



NEW YORK STATE WATER RESOURCES INSTITUTE

Department of Earth and Atmospheric Sciences

1123 Bradfield Hall, Cornell University
Ithaca, NY 14853-1901
<http://wri.eas.cornell.edu>

Tel: (607) 255-3034
Fax: (607) 255-2016
Email: nyswri@cornell.edu

Water Withdrawals for Hydraulic Fracturing

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Hydraulic fracturing (fracking) techniques used during the development of shale gas wells require millions of gallons of water. In Pennsylvania, for example, hydraulic fracturing associated with the Marcellus shale requires a total of 3 to 5 million gallons of water over a 2 to 5 day period ([SRBC](#)). Natural gas industry operators in this region use a mixture of recycled water from previous fracturing operations, and fresh water that comes predominantly from surface waters such as rivers.

These water withdrawal volumes sound large, and they are, but they need to be understood in the context of other water withdrawals that are already occurring. Many people are unaware that in the United States, more water is withdrawn to cool power plants than for any other use. In the Great Lake States in the year 2000, estimated withdrawals associated with power plant cooling were 53.7 billion gallons per day ([USGS](#)). As of 2009 it was estimated that scrubbers on coal burning thermoelectric power plants in the Susquehanna River Basin consumed 4 to 5 million gallons of water per day ([SRBC](#)). After power generation, public water supply withdrawals are the next largest draw on our water resources. For the Great Lake States in the year 2000, approximately 10.2 billion gallons per day were withdrawn by public water systems. A small city such as Ithaca, NY withdrew nearly 3 million gallons (from Six Mile Creek) each day during 2010, while the surrounding community withdrew an additional 4 million gallons per day in total from both Cayuga Lake and Fall Creek ([Ithaca](#)). Seen in this context, water withdrawals for hydraulic fracturing appear to be small relative to power plant cooling withdrawals, and similar to (small to medium) public water supply withdrawals that are happening across the state. While the total volumes of these

withdrawals seem manageable, concern remains over where and when these withdrawals will occur, and how they will be regulated.

Water withdrawals should take place in such a way so as to ensure adequate downstream water quantity and quality for both human and ecological needs. Major rivers, such as the Susquehanna, may have an abundance of water to accommodate a variety of withdrawals, while smaller streams may be more sensitive to water volume loss and alteration. Additionally, seasonally higher flows during the spring, and low flows during the summer and fall, mean that more water is available during certain parts of the year relative to others. Due to the cost of transporting and storing water, shale gas developers look to withdraw water as close to the well pad as possible just prior to commencement of hydraulic fracturing activities. However, these locations and times do not always coincide with periods of high water availability. Therefore, rules and regulations are needed to ensure that water withdrawals are performed in a way that is considerate of natural conditions, existing withdrawals for other purposes, and ecological health. See [Rahm, 2012](#) for a discussion of these issues.

Given the potential density of gas wells expected to exploit the Marcellus shale, the likelihood that many of the wells will be located near small streams, and the need for large quantities of water in a relatively short period of time, there is legitimate concern regarding the over-exploitation of water, even if this impact is temporary.

Regulating Withdrawals in Different Basins

Gas wells in the Marcellus shale (and Utica shale as well) in New York State will be primarily located in the Susquehanna and Delaware River Basins. In these regions, water withdrawals from both surface and groundwater fall under the jurisdiction of interstate commissions. Both commissions have experience with regulating water withdrawals in their basins and have clearly established their authority to issue permits related to shale gas development. Rules and regulations adopted by the commissions (see below for more detail) indicate that they have recognized the importance of water quantity and quality concerns raised above, as well as the issue of cumulative impacts that might result from multiple withdrawals for a variety of uses.

For information on the Susquehanna River Basin Commission go to <http://www.srbc.net/programs/projreviewnaturalgas.htm>

For information on the Delaware River Basin Commission go to <http://www.state.nj.us/drbc/programs/natural/>

The Susquehanna River Basin Commission (SRBC) estimates that the annually available basin-wide surface water resources are sufficient to support likely rates of shale gas drilling in the Marcellus. Over the past several years the SRBC has implemented changes in its permitting process to address water withdrawals for hydraulic fracturing while requiring minimum levels of passby flow in streams and rivers in order to maintain adequate stream ecosystem services. The Delaware River Basin Commission (DRBC) has authority to implement comparable regulations and has [drafted rules](#) tailored to shale gas development activities.

In New York State, the Marcellus shale extends into the Great Lakes Basin and Hudson River Mohawk Basins. Unlike the Susquehanna and Delaware basins, water withdrawal in these basins is not subject to the authority of an interstate commission. Rather, these areas of the state fall under the jurisdiction of the New York State Department of Environmental Conservation (NYSDEC). In the past, the NYSDEC had no authority to regulate industrial water withdrawals. Recently, however, state laws have changed this. New York passed legislation in 2011 requiring that all water withdrawals of more than 100,000 gallons per day be reported to the NYSDEC ([NYSDEC 2011](#)). Later that year, the state also amended Article 15 of the state Environmental Conservation Law to give the NYSDEC the authority to permit and regulate these water withdrawals ([NYSDEC 2011b](#)). While these new laws give the state the power to regulate withdrawals outside the Susquehanna and Delaware basins, it is not yet clear what rules the NYSDEC will put in place.

The [revised environmental impact statement](#) on shale gas development issued by the NYSDEC outlines proposed regulations for water withdrawal activities. See [here](#) for comments submitted by WRI on this topic. In general, concern remains that the NYSDEC has adequate staff with the experience needed to manage these activities. The state will have to develop a way to coordinate multiple withdrawals, prevent and mitigate

cumulative withdrawal impacts, and incentivize best practice among various stakeholders. This will be a significant challenge.