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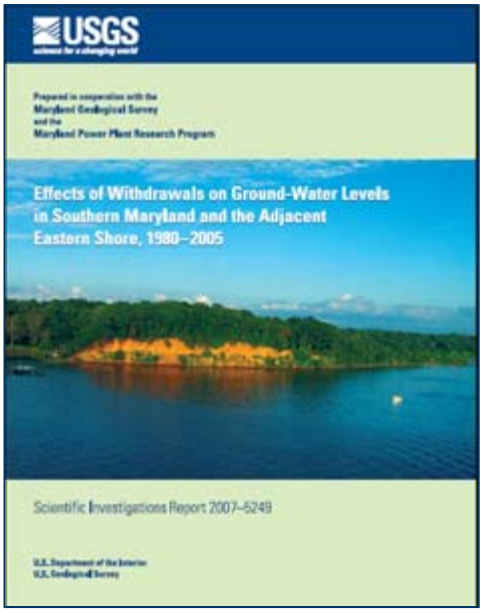

Effects of Withdrawals on Ground-Water Levels in Southern Maryland and the Adjacent Eastern Shore, 1980-2005

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Abstract

Ground water is the primary source of water supply in most areas of Maryland´s Atlantic Coastal Plain, including Southern Maryland. The counties in this area are experiencing some of the most rapid growth and development in the State, resulting in an increased demand for ground-water production.

The cooperative, basic water-data program of the U.S. Geological Survey and the Maryland Geological Survey has collected long-term observations of ground-water levels in Southern Maryland and parts of the Eastern Shore for many decades. Additional water-level observations were made by both agencies beginning in the 1970s, under the Power Plant Research Program of the Maryland Department of Natural Resources. These long-term water levels commonly show significant declines over several decades, which are attributed to ground-water withdrawals. Ground-water-level trends since 1980 in major Coastal Plain aquifers such as the Piney Point-Nanjemoy, Aquia, Magothy, upper Patapsco, lower Patapsco, and Patuxent were compared to water use and withdrawal data. Potentiometric surface maps show that most of the declines in ground-water levels can be directly related to effects from major pumping centers. There is also evidence that deep drawdowns in some pumped aquifers may be causing declines in adjacent, unpumped aquifers.

Water-level hydrographs of many wells in Southern Maryland show linear declines in levels year after year, instead of the gradual leveling-off that would be expected as the aquifers equilibrate with pumping. A continual increase in the volumes of water being withdrawn from the aquifers is one explanation for why they are not reaching equilibrium. Although reported ground-water production in Southern Maryland has increased somewhat over the past several decades, the reported increases are often not large enough to account for the observed water-level declines. Numerical modeling simulations indicate that a steady, annual increase in the number of small wells could account for the observed aquifer behavior. Such wells, being pumped at rates below the minimum legal reporting threshold of 10,000 gallons per day, might be the source of the additional withdrawals. More detailed water-use data, especially from domestic wells, central-pivot irrigation wells, and other small users not currently reporting withdrawals to the State, may help to determine the cause of the aquifer declines.

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