Invasive Aquatic Species a Potential Concern with Water Used in Drilling

Large-scale decimation of aquatic life may be due water hauling

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Drilling and hydraulically fracturing (fracking) a single horizontal Marcellus well will take somewhere between 3 and 5 million gallons of water. That's a lot of water that will be pumped out of local rivers and streams and hauled to well sites scattered around the region. With that knowledge, the NY Department of Environmental Conservation (DEC) has devoted a significant number of pages in the recently released draft Supplemental Generic Environmental Impact Statement (dSGEIS), to water issues.

In their 809-page document, DEC considers impacts of large water withdrawals – water that, because of the chemicals used to hydraulically fracture (frack) the shale, can never be returned to the watershed. Because the multi-state Susquehanna River Basin Commission (SRBC) already permits and monitors water withdrawals, DEC notes their jurisdiction and moves onto the next item: storing flowback water in floodplains.

DEC will allow flowback fluids to be stored in impoundments that can be as close as 300 feet from a water well. But not in floodplains. There the flowback must be contained in a closed-loop tank system, an idea submitted to DEC by Tioga County Landowners Group during the scoping comment period.

One issue addressed in chapter six of the dSGEIS (environmental impacts) is how drilling will impact aquatic ecosystems and wildlife. And with good reason. A couple of months ago, fishermen in West Virginia and Pennsylvania discovered that all of the fish in Dunkard Creek had died. While this may sound like an exaggeration, it's not. EPA and state scientists have catalogued 161 species of fish, mussels, salamanders, crayfish and aquatic insects that have died since September 1.

According to the Dunkard Creek Watershed Association the entire ecosystem has been destroyed – nearly everything from the headwaters of the creek to where it flows into the Monongahela River has died.

Dunkard Creek, born somewhere near Shamrock, PA, meanders for 38 miles back and forth across the border of Pennsylvania and West Virginia. Those 38 miles were, up until September, some of the most ecologically diverse waters in both states.

Given the high level of dissolved solids, chlorides and sulfates in the water, scientists began looking for a spill or intentional dumping of Marcellus wastewater. They also considered the possibility that the salty water may have originated in one of the mines in the area, a deep mine used for disposal of coalbed methane drilling wastewater.

What the scientists didn't expect to find was *Pyrmnesium parvum*, also known as the "golden alga". The two-tailed phytoplankton is microscopic and, in large numbers, toxic to fish.

How the golden alga ended up in Dunkard Creek is a mystery that's brought the West Virginia Department of Environmental Protection, West Virginia Division of Natural

Resources, Pennsylvania Department of Environmental Protection and the Environmental Protection Agency together in an investigation that's been ongoing for the past six weeks.

Hitchhiking Invasives

One hypothesis is that the golden alga may have hitchhiked to West Virginia aboard equipment used in drilling Marcellus shale. The alga thrives in brackish waters – particularly in estuaries, those transitional zones between saltwater and freshwater – though it is also found in freshwater bodies with high salt contents.

Golden alga is one of a group known as chrysophytes, a group of golden-brown algae usually found in the hotter, coastal environments of the Southwest and South. The golden alga that made its way to Dunkard Creek just happens to be the one that produces the toxins that kill fish and other aquatic creatures.

One way the golden alga could have traveled across the Mason-Dixon line was by hitching a ride in pipes, hoses, tanks, trucks, pumps or other equipment used in collecting and transporting water needed for drilling in Marcellus shale. The requirement for 3 – 5 million gallons of water to frack each well means that a lot of tankers may be filling up in one place and hauling water to another. And that presents a lot of opportunities to introduce a new species into a river or lake.

Were algal spores transported from Texas, where the golden alga has been responsible for numerous fish kills? Hard to tell because right now no state keeps tabs on the movements of drill rigs and tanker trucks.

Changes in the Stream

The other issue that cannot be separated from the golden algal bloom is the deteriorating water quality in Dunkard Creek. Since 2002 discharges from mine water treatment facilities have raised the levels of dissolved solids and chlorides in the river.

Scientific literature states both the golden algae and the toxins it produces are influenced by environmental factors including the water's pH, temperature, salinity and nutrients. The higher chlorides that stressed populations of bass and muskie provided the perfect environment for the golden alga, and it bloomed. As one EPA official told the press, "For it to thrive there must be a lot of stuff in the creek that shouldn't be there."

Now, the EPA is concerned that the golden alga found in Dunkard Creek might spread throughout the northern Appalachian region.

While in chapter seven of the dSGEIS the NYSDEC does address the potential for invasive aquatic species, they could go further. Of primary concern is how freshwater in large impoundments – some up to 9 acres – will be treated if it is not used in drilling. Will it be taken to another drilling location or returned and discharged at its point of origin?

Although the DEC outlines specific steps drillers must take to prevent the spread and introduction of terrestrial invasive plants – pressure-washing machinery, tire treads and hand tools – they do not outline similar requirements for water-hauling equipment. Instead, they simply note that "precautions must be implemented" and conclude that the measures have been adopted by the Susquehanna and Delaware River Basin Commissions "appear to be sufficient".

Unfortunately, the SRBC protocols focus on water withdrawal, not bio-security. SRBC does not require water-haulers to pressure-wash their hoses, tanks or pipelines before plopping them into the rivers.

The recent fish kill in Dunkard Creek, and the potential for aquatic species to hitch rides across country on drilling equipment, point out the need for DEC to think beyond the well pad, and even beyond state borders, as they complete the final SGEIS.