

GROUNDWATER LEVELS IN WISCONSIN, ANNUAL SUMMARY 1999

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Data compilation: Sara Breneman

2000

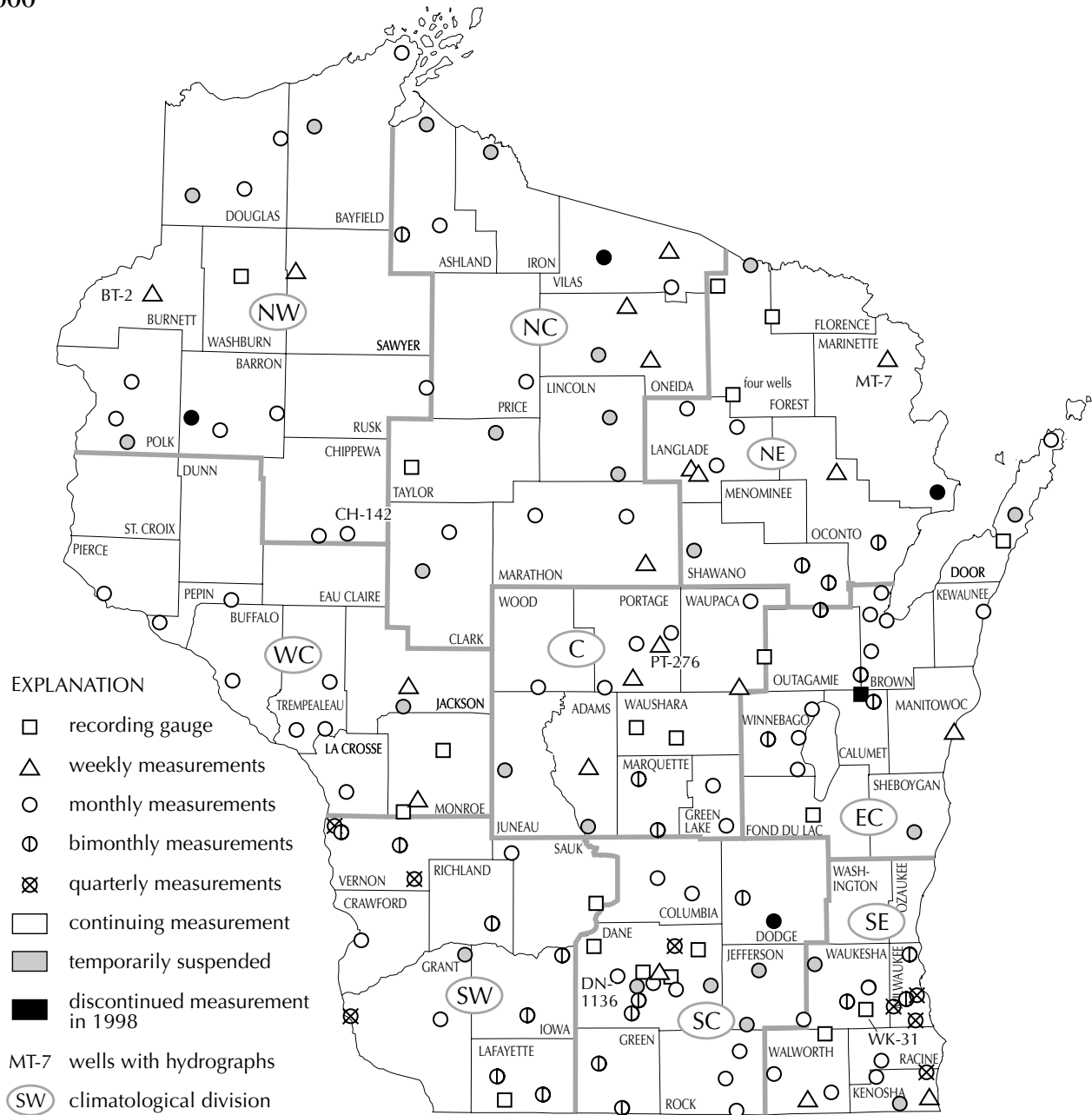


Figure 1. Location of observation wells in Wisconsin, 1999.

In cooperation with

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

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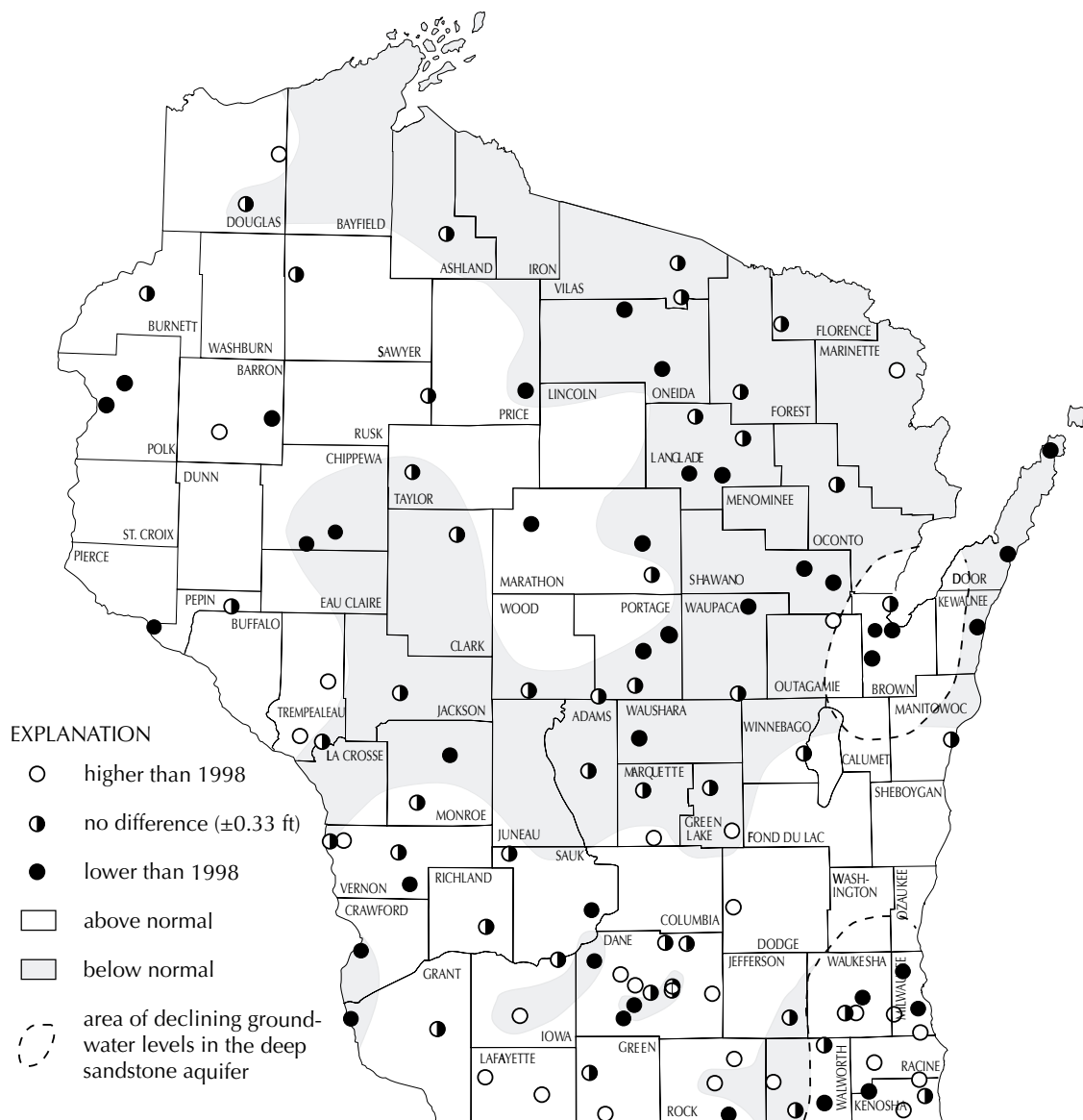


Figure 2. Average water-level changes from 1998 to 1999.

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. In 1999 water-level measurements were taken in 132 observation wells in 61 counties. Locations of wells are shown in figure 1. Measurements for five wells were discontinued during 1999 and remained suspended for 24 wells. The frequency of measurements was reduced on six additional wells to meet the network's limited operating budget. 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). Water-level information can also be found on the Internet at <<http://wi.water.usgs.gov/gw>>.

Fluctuations in groundwater levels are primarily determined by the amount of available moisture supplied by precipitation. Average annual water levels in observation wells did not change much between 1998 and 1999 because total precipitation, after a relatively dry 1997, was again close to normal (107 percent). However, precipi-

tation was especially low in spring and fall, which are critical periods for the replenishment of groundwater. For example, Wisconsin received only 30 percent of normal precipitation in March and only 61, 57, and 68 percent of normal precipitation during September, October, and November, respectively (data from State Climatology Office, 1999).

Because of that, average water levels in 1999 were generally lower than in 1998 in 59 percent of observation wells (fig. 2). The declines were mostly small, 1 ft or less, and in only a handful of wells did water levels decline more than 2 ft. This does not include wells in areas affected by heavy pumping. The maximum recorded natural decline for 1999 was 2.4 ft in a well in Shawano County.

Average annual water levels in 1999 were higher than in 1998 in the remaining 41 percent of observation wells, primarily in the south-central and southeastern parts of the state (fig. 2). On the average, water levels in 74 percent of these observation wells have not risen more than 1 ft. The largest increases in water levels (more than 2 ft) were recorded in observation wells in Douglas, Green Lake, Rock, and Waukesha Counties. The maximum recorded rise was 5 ft in a well in Douglas County.

Natural water-level fluctuations in 1999 were generally minimal. Average water levels in 70 percent of all observation wells were within 1 ft of 1998 levels; average levels in 42 percent of all observation wells were approximately the same (± 0.3 ft) as in 1998 (fig. 2).

Average water levels in observation wells open to the deep sandstone aquifer in areas of large groundwater pumpage in eastern Wisconsin (Brown, Milwaukee, Waukesha, Racine, and Kenosha Counties) continued in their gradual decline; their drawdown has affected large areas around Green Bay and in southeastern Wisconsin (fig. 2). Water levels declined the most in observa-

tion wells in the Milwaukee–Waukesha area; these declines ranged from 6.4 to 8.0 ft. In the Green Bay area, water levels in observation wells in the center of the heavy pumping declined most; declines in this area ranged from 2.8 to 5.5 ft.

In comparison with the 30-year means (so-called normal water levels), the 1999 average water levels, under natural conditions, were below normal in 56 percent of observation wells. They continued to be below normal in all northeastern Wisconsin, in the northern parts of northwest and north-central Wisconsin, and in most of the central part of the state. The area of below-normal levels expanded from 1998 into a large part of west-central Wisconsin (fig. 2). Above-normal water levels were recorded in 44 percent of the observation wells, primarily in the western third of the state, the southern part of north-central Wisconsin, and much of the southern part of the state (fig. 2). One-fifth of all observation wells recorded no significant departures ($\pm 1\%$) from normal levels. Variations were within five percent of normal levels in 64 percent of observation wells. Not considering wells affected by heavy pumping in eastern Wisconsin, the 1999 water levels in only three wells in Portage and Waushara Counties were lower than 85 percent of normal. Water levels higher than 115 percent of normal also were only found in a few individual observation wells in Douglas, Monroe, Vernon, Iowa, Rock, and Kenosha Counties.

Long-term trends in groundwater levels in selected wells in different parts of the state are shown in figure 3. The hydrographs demonstrate the trends for the past 14 years and their relationship to precipitation (top of fig. 3). Water levels in these observation wells slowly declined from 1986 until they reached minima in 1990. The rising water levels that followed peaked in 1993 and have been gradually declining (generally in southern, central, and eastern Wisconsin) or remained approximately the same in other parts of the state.

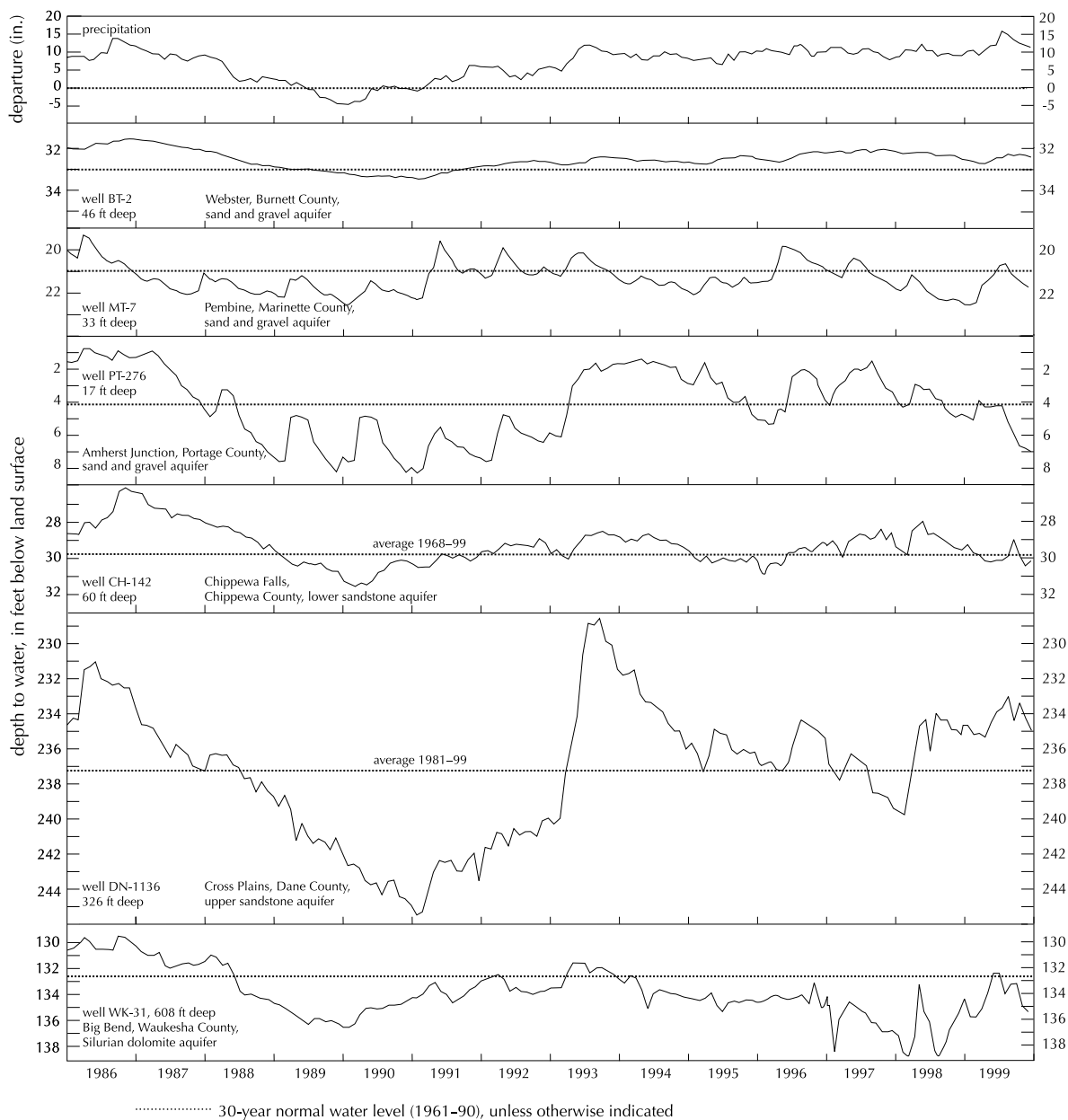


Figure 3. Cumulative departure from normal monthly precipitation in Wisconsin and fluctuations of water levels in selected key wells, 1986–99.

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