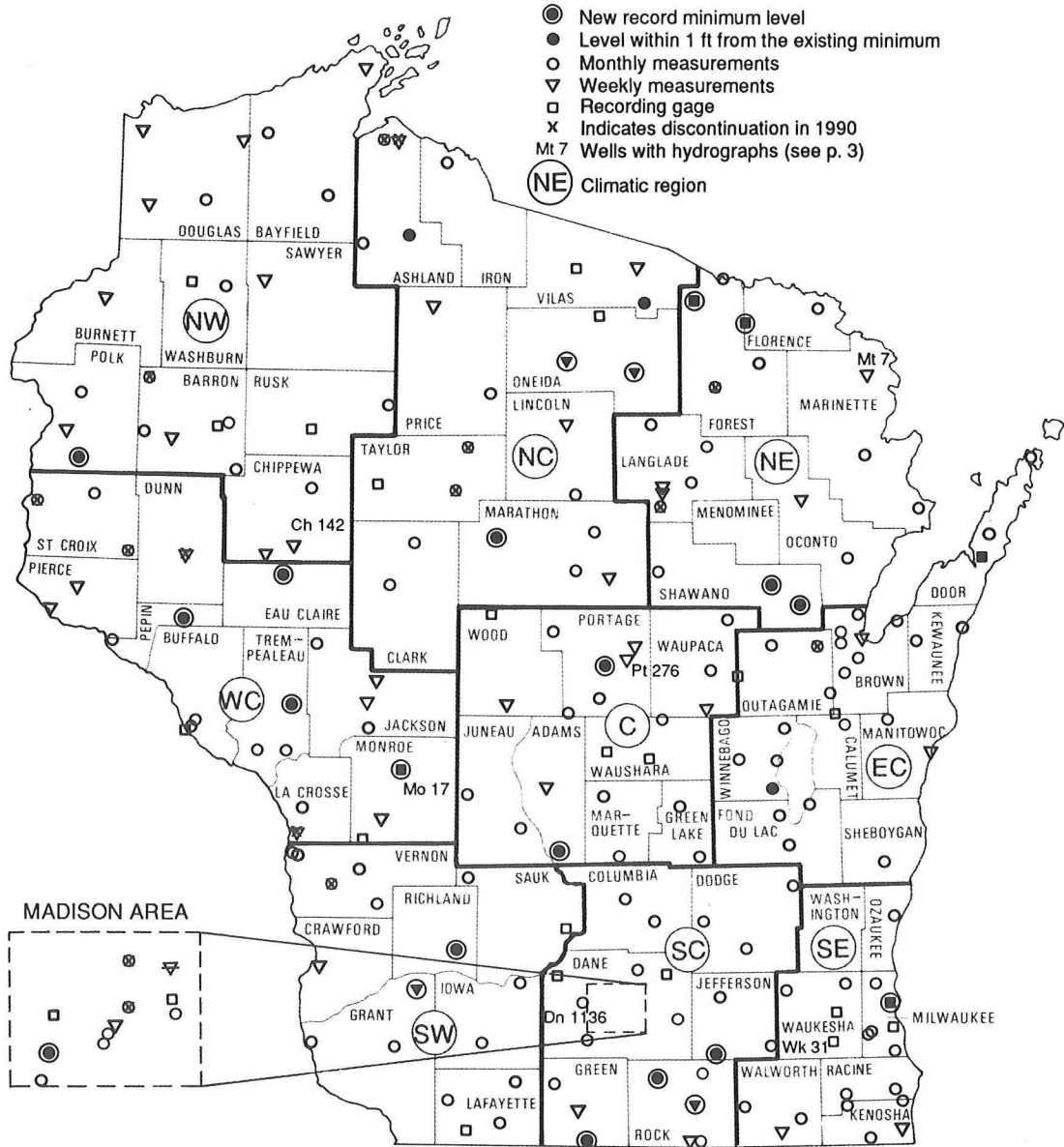
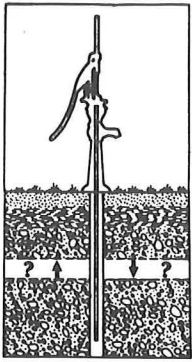


GROUNDWATER LEVELS IN WISCONSIN, ANNUAL SUMMARY 1990

Alexander Zaporozec

(Compilation of data: Pamela Naber and Angshuman Guha)
1991



- New record minimum level
- Level within 1 ft from the existing minimum
- Monthly measurements
- ▽ Weekly measurements
- Recording gage
- x Indicates discontinuation in 1990
- Mt 7 Wells with hydrographs (see p. 3)
- (NE) Climatic region

LOCATION OF OBSERVATION WELLS IN WISCONSIN, 1990

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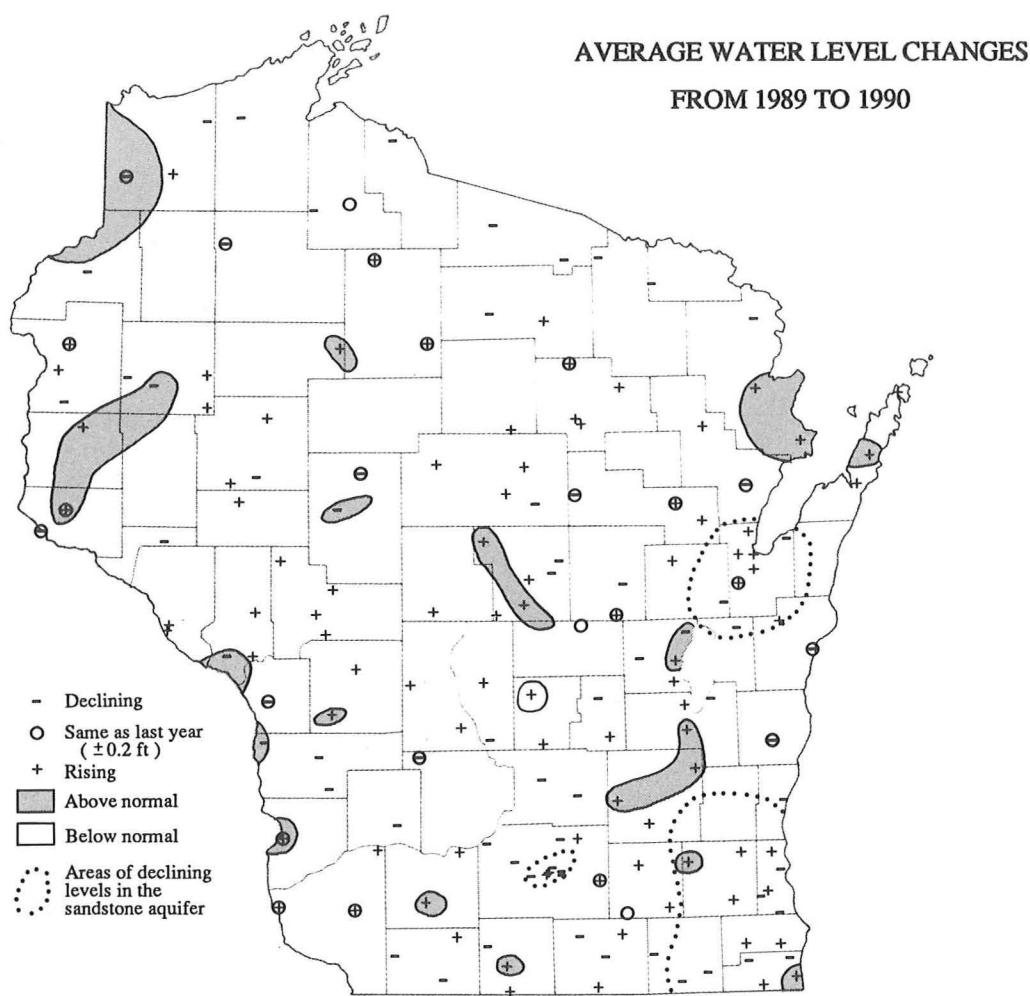
Even though 1990 was a wet year (see p. 4), groundwater levels in many parts of Wisconsin continued their decline in the aftermath of the 1988-89 drought. Groundwater levels do not respond to changes in precipitation immediately like the water levels of surface-water bodies do because of the amount of time it takes for water to seep from the land surface to the water table. Response time can be days or weeks for shallow wells; for deeper wells, the response can take several months to a year or more. Twenty-two observation wells reached new record low levels and four wells dropped to near-record low levels (see p. 1).

The well hydrographs on page 3 show a variety of responses to precipitation. The shallow water table shown by well MO 17 recovered dramatically, but it is still significantly below normal. Another shallow water table, represented by well PT 276, recovered partially during spring, but it resumed its decline for the rest of the year and remains below normal. The moderately deep water table shown by BT 2 is slightly below normal and still declining at a slow rate. The deep water level represented by WK 31 shows some signs of recovery, but the cumulative effects of

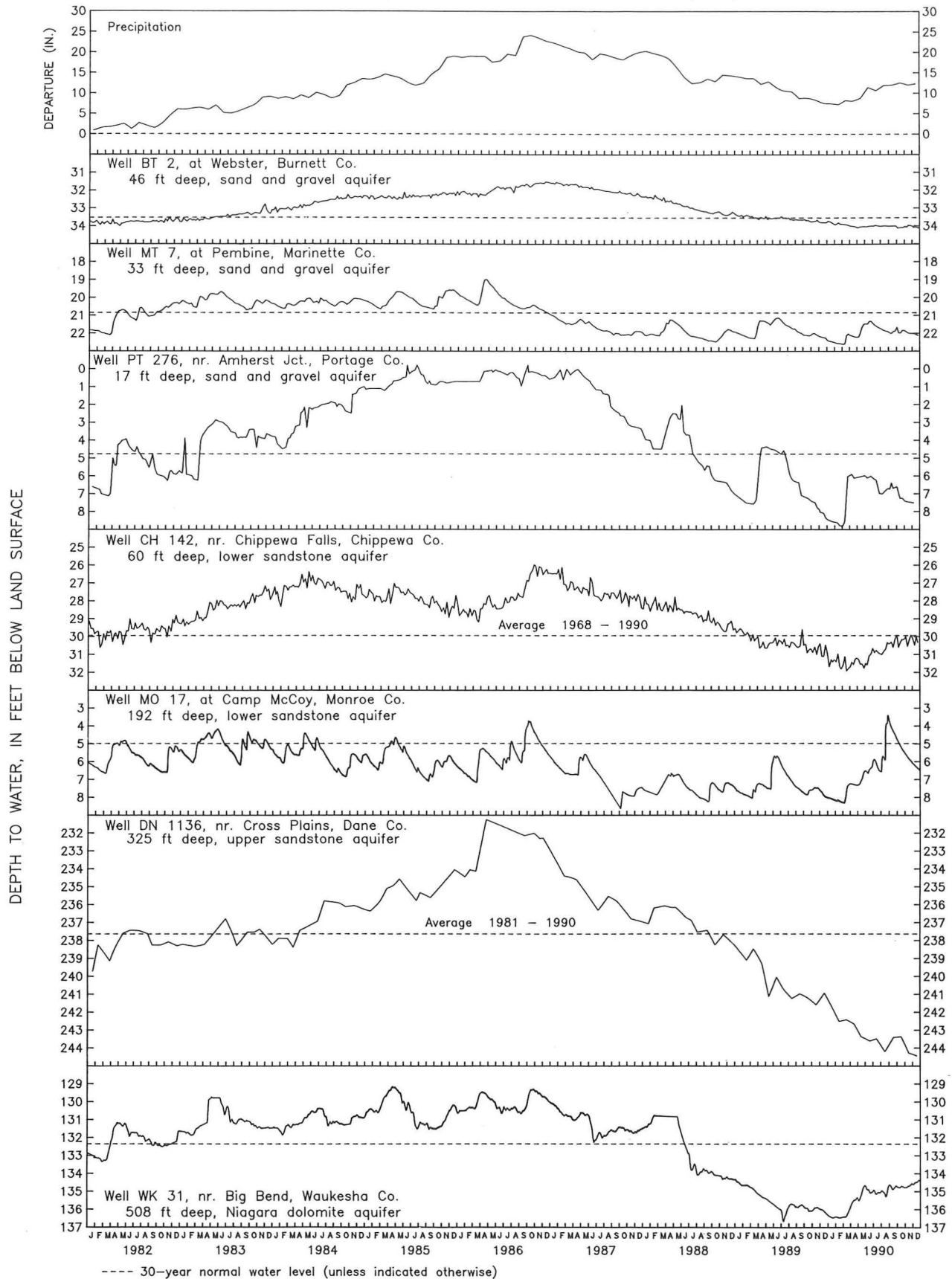
the continuous decline during 1988-89 will persist into 1991. The deep water level represented by well DN 1136 shows no signs of recovery at all.

The map below shows that the average water levels in most of the observation wells in Wisconsin rose as compared to 1989, especially in west-central, central, northeastern, and southeastern Wisconsin. The replenishment of groundwater has been sufficient to slow down or even temporarily reverse the gradually declining levels in the heavily pumped areas of Green Bay and southeastern Wisconsin. Declining water levels persist in observation wells in northwestern, north-central, southwestern, south-central, and east-central Wisconsin. In these areas, water levels have been declining during the last four years. The greatest declines (more than 2 ft) were recorded for some wells in the southwestern and south-central areas.

In comparison with long-term means, water levels in observation wells remain below normal in most of Wisconsin and rose above normal only in less than 20 percent of the observation wells. The above-normal areas are isolated and scattered around the state, as illustrated below.



CUMULATIVE DEPARTURE FROM NORMAL MONTHLY PRECIPITATION IN WISCONSIN
AND FLUCTUATIONS OF WATER LEVELS IN SELECTED KEY WELLS (see p.1 for locations)



The year 1990 was the eleventh wettest in the last 100 years. The map below shows the distribution of precipitation in percent of normal precipitation. In most of Wisconsin precipitation was above normal; parts of the northwest were less than normal. The driest regions of the state were located along the upper St. Croix River in Burnett County and especially on the extreme northern edge of Wisconsin, where the conditions reflect the continuing drought in the Upper Peninsula of Michigan. All districts shown on the map averaged above normal. Precipitation was heaviest in the east-central district (25 percent above normal) and lightest in the northwestern and northeastern districts (7 to 10 percent above normal). Precipitation ranged from less than 82 percent of normal at Gurney in Iron County to almost 145 percent of normal at Bloomer in Chippewa County.

The winter of 1989-90 was mild. Temperatures were above normal most of the winter, which made it difficult for

snow to accumulate on the ground. Precipitation in January and February was 90 percent and 78 percent of normal, respectively. The above-normal rains started in March (152 percent of normal) and continued throughout the growing season, with the exception of April (95 percent) and July (80 percent). The heaviest precipitation was recorded in June (166 percent), and the least rain fell in November, which was extremely dry (71 percent of normal).

The issue of drought has been largely forgotten in 1990, due to the abundant rains and replenished soil moisture in nearly all agricultural areas in Wisconsin. In addition, many aquifers began to recover from the 1988-89 drought. This trend -- combined with higher than normal precipitation in early 1991, the favorable projections of precipitation for the spring, and shallower than normal average frost depth in most of the state -- leads to an optimistic view for the continued recovery of groundwater levels.

