WISCONSIN GEOLOGICAL AND NATURAL HISTORY SURVEY · EDUCATIONAL SERIES 15

Groundwater Levels in Wisconsin, Summary 1991–93

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(Compilation of data: Jonathan Chipman)

1994

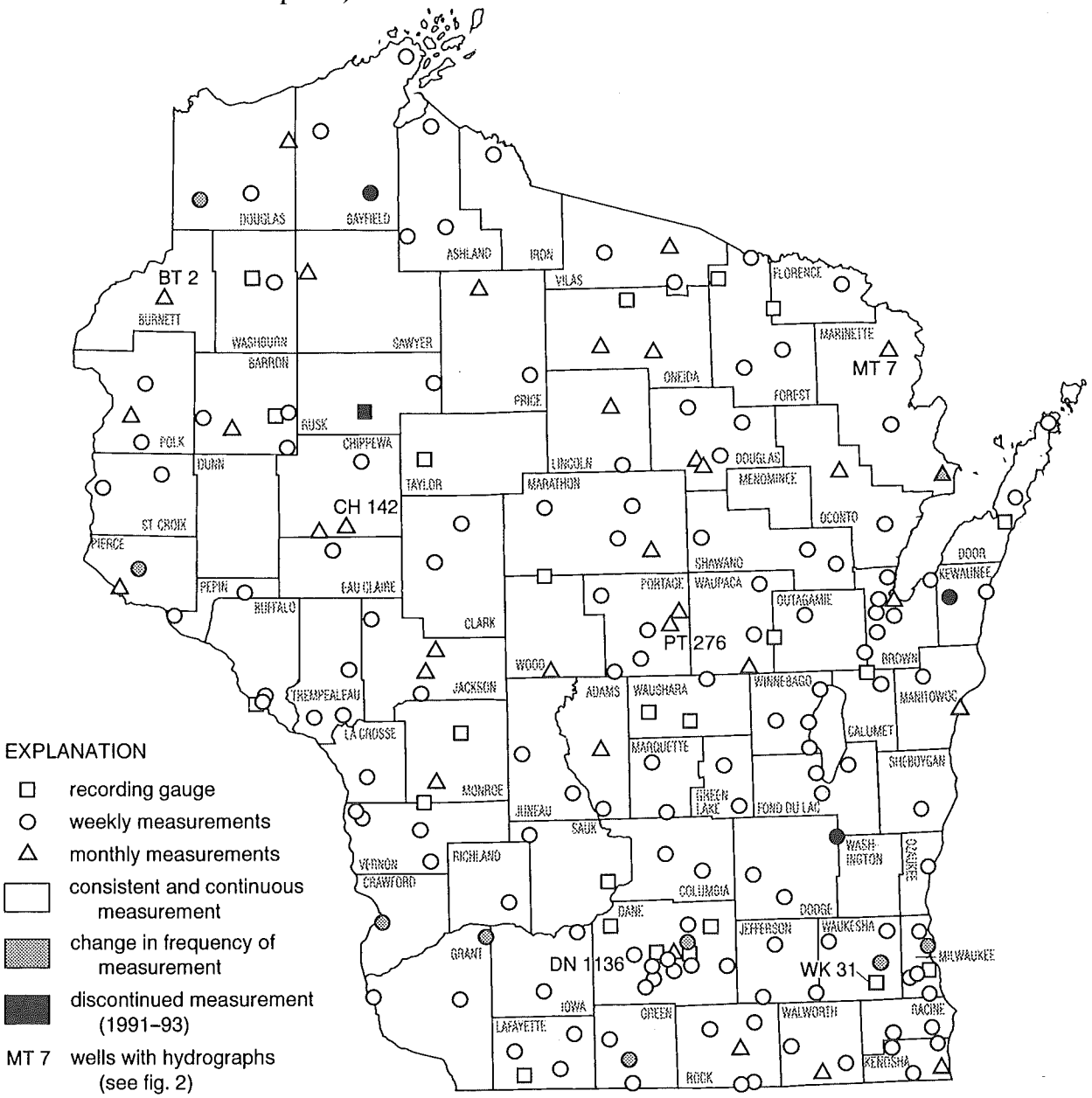

Figure 1. *Location of observation wells in Wisconsin, 1993.*

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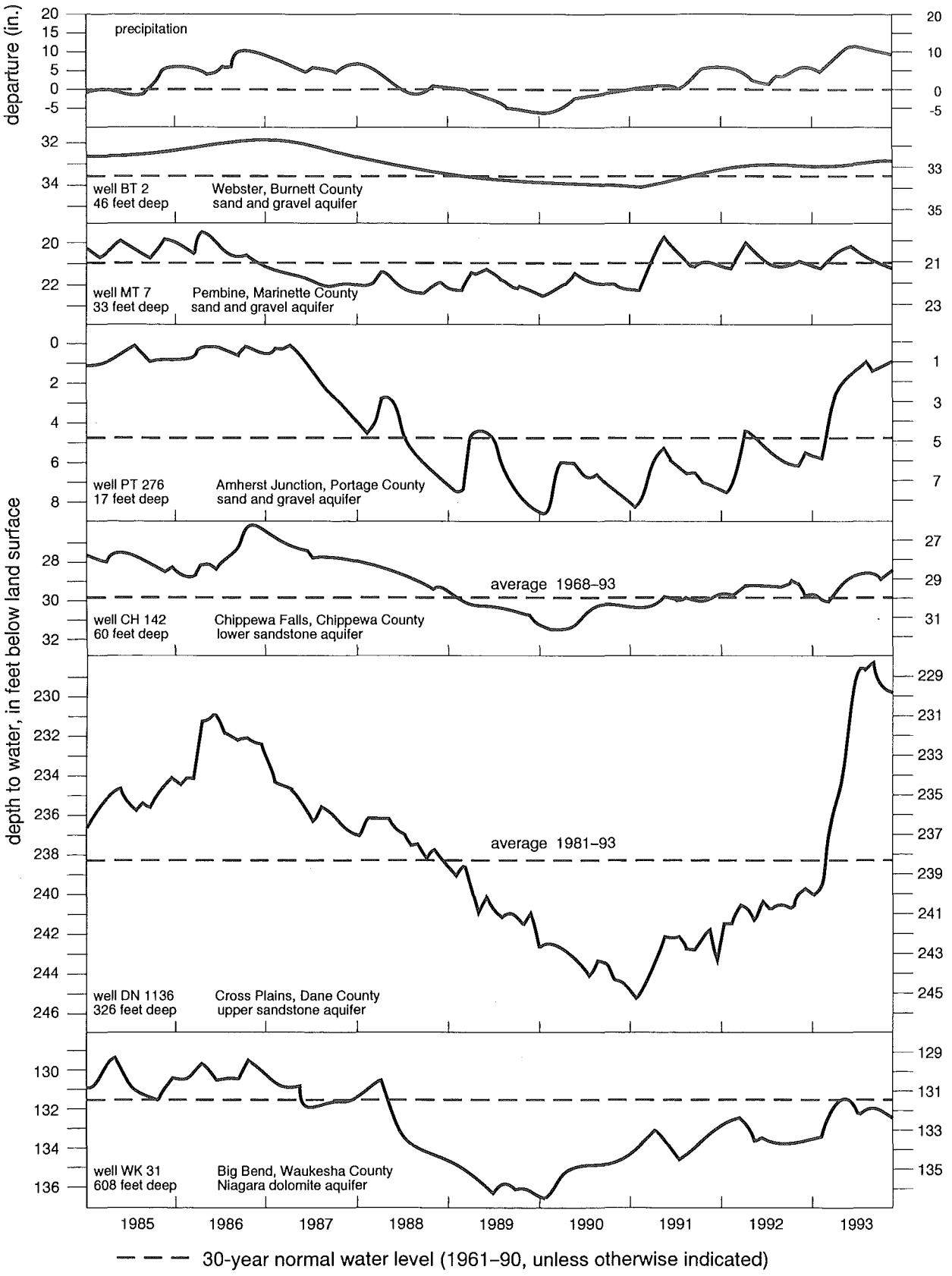

Figure 2. *Cumulative departure from normal monthly precipitation in Wisconsin and fluctuations of water levels in selected key wells.*

No summaries were published for 1991 and 1992; this summary covers the period of 1991–93. Data collected from the 193 observation wells that form the statewide groundwater-level-monitoring network were used for this report; locations of these wells are shown on figure 1. Groundwater-level data are available from the U.S. Geological Survey or the Wisconsin Geological and Natural History Survey.

During the time period covered by this report, groundwater levels in Wisconsin recovered from declines caused by the drought of 1988 and 1989. More than 40 percent of the 136 observation wells that have a record of 15 years or longer had established new record low levels from 1989 to 1991. However, replenishment of groundwater was swift (fig. 2) as a result of plentiful precipitation during 1990, 1991, and 1993. The recovery from the extremely low to extremely high levels was short—only 3.5 years on the average. Approximately 25 percent of wells with a record of 15 years or longer reached new record high levels in 1993.

Except for the wells in the sandstone aquifer in areas of heavy pumping in eastern Wisconsin, where groundwater levels are continuously declining (fig. 3), many observation wells (78% of 158 wells) had groundwater levels higher at the end of 1992 than at the end of 1990; levels remained the same in 14 percent of the wells and were lower in 8 percent of the wells. Effects of the drought persisted for a longer time in isolated pockets in Pepin, La Crosse, Waupaca, and Fond du Lac Counties, and in northern Door County, parts of Portage County, and eastern Rock and western Walworth Counties (fig. 3).

In comparison with long-term means (normal water levels), groundwater levels in many Wisconsin observation wells were below normal at the end of 1992, especially in the central and south-central parts of the state and along the Mississippi River (fig. 3). By the spring of 1993, groundwater levels reached or exceeded the normal levels in almost the entire state. However, a few wells in the state still had below normal levels in 1993, particularly in central and south-central Wisconsin (fig. 3). Some of these wells showed normal groundwater levels in July 1993, but the levels dropped again as a result of low amounts of precipitation during the last quarter of 1993.

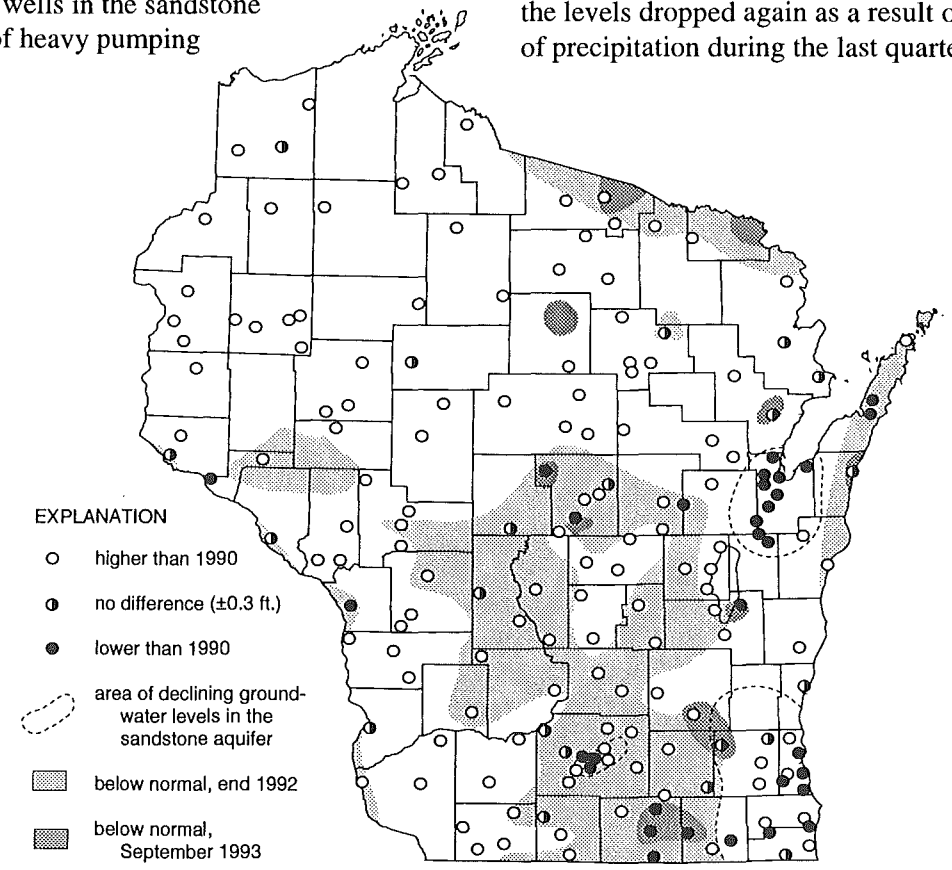

Figure 3. *Difference in average groundwater levels (+ or -, in feet) for 1991–93 as compared to 1990, and the 1992–93 percentage of long-term groundwater levels.*

Although precipitation amounts vary from year to year, they have been generally increasing since the mid-1960s; this trend was temporarily interrupted by drought in 1976 and 1988–89. The most recent drought resulted in depleted groundwater levels.

However, the precipitation received in Wisconsin during the past few years helped the groundwater levels recover quickly. In most of Wisconsin precipitation was above normal for at least three of the past four years; in the northern third of the state and along the Illinois state line precipitation was above normal in only two of the past four years (fig. 4). The driest conditions prevailed in parts of Douglas, Washburn, and Burnett Counties and in northern Ashland, Iron, and Florence Counties.

The years 1990 and 1991 were the eleventh and third wettest of the past 100 years. Nearly normal amounts of precipitation fell in 1992. Precipitation from January through July 1993 was 139 percent of normal; the precipitation that fell between April and July 1993 was 66 percent of the total amount expected in a normal year. During the remainder of 1993 Wisconsin experienced much drier weather conditions. Precipitation from August through December 1993 was below normal each month; particularly dry conditions occurred during the last three months of 1993 (66% of normal precipitation). Overall, precipitation in 1993 was 112 percent of normal.

Because we did not have any significant recharge to groundwater in the fall of 1993, the outlook for the 1994 groundwater levels depends upon soil-moisture conditions, the depth of frost, the amount of snow on the ground at the beginning of spring, the rate of spring snowmelt, and the amount of spring rain. According to predictions of the Midwestern Climate Center (Champaign, Illinois), excess precipitation (that which cannot be absorbed by the soil) for the beginning of 1994 (January 1–April 30, 1994) will be close to the long-term average. However, because of high soil moisture, less recharge would be required to replenish groundwater and keep groundwater levels above normal in 1994.

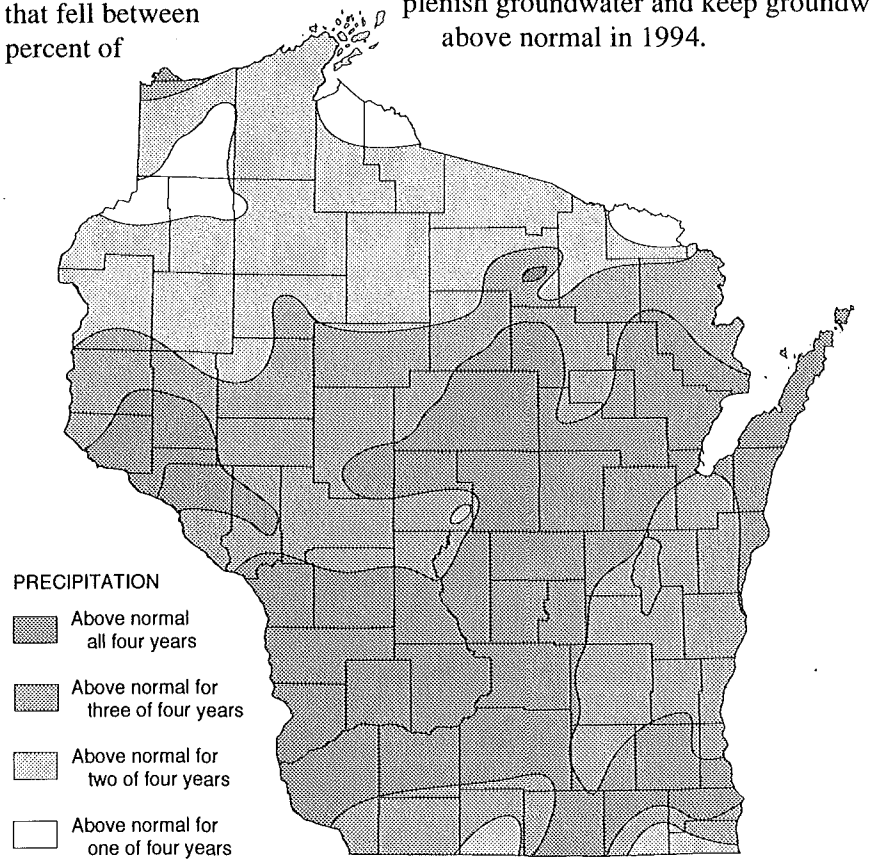

Figure 4. *Composite precipitation for 1990–93.*