0	5.0	5.2	5.3	4.1	4.5	5.3	6.9	4.7	6.0	3.9	4.3	60.2	.277	.128
Iron River	9.4	11.2	9.1	8.6	9.5	8.7	11.3	12.6	8.3	8.6	8.2	10.3	115.8	.594	.174
Iron River Township	11.8	10.8	11.8	10.5	10.2	10.6	13.9	13.8	8.7	9.8	8.6	10.3	130.8	.550	.239
Stambaugh	5.3	5.0	5.6	5.7	5.6	4.6	4.8	5.4	5.3	4.9	4.5	5.3	62.0	.646	.112
Stambaugh Township	2.8	3.0	3.3	2.0	2.6	3.3	5.0	4.5	2.2	2.3	2.1	2.6	35.7	--	--
ISABELLA															
g) Mt. Pleasant	53.9	60.8	63.1	71.2	64.7	58.0	67.7	72.1	79.8	75.4	69.3	62.9	798.9	3.263	1.333
JACKSON															
Concord	2.9	2.6	3.9	4.2	4.0	4.1	5.4	4.6	4.1	4.7	3.9	3.7	48.1	.307	.072
Q) Grass Lake			4.8			6.1			6.2			6.0	23.1	--	--
Jackson	340.9	298.4	310.4	341.5	346.3	355.2	375.0	379.2	336.1	368.4	308.4	317.6	4,077.4	18.515	5.146
Springport	3.0	2.9	3.1	3.1	3.9	5.1	6.1	4.2	3.7	3.8	3.3	3.4	45.6	.294	--
KALAMAZOO															
Augusta	2.0	1.9	2.2	2.3	2.2	2.2	3.0	2.4	2.0	2.3	1.8	2.6	26.9	.136	.026
Brown Company	204.1	153.2	163.9	225.4	236.8	258.4	294.5	306.0	308.1	323.7	292.9	252.0	3,019.0	--	--
Galesburg	4.5	4.2	4.9	4.8	6.0	6.0	7.4	6.4	4.8	4.7	4.2	4.4	62.3	.368	.093
Kalamazoo	453.6	430.4	472.8	470.3	559.6	571.7	772.5	673.2	519.1	514.2	458.2	440.7	6,336.3	39.518	10.099
Parchment	7.0	6.5	7.3	6.9	9.4	9.5	15.4	11.3	7.6	7.4	6.6	7.0	101.9	1.055	.151
Portage	40.8	37.6	41.0	40.7	54.8	57.7	105.2	67.5	47.9	47.6	44.3	45.8	630.9	6.330	.843
Schoolcraft	6.9	6.2	7.1	7.3	7.8	7.4	8.6	7.8	7.1	7.6	7.6	5.2	86.6	--	--
Simpson-Lee Paper Company	25.0	23.0	29.0	32.0	32.0	34.0	26.5	34.0	37.5	44.0	38.0	41.0	396.0	2.300	--
State Hospital, Kalamazoo	12.9	11.0	12.9	12.3	14.0	12.8	12.8	13.6	13.6	12.7	11.2	9.4	149.2	.760	.321
Upjohn Company	437.9	404.4	472.6	453.6	495.2	468.2	480.3	455.9	387.8	377.5	367.1	372.8	5,173.3	19.013	8.025
Vicksburg	8.3	6.5	7.1	9.2	9.4	8.8	11.9	11.0	8.3	7.6	9.6	10.4	108.1	1.926	.128
KALKASKA															
Kalkaska	6.7	8.1	7.9	7.1	9.1	8.8	11.6	8.6	5.5	5.3	5.1	5.5	89.3	.573	.135
KENT															
Cedar Springs	7.4	8.3	9.8	9.5	10.5	10.2	11.7	9.3	7.6	7.8	7.1	7.3	106.5	.689	.120
Harman International Industry	9.1	9.2	9.6	9.6	10.3	10.0	12.4	12.3	11.3	10.9	10.4	10.9	126.0	.620	.169
Kent County Airport													e) 12.0	--	--
Plainfield Township	26.4	23.8	26.5	26.3	49.6	50.7	85.4	51.0	30.0	31.0	28.1	27.8	456.6	4.325	.722
Sparta	9.4	8.2	9.5	9.0	10.6	9.3	12.9	12.3	7.4	10.3	8.6	9.6	117.1	.645	.101

TABLE 2. REPORTED GROUND-WATER PUMPAGE, IN 1975. (IN MILLIONS OF GALLONS)-CONTINUED

COUNTY AND WATER USER	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC		1975 TOTAL	MAX DAY	MIN DAY
LAKE																
Baldwin	.9	1.4	1.0	1.4	1.2	1.4	1.1	1.5	.7	1.0	1.6	1.4		14.6	--	--
LAPEER																
Almont	3.8	3.5	4.1	4.1	4.3	3.7	3.7	3.6	3.0	3.4	3.2	3.2		43.6	--	--
Dryden													e)	20.4		
North Nranch	2.5	2.4	2.7	2.8	3.2	2.9	3.9	4.0	3.0	2.5	2.3	2.6		34.8	.200	.069
LENAWEE																
Addison	2.9	2.8	3.2	3.4	3.6	3.6	4.3	4.1	3.5	3.6	3.2	3.0		41.2	.211	.045
Britton	1.6	1.5	1.8	2.1	2.8	2.0	2.0	2.8	1.9	1.9	1.7	1.9		24.0	.098	.033
Clinton	6.1	6.8	7.1	6.3	5.3	7.8	8.3	10.9	7.1	6.2	6.2	6.1		85.2	--	--
Hudson	8.1	7.2	8.4	7.3	8.7	9.9	12.8	4.7	12.8	9.5	9.9	9.2		108.5	.571	.164
Morenci	7.0	6.6	7.7	8.1	8.7	8.5	8.4	8.7	8.3	7.9	6.6	6.3		92.8	.651	.148
Onsted	2.1	1.9	2.1	2.2	2.5	2.3	2.5	2.3	2.4	2.5	2.3	2.5		27.6	.127	.051
Tecumseh	28.6	24.6	28.8	30.1	32.8	32.1	36.4	35.9	30.3	28.5	25.5	25.4		359.0	2.317	.148
Fisher Body, Tecumseh	1.3	1.1	1.1	1.3	1.3	1.5	1.8	1.8	1.4	1.4	1.2	1.1		16.3	.113	.026
LIVINGSTON																
Boys Training Camp	4.1	3.5	3.8	3.5	4.1	3.8	4.1	4.2	3.9	4.3	3.7	3.9		46.9	.215	.092
Brighton	24.5	18.6	19.3	17.8	20.2	20.6	26.7	21.0	18.9	19.2	17.6	18.9		243.3	1.300	.430
Fowlerville	6.5	5.4	6.6	6.7	6.6	7.9	9.3	8.2	6.6	6.8	6.8	7.5		84.9	.989	.086
Green Oak Township	2.3	2.0	2.2	2.2	3.8	3.4	3.9	2.8	3.4	2.5	2.2	1.7	e)	32.4	.231	.020
Howell	36.0	31.0	33.4	32.9	37.6	36.7	42.2	41.3	37.0	39.9	41.2	31.8	e)	441.0	2.030	.751
State Hospital, Howell	3.2	2.8	3.4	2.9	4.0	4.1	4.0	5.0	2.4	2.4	3.1	2.5		39.8	.233	.066
LUCE																
Newberry	13.4	12.8	12.9	14.2	12.9	14.2	19.7	19.7	11.2	11.6	11.0	11.8		165.4	1.014	.232
State Hospital, Newberry	5.3	4.6	5.3	5.0	5.4	6.2	6.1	6.4	5.9	5.1	5.0	4.7		65.0	--	--
MACOMB																
Armada	3.2	3.1	3.4	3.2	3.8	3.6	3.9	3.5	3.0	3.2	2.9	3.0		39.8	.255	.068
Richmond	9.2	10.3	11.7	10.5	12.8	10.8	13.9	10.8	10.7	10.9	10.1	11.0		132.7	--	--
Romeo	23.3	20.9	23.1	25.5	28.0	27.2	20.6	18.7	20.6	19.7	19.8	24.1		271.5	--	--
MANISTEE																
Filer Township	2.8	2.5	2.9	3.2	4.4	3.7	7.1	5.7	3.0	3.1	4.7	2.8		45.9	.431	.072
Manistee	39.9	30.7	42.6	43.9	40.7	40.3	55.7	50.7	36.6	38.1	38.6	34.0		491.8	2.486	.875
MARQUETTE																
Ishpeming Township	10.0	7.3	9.0	10.3	6.1	6.7	8.9	7.4	5.2	6.4	7.4	9.0		93.7	--	--
K. I. Sawyer AFB	34.4	31.2	34.0	34.0	38.0	37.4	47.2	42.5	34.0	34.3	33.3	34.9		435.2	2.240	.843
Powell Township	.6	.5	.6	.6	.6	.7	.9	1.0	.8	.7	.6	.6	e)	8.2	.032	.019
Richmond Township	2.4	2.3	1.9	1.5	1.4	2.3	1.8	1.4	1.3	1.8	2.3	2.3	e)	22.7	--	--
MASON																
Scottville	2.0	2.0	2.5	3.0	3.0	4.0	4.5	4.5	4.0	3.0	2.0	2.0	e)	36.5	--	--
MENOMINEE																
Stephenson	2.8	2.5	2.8	2.4	3.1	3.1	5.6	4.1	2.6	2.8	2.6	2.4		36.8	.216	.063
MIDLAND																
Coleman	2.8	2.6	3.0	2.8	3.1	3.0	3.6	3.1	2.6	2.8	2.7	2.8		34.9	.172	.065
MISSAUKEE																
Lake City	3.1	2.9	2.7	2.7	4.9	6.9	9.2	7.6	4.3	4.5	3.4	3.4		55.6	.915	.011
MONROE																
Milan	20.4	17.1	15.7	14.0	17.6	18.8	24.2	19.2	19.0	19.1	17.2	17.1	e)	219.4	1.137	.423
Petersburg	2.8	4.7	4.0	2.7	2.8	2.3	2.9	2.8	2.6	3.1	2.9	2.9		36.5	--	--
MONTCALM																
Carson City	7.2	6.6	7.3	7.3	8.0	7.9	7.1	7.7	6.6	5.8	6.1	6.1		83.7	.340	.160
Edmore	10.9	6.6	3.9	4.3	5.0	5.7	10.0	7.1	6.0	5.6	8.1	10.8		84.0	--	--
Greenville	54.7	47.4	46.3	46.9	43.0	40.0	69.7	56.0	48.1	54.0	43.8	54.5		604.4	3.286	.333
Sheridan	1.9	1.6	2.1	2.1	2.7	2.2	3.9	3.1	2.2	2.6	2.3	2.7		29.4	--	--
Stanton	3.0	2.9	3.2	3.0	3.4	3.4	2.8	3.2	3.2	3.5	3.0	3.8		38.4	--	--
MUSKEGON																
Montague	5.2	4.9	5.9	5.4	9.9	7.9	15.0	8.9	5.3	4.8	4.0	4.3		81.5	--	--
Ravenna	1.7	1.5	1.7	1.7	2.4	2.1	4.1	1.5	2.0	2.2	1.9	1.7		24.5	.260	.000
Whitehall	37.1	30.6	34.0	34.7	42.1	40.4	49.8	41.9	39.1	39.8	34.6	34.2		458.3	2.642	.583

TABLE 2. REPORTED GROUND-WATER PUMPAGE, IN 1975. (IN MILLIONS OF GALLONS)-CONTINUED

COUNTY AND WATER USER	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC		1975 TOTAL	MAX DAY	MIN DAY
NEWAYGO																
Fremont	12.8	11.1	13.2	15.5	21.5	23.3	32.2	28.2	23.9	27.7	23.5	24.4		257.3	1.667	--
Hesperia	.6	.6	.6	2.4	2.4	2.4	2.2	2.2	2.2	2.0	2.0	2.0		21.6	--	--
Newaygo	5.8	5.9	6.3	6.8	6.2	7.0	6.7	7.4	6.3	5.9	4.6	4.9		73.8	.471	.126
White Cloud	8.9	7.9	7.4	6.3	7.2	7.3	9.1	8.8	8.4	7.6	7.6	9.0		95.5	.480	.100
OAKLAND																
Holly	10.2	9.7	11.0	11.0	13.7	13.4	15.3	12.7	11.2	10.5	9.4	10.6		138.7	.686	.211
Independence Township	4.5	5.1	4.8	4.5	3.7	6.3	11.9	6.7	4.7	5.1	4.7	4.8		66.8	--	--
Milford	18.9	16.8	18.2	18.9	18.6	25.0	28.7	24.6	18.1	17.6	17.9	18.0	e)	241.3	14.720	.472
Oakland County, D.P.W.	18.7	10.8	19.4	22.7	33.7	30.2	64.9	50.0	29.2	19.8	21.2	26.7		347.3	--	--
Orion Township	12.6	12.0	12.9	14.1	15.7	18.2	21.6	20.3	17.2	14.6	11.3	12.1	e)	182.6	--	--
Rochester	53.5	51.7	56.1	57.2	68.6	75.6	80.9	75.4	56.5	65.4	49.3	50.9		741.1	3.652	1.153
Southfield													e)	56.3	--	--
South Lyon	59.4	50.8	57.8	60.1	62.3	58.8	47.2	58.0	54.2	59.2	51.8	51.9		671.5	--	--
Sylvan Lake	5.3	4.6	4.7	5.5	5.6	6.3	8.9	7.8	5.4	5.1	5.1	6.1		70.4	--	--
Waterford Township	84.2	75.2	73.9	85.5	122.6	108.2	175.8	128.8	95.8	97.5	90.7	97.1		1,235.3	14.500	--
Walled Lake	11.9	12.0	10.3	10.4	11.5	11.5	10.3	13.9	10.7	11.2	12.8	12.6		139.1	--	--
Wolverine Lake			10.9			19.2			33.9			12.0		76.0	--	--
OCEANA																
Hart	13.2	13.5	14.1	11.6	17.8	16.3	47.2	28.4	23.6	24.4	18.0	21.1	e)	249.2	--	--
Pentwater	3.1	3.7	3.7	5.8	5.6	8.0	10.2	7.7	5.4	2.8	2.9	3.3		62.2	.570	--
Shelby	11.1	10.1	10.4	10.3	13.4	12.8	22.7	16.2	11.1	13.2	12.3	12.6	e)	156.2	--	--
OGEMAW																
West Branch	8.1	7.2	8.2	8.6	10.4	8.7	10.5	9.6	8.7	8.7	8.3	9.5		106.5	.505	.106
ONTONAGON																
Bergland Township	.8	.8	.7	.6	.8	.8	.9	.8	.8	.9	.8	.9		9.6	.040	.017
OSCEOLA																
Evart	59.7	54.1	54.8	59.3	58.5	73.4	59.9	83.1	79.6	82.8	71.9	53.7		790.8	3.627	.541
Reed City														117.8	--	--
OTSEGO																
Gaylord	18.9	17.3	34.8	10.9	12.9	33.6	23.7	21.5	17.7	16.4	15.7	18.2	e)	241.6	--	--
State Hospital, Gaylord	.8	.8	.9	.8	.9	.9	.9	.8	.7	.8	.8	.8		9.9	.052	.009
OTTAWA																
Coopersville	4.1	3.5	4.0	4.2	5.4	4.5	5.4	4.5	4.1	4.3	4.5	4.9		53.4	.305	.050
Spring Lake	8.4	9.1	8.9	9.4	13.3	17.1	23.6	19.5	11.0	10.0	8.7	9.4		148.4	3.830	.159
PRESQUE ISLE																
Onaway	4.3	4.2	4.2	4.2	4.3	4.3	5.0	5.0	4.3	4.2	4.7	4.7	e)	53.4	--	--
ROSCOMMON																
Roscommon	4.1	3.7	3.9	3.9	4.4	4.4	6.1	5.7	4.4	4.4	4.4	4.4		53.8	--	--
SAGINAW																
Birch Run	1.8	1.8	2.0	1.7	2.1	2.0	2.3	2.0	1.9	2.1	1.7	1.8		23.2	--	--
Chesaning	7.0	6.7	7.4	7.5	9.3	9.1	9.4	8.7	8.1	9.9	7.6	8.7		99.4	--	--
Tittabawassee Township	3.3	3.4	2.8	3.5	4.0	3.6	3.5	4.5	3.8	3.5	3.7	3.4		43.0	--	--
ST. CLAIR																
Capac	3.3	3.1	3.6	4.3	3.7	3.6	5.3	4.3	3.3	3.6	3.2	3.4		44.7	.249	.086
Yale	5.8	5.2	6.1	6.5	6.5	6.5	8.0	7.1	7.0	7.3	7.5	6.1		79.6	--	--
ST. JOSEPH																
Constantine	8.2	7.9	7.6	6.1	6.2	5.8	8.6	7.6	6.7	7.0	6.7	9.0		87.4	.436	.122
Mendon	6.8	5.7	6.8	7.7	7.0	8.8	9.4	6.4	6.3	5.3	5.7	5.1		81.0	.459	.069
Sturgis	57.7	51.5	56.2	56.4	64.2	67.7	88.7	71.6	58.4	56.5	58.0	57.2	e)	744.1	4.423	.700
Three Rivers	28.7	25.5	26.6	30.3	35.4	52.7	45.9	38.3	37.1	43.6	40.8	43.6		448.5	3.339	.280
SANILAC																
Brown City	5.0	5.0	5.0	5.2	5.4	5.3	6.5	5.5	5.5	5.5	4.9	4.6	e)	63.4	--	--
Croswell	17.0	9.0	13.5	15.3	17.7	29.4	35.6	31.7	25.0	22.1	16.1	14.8		247.2	1.526	.243
Deckerville	2.5	2.1	2.3	3.0	3.8	4.0	5.7	5.7	3.7	2.8	2.5	2.5		40.6	.329	.032
Marlette	7.7	7.2	7.9	8.2	8.5	8.3	10.3	10.0	8.1	8.9	8.5	8.0		101.6	.432	.159
Peck	1.5	1.6	1.6	1.6	1.6	1.7	1.8	1.8	1.7	1.6	1.6	1.5		19.6	.171	.047
Sandusky	16.5	16.1	17.5	18.4	17.1	15.7	19.6	20.3	17.7	16.4	14.7	15.5		205.5	.993	.251

TABLE 2. REPORTED GROUND-WATER PUMPAGE, IN 1975. (IN MILLIONS OF GALLONS)-CONTINUED

COUNTY AND WATER USER	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	1975 TOTAL	MAX DAY	MIN DAY
SHIAWASSEE															
Bancroft	1.1	1.2	1.3	1.4	1.4	1.6	1.6	1.6	1.4	1.3	1.2	1.2	e) 16.3	.062	.030
Byron													e) 19.8	--	--
Corunna	5.9	4.6	5.6	6.5	7.4	7.5	7.3	7.8	7.7	7.2	6.4	7.1	81.0	.570	.044
Durand	12.7	13.4	14.2	13.6	15.0	14.0	15.2	14.1	13.3	13.6	12.6	12.7	164.4	.673	.261
Owosso	85.0	78.1	91.4	87.0	76.3	75.9	80.6	74.5	66.6	71.7	65.6	72.2	e) 924.9	--	--
Perry	3.6	3.5	3.7	3.5	4.1	4.1	5.3	4.3	4.2	4.6	3.9	3.5	48.3	--	--
TUSCOLA															
Akron	17.8	6.8	22.3	19.7	13.4	57.6	46.3	42.8	7.9	81.6	10.9	9.6	336.7	--	--
Caro	19.1	15.4	15.2	11.5	14.6	15.6	16.7	17.8	16.1	19.8	19.2	19.1	200.1	.900	.464
Cass City	9.0	10.2	9.8	8.8	10.0	9.1	10.8	10.5	6.9	7.7	7.3	7.9	108.0	.497	.170
Kingston	1.3	1.2	1.2	1.3	1.5	1.5	2.2	1.3	1.5	1.7	1.7	1.9	18.3	.136	.026
Mayville													51.1		
State Hospital, Caro	4.8	4.7	5.3	4.9	4.5	4.5	5.0	5.2	4.5	5.3	5.2	5.2	59.1	.270	.100
Vassar	17.4	14.6	15.9	15.8	17.0	17.9	21.8	20.8	16.9	21.1	14.1	13.2	206.5	--	--
VAN BUREN															
Bangor	9.0	7.5	7.9	7.7	8.4	9.6	10.3	9.5	9.2	10.9	9.7	8.4	108.1	.460	.139
Decatur	6.7	6.5	7.4	7.8	9.4	7.7	10.6	7.9	7.3	7.5	5.2	7.4	91.4	--	--
Gobles	1.7	1.7	1.6	1.8	2.1	1.9	1.9	1.8	1.7	1.7	1.7	1.6	21.2	.251	.036
Hartford	7.3	6.6	7.3	7.0	7.6	11.6	11.6	9.3	8.3	9.3	6.7	9.0	101.6	.579	.141
Lawrence	2.5	2.5	2.6	2.8	3.1	3.1	11.0	2.0	3.1	2.9	2.9	3.1	e) 41.6	--	--
Lawton	18.8	14.8	18.8	20.4	22.0	22.7	21.3	22.5	29.9	30.9	15.2	15.1	252.4	2.000	.165
Paw Paw	8.0	16.1	17.3	14.4	20.8	19.3	25.7	25.7	23.6	20.5	15.8	16.2	223.4	1.485	.144
WASHTENAW															
h) Ann Arbor	49.0	9.1	7.5	28.0	46.8	95.4	131.6	140.8	123.2	100.1	73.5	73.2	878.2	--	--
Cassidy Lake School	1.0	1.5	1.7	1.1	1.5	1.3	2.2	1.0	1.7	1.6	1.3	1.6	17.5	--	--
Chelsea	18.1	16.2	15.4	15.7	18.0	18.2	20.5	19.4	17.8	17.2	15.8	15.1	207.4	1.061	.249
Dexter	5.2	5.0	5.3	5.1	6.8	9.0	9.6	9.0	7.2	6.2	6.5	5.3	80.2	.439	--
Manchester	7.3	5.8	6.9	6.9	7.8	7.6	7.3	9.4	6.4	9.6	8.5	8.4	91.9	.777	.134
Saline	26.8	24.8	24.0	26.6	32.0	31.3	37.3	34.4	30.0	30.3	26.7	26.4	350.6	1.892	.504
State Hospital, Ypsilanti	10.0	8.6	9.0	8.9	9.4	10.1	12.9	12.5	9.1	9.0	8.0	8.0	115.5	.615	.212
Webster Township	1.9	1.3	1.7	1.7	3.2	3.4	4.8	3.1	1.7	1.1	1.8	1.7	27.4	.456	.038
Ypsilanti	149.4	104.1	126.2	104.0	93.9	123.2	138.7	145.8	120.0	121.4	122.7	112.9	1,462.3	8.168	1.079
Ypsilanti Township	59.2	29.1	9.5	67.0	113.7	119.4	169.0	130.4	80.6	59.3	11.4	5.2	853.8	10.459	.000
WEXFORD															
Cadillac	69.4	63.3	54.3	50.5	67.4	66.5	100.3	92.9	63.1	59.5	53.0	58.9	799.1	5.313	1.373
Manton	2.0	1.7	1.8	2.1	2.5	3.0	3.8	4.5	2.0	3.2	2.8	2.9	32.3	.310	.061

NOTES

a) Pumped 892 million gallons from the Pine River.

b) Amount pumped to supply Houghton, Hancock, Portage Township, Copper Range Company, and Atlantic Mine.

c) Amount pumped to supply Painesdale, Trimountain, Baltic, and South Range.

d) Amount pumped to supply Calumet, Calumet Township, Copper City, Lake Linden, Laurim, Osceola Township, Torch Lake Township, Ahmeek, and Alleouez Township.

e) Wholly or partly estimated.

f) East Lansing and Meridian Township combined water systems in July 1973.

g) Use Ranney collector system at Chippewa River site.

h) Also pumped 4,848 million gallons from Huron River.

Q) Quarterly figures.

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1937	840	1946	1071	1955	1404
1938	845	1947	1096	1956-57	1537
1939	886	1948	1126	1958-62	1782
1940	906	1949	1156	1963-67	1977
1941	936	1950	1165	1968-72	2140
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