GROUNDWATER LEVELS IN WISCONSIN, ANNUAL SUMMARY 1996

Alexander Zaporozec
(Compilation of data: Tom Gihring)
1997

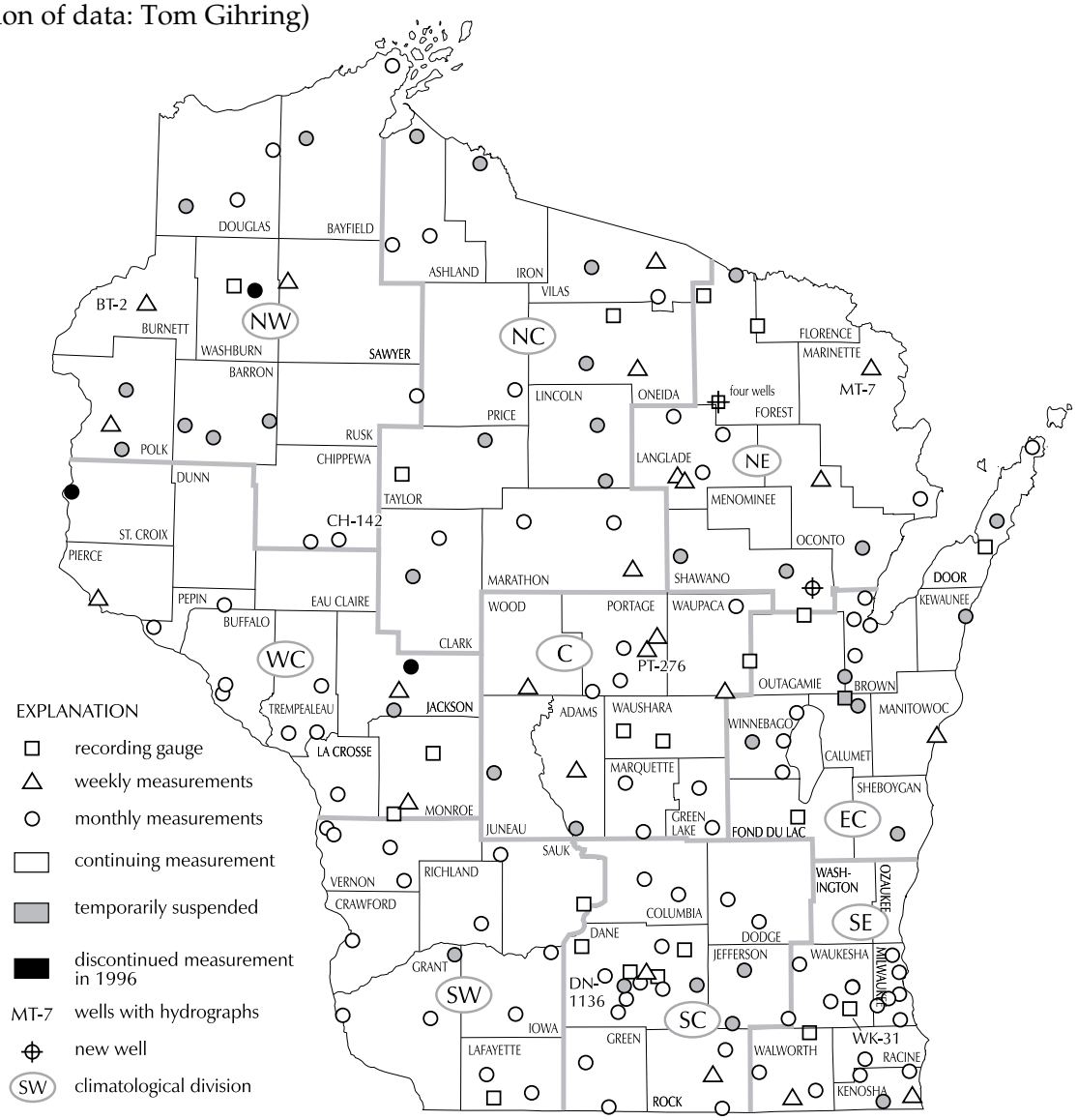

Figure 1. Location of observation wells in Wisconsin, 1996.

The Wisconsin Geological and Natural History Survey (WGNHS) and the U.S. Geological Survey (USGS) have jointly operated a statewide network of observation wells in Wisconsin since 1946. During 1994 and 1995 a joint USGS/WGNHS committee evaluated all observation wells to determine whether they met network goals and objectives (Zaporozec, 1996) and recommended revision of the network, which continued through 1996. In the effort to make the network more efficient and of better quality within the existing limited budget, measurements at 35 observation wells were temporarily suspended pending further evaluation. At the end of 1996 the network had 132

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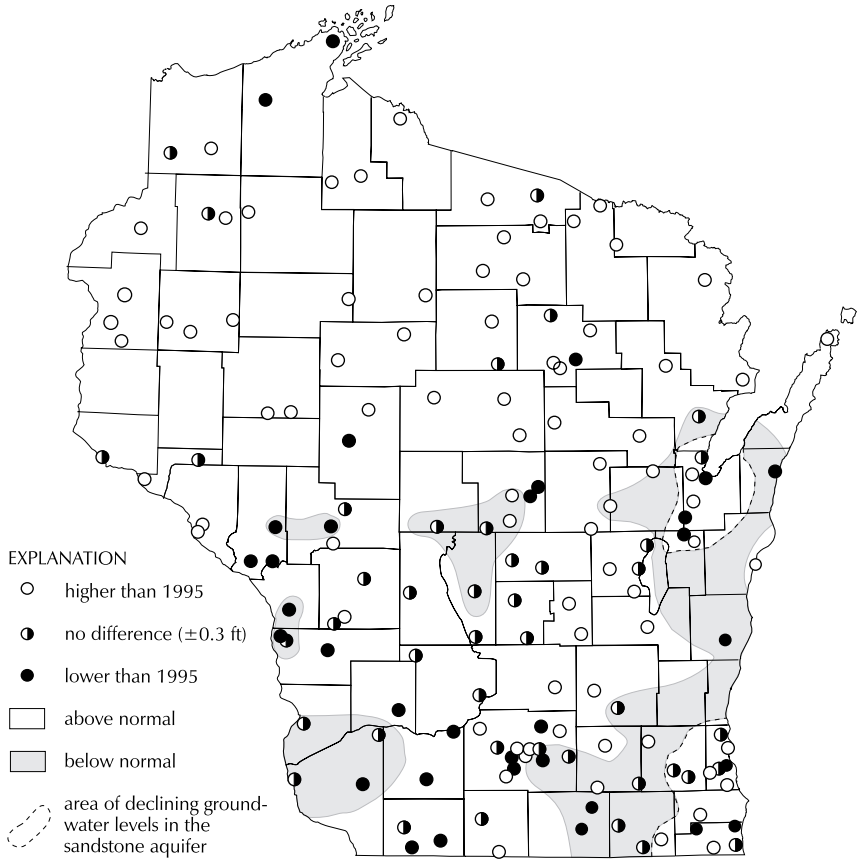

Figure 2. Average water-level changes from 1995 to 1996.

wells in 66 counties. Locations of these wells are shown in figure 1. At present, the counties of Dunn, Eau Claire, Menominee, Ozaukee, St. Croix, and Washington do not have any observation wells in the network. Information about wells and water-level measurements can be obtained from the USGS (Bernie Ellefson, 608/821.3849) or the WGNHS (Alexander Zaporozec, 608/262.3385).

Fluctuations in groundwater levels are determined to a large degree by the amount of recharge available to the groundwater from the infiltration of precipitation. Precipitation amounts in 1996 were 104 percent of normal levels for the second year in a row (M.J. Menne, State Climatology Office, verbal communication, 1997). This adequate supply of water resulted in groundwater levels that generally were slightly above the 1995 levels. Individual water-level measurements were averaged monthly to calculate average annual water levels in individual observation wells. Average water levels in 1996 were higher than in 1995 in 66 percent of observation wells in most of Wisconsin, except in the southwest, where the water levels were lower than in 1995 (fig. 2). Observation wells in the western part of central Wisconsin have recorded only minor changes from 1995 to 1996; average water levels were within 0.3 ft of the 1995 levels.

Water-level fluctuations in 1996 were relatively small. Average water levels in 1996 were within 0.5 ft of 1995 levels in almost half of the observation wells, and within 1 ft in two-thirds of the observation wells. The greatest rises were recorded in observation wells in the eastern part of central Wisconsin. Average water levels in 1996 in Waupaca, Fond du Lac, and Green Lake Counties were 2.1, 2.5, and 3.0 ft higher than in 1995, respectively. The greatest natural annual declines (greater than 2 ft) were recorded for observation wells in Trempealeau, Rock, and Vernon Counties: -2.1 and -2.2, -3.0 and -3.8, and -3.9 ft, respectively. The maximum recorded natural decline for 1996 was -3.92 ft in a well in Vernon County.

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 (fig. 2). The maximum decline in the Green Bay area was in well BN-76 (-10.45 ft); in the Milwaukee/Waukesha area, in well ML-85 (-7.94 ft); and in the Racine/Kenosha area, in well KE-6 (-2.60 ft). Water levels in the overlying Silurian dolomite aquifer have not been affected (see WK-31, fig. 3).

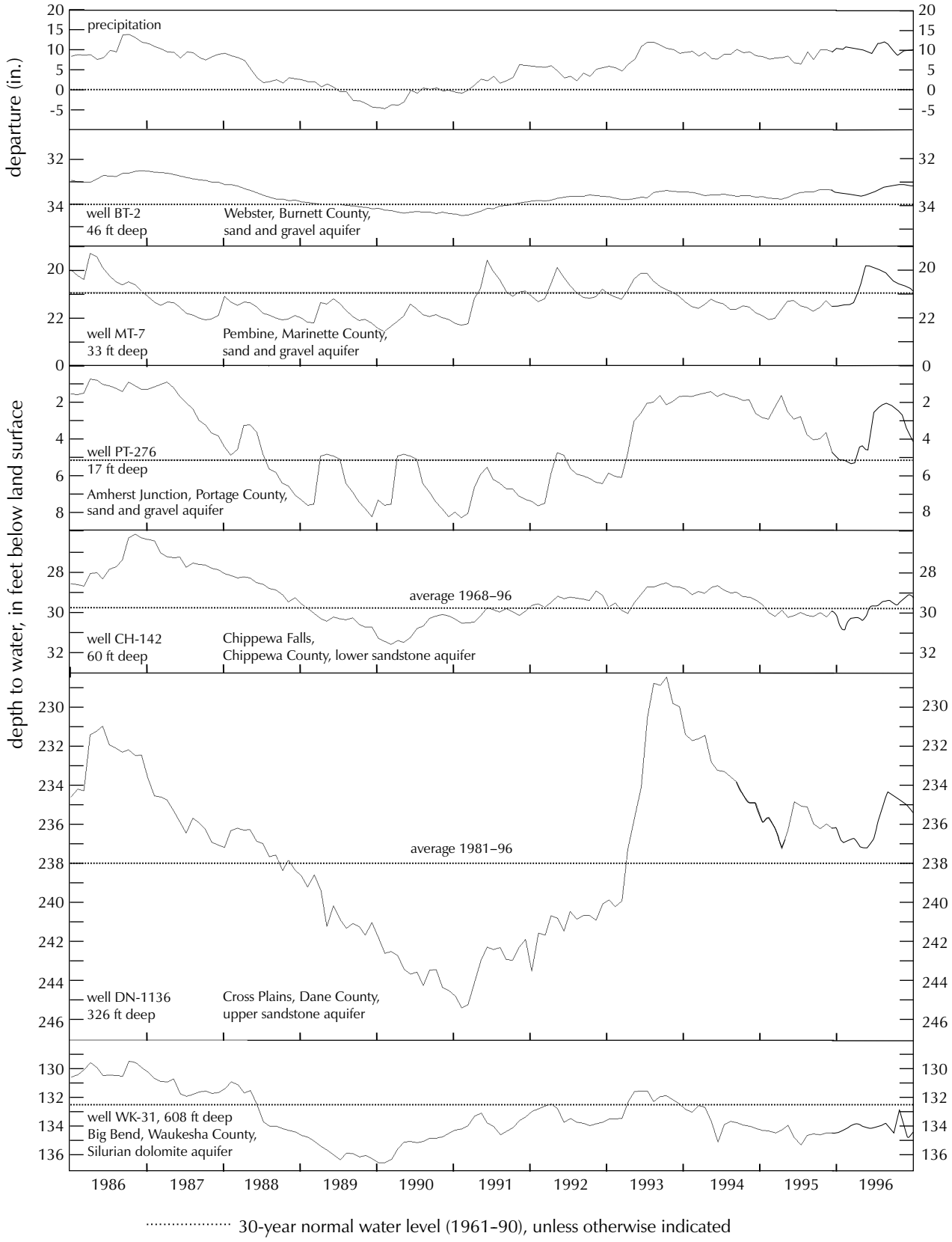

Figure 3. Cumulative departure from normal monthly precipitation in Wisconsin and fluctuations of water levels in selected key wells, 1986–96.

In comparison with the 30-year means (so-called normal water levels), the 1996 average water levels were above normal in 54 percent of observation wells located in the northern half of the state and in most of the central and south-central parts. Below-normal water levels were recorded in 29 percent of observation wells, primarily in extreme eastern Wisconsin and in parts of southwestern, central, and west-central Wisconsin (fig. 2). Observation wells having no significant departure (±1%) from normal levels were scattered all around the state.

In 1996 seasonal fluctuations in groundwater levels reflected the trends in precipitation. Although the year began with plenty of snow in January and generally good snowfall statewide, much of this moisture was gone when the winter season ended in late March. There was hardly any significant spring rainfall, which usually replenishes groundwater. Total precipitation for February through May was 79 percent below normal; March and May were especially dry. This dry spell peaked in late May. With inadequate, sporadic spring moisture, groundwater levels did not start rising until late April and early May and peaked much later than usual, in June and July, because of heavy rain showers in June and above-normal rainfall in July. About 63 percent of the observation wells reached their annual maximum water levels from late April through early August; 42 percent of the wells peaked in June and July. The usual secondary peak in the fall was almost nonexistent. Most of the lowest annual levels were recorded during September through December (51 percent), especially in December.

Groundwater levels fluctuate not only seasonally but also from year to year in response to long-term trends in precipitation. Well hydrographs (fig. 3) show the long-term trends and their relationship to precipitation trends (top box, fig. 3). Average water levels in observation wells were generally declining from their peaks in 1986 and reached their minima in late 1990 to early 1991 in response to drought years 1988–89. The generally rising trend in water levels can be seen from 1990 until 1995, with a temporary peak in 1993.

Reference

Zaporozec, A. 1996. Wisconsin groundwater observation-well network, 1995: Wisconsin Geological and Natural History Survey Educational Series 40, 14 p.

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Wisconsin Geological and Natural History Survey
3817 Mineral Point Road, Madison, Wisconsin 53705-5100
608/263.7389 FAX 608/262.8086
James M. Robertson, Director and State Geologist

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