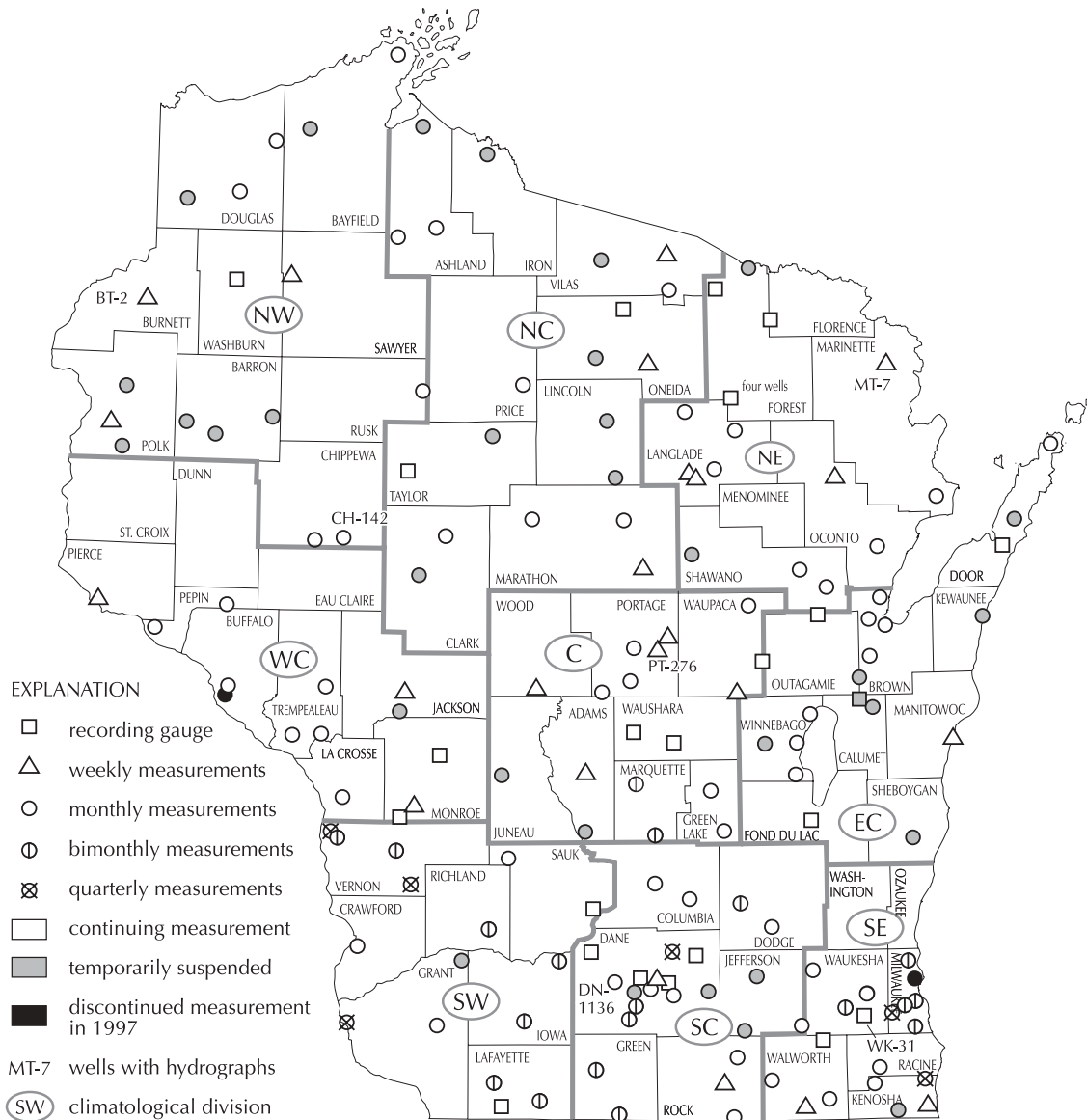


# GROUNDWATER LEVELS IN WISCONSIN, ANNUAL SUMMARY 1997

Alexander Zaporozec

1998



**Figure 1.** Location of observation wells in Wisconsin, 1997.

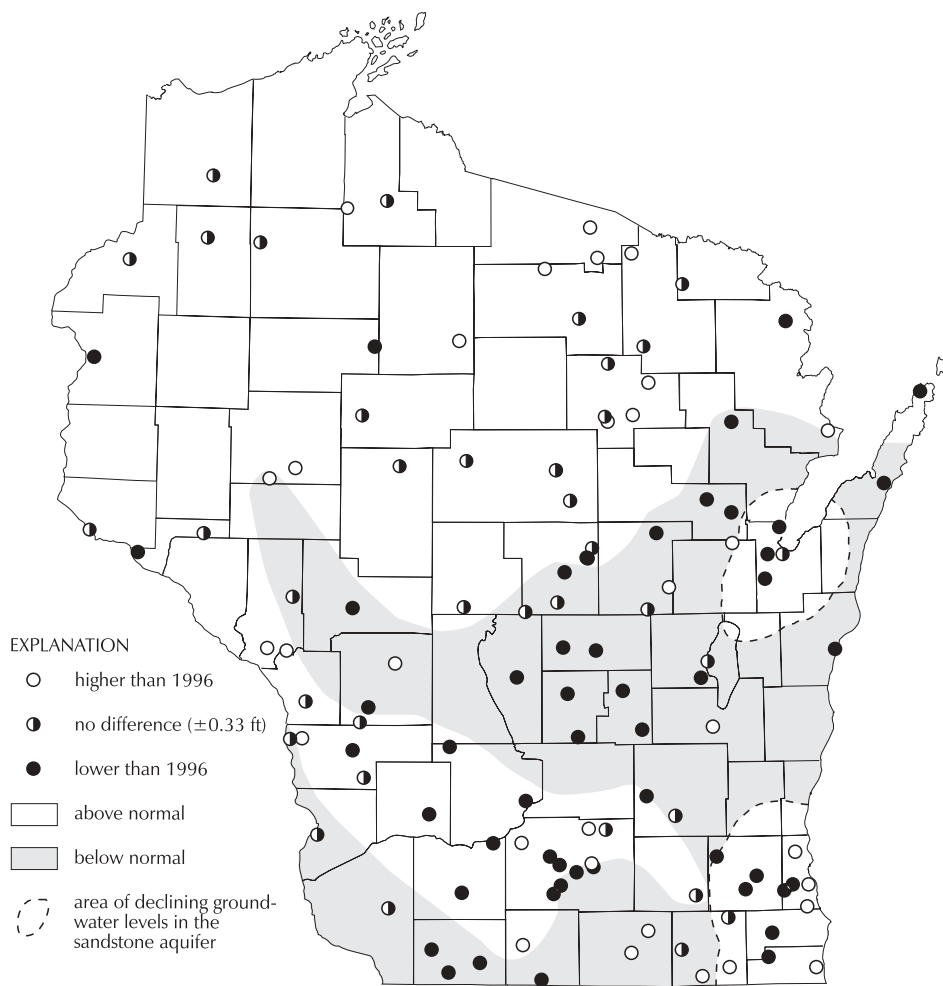
The Wisconsin Geological and Natural History Survey (WGNHS) and the U.S. Geological Survey (USGS) have jointly operated a network of observation wells in Wisconsin since 1946. During the past three years, a joint USGS/WGNHS committee has been evaluating the effectiveness of all observation wells to improve the quality of the network

and to reduce the number of observation wells because of the limited budget for operating the network. In 1996 the committee temporarily suspended 35 observation wells, which are being further evaluated. In 1997, two wells were permanently discontinued. Frequency of measurements was reduced on 33 observation wells, mostly from

*In cooperation with*

**U.S. Department of the Interior, U.S. Geological Survey**

Water Resources Division, Madison District Office, 8505 Research Way, Middleton, Wisconsin 53562-3586



**Figure 2.** Average water-level changes from 1996 to 1997.

once a month to every other month. The counties of Dunn, Eau Claire, Menominee, Ozaukee, St. Croix, and Washington at present do not have any observation wells. By the end of 1997, the network consisted of 131 wells in 66 counties. Locations of wells are shown in figure 1. Information on wells and water-level measurements can be obtained from the USGS (Bernie Ellefson, 608/821.3849) or the WGNHS (Alex Zaporozec, 608/262.3385).

Groundwater levels were affected by less than normal precipitation, which was 90 percent of the normal level for the state (M.J. Menne, Acting State Climatologist, verbal communication, 1998). Precipitation amounts were especially low in spring and fall—two critical periods for the replenishment of groundwater. In April, on the average, Wisconsin received only 37 percent of normal precipi-

tation; during September, October, and November, only 68 percent of normal precipitation for that period. Summer rains during the growing season were not sufficient to adequately recharge groundwater. These below-normal rainfall amounts resulted in lower water levels in observation wells, and water levels in most of observation wells declined for the remainder of the year.

Compared to 1996, average water levels in 1997 were lower in about two-thirds of observation wells, primarily in the central third of the state and in the southwest; levels rose slightly (less than 1 ft) in the remaining 30

percent of wells, primarily in northwestern and north-central Wisconsin (fig. 2). Water-level fluctuations in 1997 were again relatively small. In general, average water levels of individual wells did not differ more than 2 ft from 1996 levels, were within 0.5 ft of 1996 levels in 42 percent of observation wells, and were within 1 ft in 66 percent of the observation wells. The maximum recorded decline was 3.75 ft for a well in Green Lake County, and the maximum recorded rise was 2.2 ft for a well in Waupaca County.

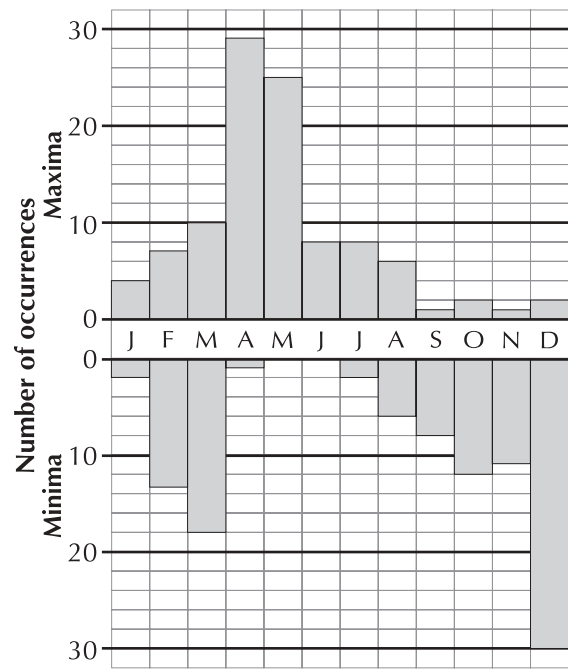
The distribution of rainfall during the year was also reflected in the distribution of peaks and lows in observation wells (fig. 3). During the first half of 1997, water levels retained their high 1996 levels, reaching their maxima mostly in April and May. The peaks, however, were not distinct and almost

nonexistent during September through December. Almost two-thirds of the observation wells had minimum water levels during the second half of the year, especially in December. The remaining third had minima during February and March.

Average water levels in the deep sandstone aquifer in areas of large withdrawals of groundwater (Brown, Milwaukee, Waukesha, Racine, and Kenosha Counties) continued in their gradual decline, and the areas of drawdown have expanded slightly (fig. 2). However, their declines in 1997 were only moderate (less than 1.5 ft), and water levels even rose in two wells in Milwaukee County, probably due to the above-normal precipitation in 1995 and 1996.

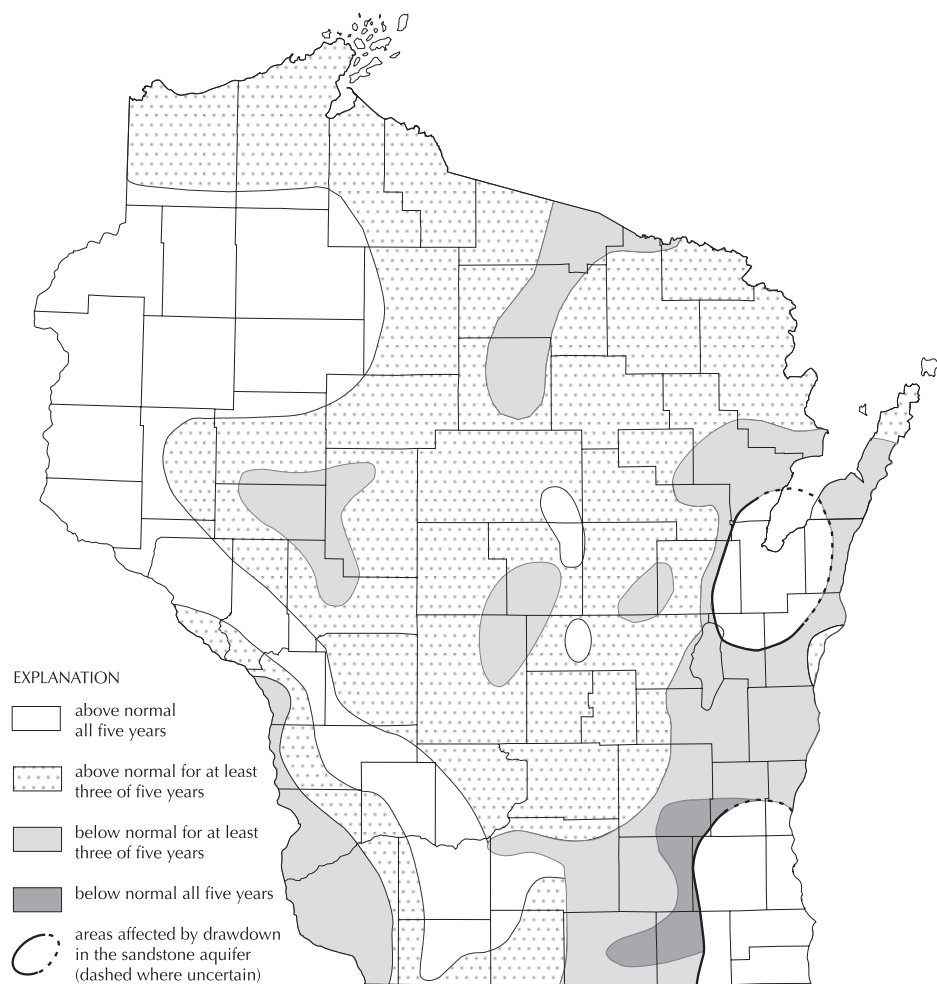
In comparison with the 30-year means for the years 1961–90 (so-called normal water levels), the 1997 groundwater levels generally were above normal in the northern half (especially in the northwest and north-central areas), and below normal in the southern half of Wisconsin (fig. 2). Although the majority of observation wells (56%) had above-normal levels, the area of below-normal levels expanded slightly in west-central, central, east-central, and northeastern Wisconsin as compared to 1996. Variations were within 5 percent of normal levels in 65 percent of observation wells. Not considering wells in areas of heavy pumping, water levels were not significantly (more than 15%) below normal; the minimum recorded was 88 percent of normal for a well in Portage County. The 1997 water levels significantly higher (more than 15%) than normal were recorded only in single wells in Iowa, Marathon, Portage, Price, Rusk, and Winnebago Counties.

Trends in groundwater levels for the past five years reflected the general trends in precipitation, which has been above normal since the end of the 1988–89 drought and has been relatively stable, even though it declined slightly in 1997. From July 1993 to June 1997, cumulative departure from normal monthly precipitation averaged +9.64 in., and



**Figure 3.** Distribution of the monthly maximum and minimum water levels for selected observation wells.

its maximum and minimum for this period was +12.46 in. (July 1996) and +6.43 in. (July 1995), respectively. This steady supply of moisture has resulted into generally positive trends in groundwater levels. Figure 4 shows the trends in groundwater levels during the past five years (1993–97); only those wells with more than 20 years of record have been included. Water levels remained above normal for at least three of the past five years in most of Wisconsin, and they were above normal for all five years in wells in the northwest and in parts of west-central and southwestern Wisconsin. Water levels in observation wells in east-central and southeastern Wisconsin and in parts of north-central, central, southwestern, and south-central Wisconsin were below normal for at least three of the past five years, and a few wells were even below normal for all five years (not including wells within the areas of drawdown in the sandstone aquifer, in which water levels are steadily declining).



**Figure 4.** Long-term trends in groundwater levels for calendar years 1993 to 1997.

Published by and available from



**University of Wisconsin-Extension  
Wisconsin Geological and Natural History Survey**

3817 Mineral Point Road, Madison, Wisconsin 53705-5100  
 ☎ 608/263.7389 FAX 608/262.8086 <http://www.uwex.edu/wgnhs/>  
 James M. Robertson, Director and State Geologist

**ISSN: 0375-8265**

This report is an interpretation of the data available at the time of preparation. Every reasonable effort has been made to ensure that this interpretation conforms to sound scientific principles; however, the report should be used to guide site-specific decisions without verification. Proper use of this publication is the sole responsibility of the user.

Issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, University of Wisconsin-Extension, Cooperative Extension. University of Wisconsin-Extension provides equal opportunities in employment and programming, including Title IX and ADA requirements. If you need this information in an alternative format, contact the Office of Equal Opportunity and Diver-

sity Programs or the Wisconsin Geological and Natural History Survey (☎ 608/262.1705).

**Mission of the Wisconsin Geological and Natural History Survey**

*The Survey conducts earth-science surveys, field studies, and research. We provide objective scientific information about the geology, mineral resources, water resources, soil, climate, and biology of Wisconsin. We collect, interpret, disseminate, and archive natural resource information. We communicate the results of our activities through publications, technical talks, and responses to inquiries from the public. These activities support informed decision-making by government, industry, business, and individual citizens of Wisconsin.*