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Groundwater Levels Decline in Western and Central Kansas

LAWRENCE--Average groundwater levels across western and central Kansas showed significant declines for the second consecutive year, according to preliminary data compiled by the Kansas Geological Survey (KGS), based at the University of Kansas.

In early January 2013, the KGS and the Kansas Department of Agriculture's Division of Water Resources (DWR) measured water levels in approximately 1,400 water wells in 47 western and central Kansas counties to document changes in groundwater levels during 2012.

The KGS and DWR monitor the wells annually. Most are used for irrigation, although some are stock or abandoned wells. No domestic wells are monitored.

Over 2012, water levels in the network declined, on average, a little more than 2 feet, following a 2.25-foot drop the year before. As drought conditions continued, regional declines ranged from 1.4 feet in the northwest to 3.56 feet in the southwest.

"Nearly the entire state experienced lower-than-average precipitation during the 2012 May-to-July growing season," said Brownie Wilson, KGS water-data manager, "and areas with the greatest increases in water demands due to drought also saw the most extreme groundwater level declines."

Prolonged pumping to compensate for the lack of precipitation, not the lack of precipitation itself, has the biggest impact on groundwater levels, he said. The physical attributes of the state's aquifers also influence their long-term sustainability.

Ninety percent of the wells measured by the KGS and DWR draw from the High Plains aquifer system--a network of underground water-bearing formations, consisting of porous rock and unconsolidated materials, that includes the extensive Ogallala aquifer.

"The High Plains aquifer varies significantly from place to place in depth, thickness, and water-producing capacity," Wilson said.

Wells measured by the KGS and DWR that do not produce water from the High Plains aquifer are drilled into deeper aquifer systems, such as the Dakota, or shallower aquifers along creeks and rivers.

Most of the 1,400 wells in the network are within the boundaries of the state's five Groundwater Management Districts (GMDs), which are organized and governed by area landowners and large-scale water users to address water-resource issues.

The average water level for the entire network has dropped about 14 feet since 1996, with declines in the

northwest, west-central, and southwest Kansas GMDs about 10 to 30 times greater than in the south-central Kansas GMDs.

In GMD 3 in southwestern Kansas, the 2012 decline of 3.56 feet followed a 4.26-foot drop in 2011. Hardest hit by drought over the past several years, GMD 3 has also suffered the greatest average regional decline since 1996, at 32.5 feet.

The wells monitored in the GMD 3 produce water from the Ogallala aquifer except in a few selected areas where they draw from the Dakota aquifer. The district includes all or part of Grant, Haskell, Gray, Finney, Stanton, Ford, Morton, Stevens, Seward, Hamilton, Kearny, and Meade counties.

Western Kansas GMD 1 includes portions of Wallace, Greeley, Wichita, Scott, and Lane counties, where the majority of wells are drilled into the Ogallala aquifer. The district had its highest declines in 2012 (1.54 feet) and 2011 (2.05-foot) following an average decline of only 0.5 feet per year over the previous 15 years. Average water levels for the district are down 10.74 feet since 1996.

Northwest Kansas GMD 4, with an average drop of 1.39 feet in 2012, also experienced notably higher declines than in recent years, in part because the area had largely not been subjected to extensive drought conditions until the summer of 2012. Average levels there decreased about 0.5 feet in both 2011 and 2010 after a slight increase in 2009, and are down 10.12 feet since 1996.

Groundwater in GMD 4--covering Sherman, Thomas, Sheridan, and parts of Cheyenne, Rawlins, Decatur, Graham, Wallace, Logan, and Gove counties--is pumped mainly from the Ogallala aquifer.

Besides the Ogallala aquifer, which underlies parts of eight states, the High Plains system includes the smaller Great Bend Prairie aquifer in south-central Kansas and the Equus Beds aquifer north and west of Wichita.

Big Bend GMD 5 is centered on the Great Bend Prairie aquifer underlying Stafford and Pratt counties and parts of Barton, Pawnee, Edwards, Kiowa, Reno, and Rice counties and had a decline of 1.83 feet in 2012 following a 2.95 feet decline in 2011. The average level there, boosted by a 3.34-foot gain in 2007 following flooding conditions, has dropped about one foot since 1996.

Water levels in the Equus Bed GMD 2, which includes parts of Sedgwick, McPherson, Harvey, and Reno counties, fell 1.63 feet in 2012 following a decline of 3.06 feet in 2011. Prior to 2011, the district had not suffered an annual reduction of more than one foot and had shown gains in 7 of the 15 years between 1996 and 2011. Average levels for the district are down 1.59 feet since 1996.

Much of the water supply for Wichita, Hutchinson, and the surrounding area comes from the Equus Bed aquifer.

The same wells are measured each year to determine the long-term behavior of the aquifer, and measurements are taken primarily in January because water levels are least likely to fluctuate when irrigation wells aren't in use. Infrequently, however, later-than-normal pumping due to dry conditions may unduly affect measurement results.

"A few wells in western Kansas registered dramatic increases in water levels in 2012 even though weather conditions or measurements from neighboring wells did not warrant those increase," Wilson said. "It appears late localized irrigation pumping in November and December of 2011 likely caused the January 2012 measurements to be lower than normal, and by January 2013 they had rebounded, although still below January 2011 values."

The High Plains aquifer is the primary source of municipal, industrial, and irrigation water for much of western and central Kansas. Approximately 80% of the 33,000 non-domestic water wells in Kansas are in the High Plains aquifer region of the state.

Results of the measurements are provisional and subject to revision based on additional analysis. The data will be available in mid-February at <http://www.kgs.ku.edu/Magellan/WaterLevels/index.html>.

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URL="<http://www.kgs.ku.edu/General/News/2013/2013groundwaterlevels.html>"