



U.S. Geological Survey (USGS) Science Summary—New digital map documents surficial-aquifer thickness in the Delmarva Peninsula, Maryland and Delaware: Helping to understand the role of groundwater in delivering nitrogen to Chesapeake Bay (Released October 2016)

Issue

Nitrate, the major source of nitrogen in streams of the Eastern Shore of Chesapeake Bay and the wider Delmarva Peninsula, is transported primarily in groundwater through the unconfined surficial aquifer. Understanding the subsurface processes that affect nitrate transport in this area has been hampered by a lack of regional information on the thickness of this aquifer.

Results of new USGS research

The USGS produced a digital map of the thickness of the surficial aquifer (fig. 1) of the Maryland and Delaware part of the Delmarva Peninsula. The map, published as a USGS data release (Denver and Nardi, 2016), is intended to be used in conjunction with other digital environmental data (such as land use, location of wetlands, and soil characteristics) to facilitate studies of the transport of nitrate and other water-soluble chemicals in groundwater in this region by providing the subsurface hydrogeologic information needed to improve our understanding of regional groundwater flow processes.

Implications for ecosystem management include:

The map can be applied to help:

- Support other studies of the transport of nitrate and other chemicals in groundwater and streams on the Delmarva Peninsula in Maryland and Delaware.
- Study the function of riparian zones with respect to their potential to remove nitrate from groundwater flowing through anoxic sediments associated with near-stream aquifer discharge areas, as well as the potential for groundwater flow paths to bypass (flow beneath) the zone of potential denitrification, where nitrate present in groundwater may be converted to nitrogen gas.
- Improve understanding of nutrient transport processes in the surficial aquifer and aid in identifying and developing the most effective best management practices for reducing nutrient transport to surface waters.

Source of information

The USGS data release described in this Science Summary is available by accessing the document below, which should be used as the reference for this information:

Denver, J.M., and Nardi, M.R., 2016, Thickness of the surficial aquifer, Delmarva Peninsula, Maryland and Delaware: U.S. Geological Survey data release, accessed July 8, 2016, at <http://dx.doi.org/10.5066/F7610XFT>.

Additional information about the hydrogeology of the Eastern Shore of the Chesapeake Bay watershed and the transport of nitrate and other chemicals can be found at:

Andreasen, D.C., Staley, A.W., and Achmad, Grufon, 2013, Maryland Coastal Plain Aquifer Information system—Hydrogeologic framework: Maryland Geological Survey Open-File Report No. 12-02-20, 121 p., accessed July 8, 2016, at http://www.mgs.md.gov/publications/report_pages/OFR_12-02-20.html.

Ator, S.W., and Denver, J.M., 2015, Understanding nutrients in the Chesapeake Bay watershed and implications for management and restoration—The Eastern Shore (ver. 1.2, June 2015): U.S. Geological Survey Circular 1406, 72 p., accessed July 8, 2016, <http://dx.doi.org/10.3133/cir1406>.

Ator, S.W., Denver, J.M., Krantz, D.E, Newell, W.L., and Martucci, S.K., 2005, A surficial hydrogeologic framework for the Mid-Atlantic Coastal Plain: U.S. Geological Survey Professional Paper 1680, 44 p., 4 pls. [Also available at <http://pubs.water.usgs.gov/pro1680>.]

Denver, J.M., Ator, S.W., Fischer, J.M., Harned, D.C., Schubert, C.E., and Szabo, Zoltan, 2014, The quality of our Nation's waters—Water quality in the Northern Atlantic Coastal Plain surficial aquifer system, Delaware, Maryland, New Jersey, New York, North Carolina, and Virginia, 1988–2009: U.S. Geological Survey Circular 1353, 88 p., accessed July 8, 2016, at <http://dx.doi.org/10.3133/cir1353>.

Sanford, W.E., and Pope, J.P., 2013, Quantifying groundwater's role in delaying improvements to Chesapeake Bay water quality: Environmental Science and Technology, v. 47, no. 23, p. 13330-13338, accessed July 8, 2016, at <http://dx.doi.org/10.1021/es401334k>.

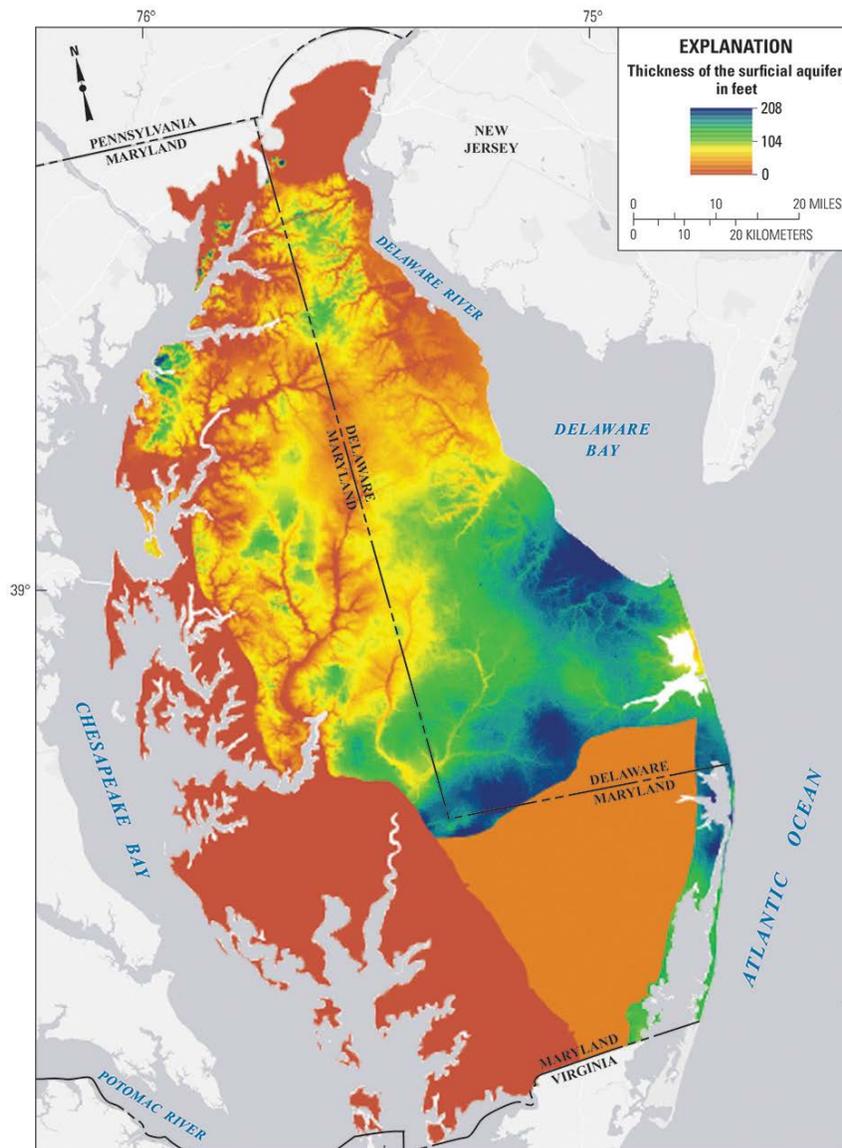


Figure 1. Thickness of surficial-aquifer sediments in the Delmarva Peninsula, Maryland and Delaware. (Modified from Denver and Nardi, 2016)