Dragonfly Gazette

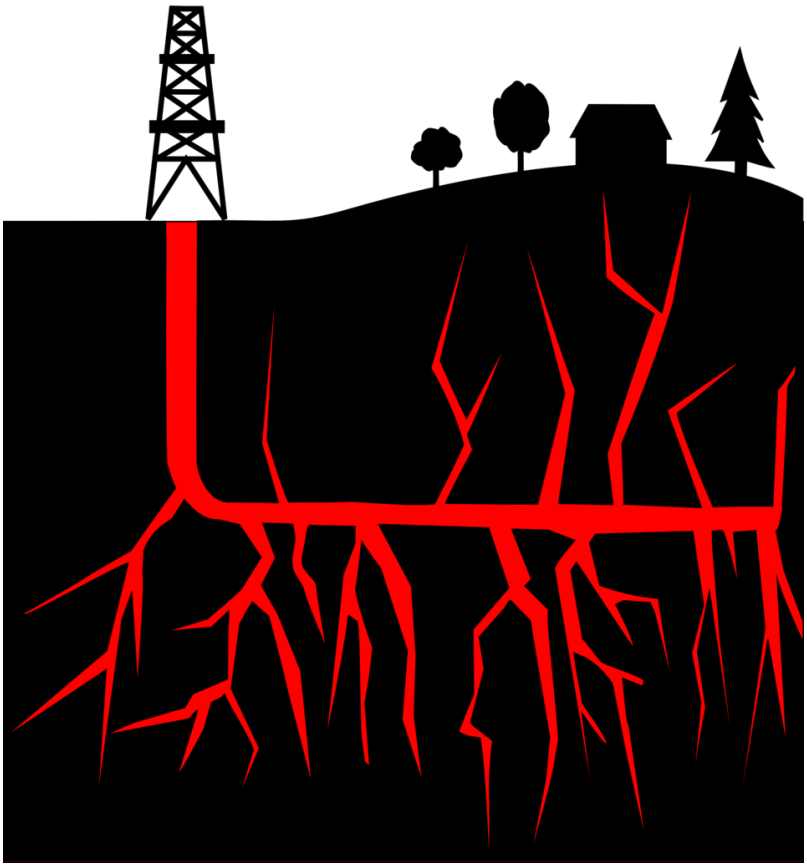
GEORGIA PROJECT WET Environmental Protection Division

Fall 2017

IN THIS ISSUE:

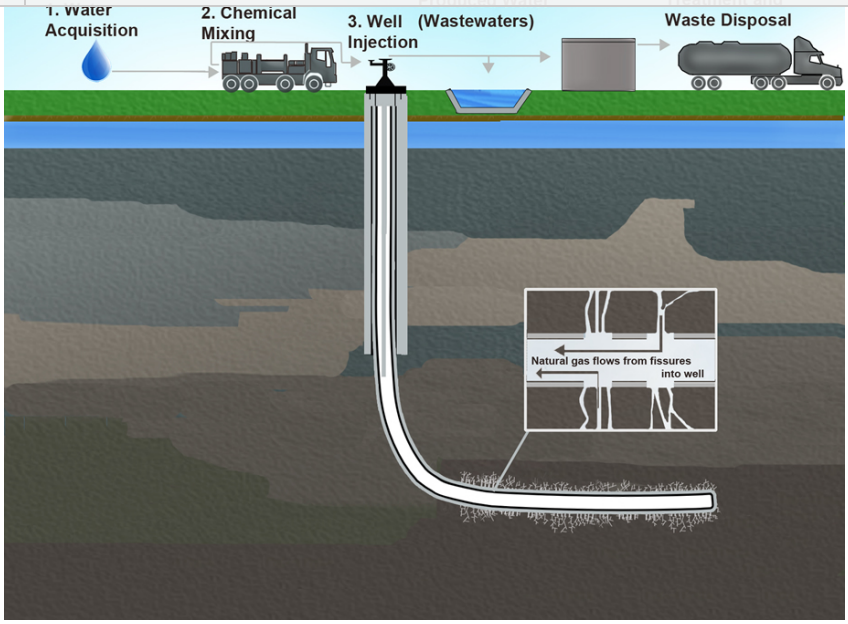


# What the FRACK?!!!



## You've heard of fracking, but what is it and how does it affect our water resources?

Hydraulic Fracturing, *or fracking*, is a high-pressure technique of drilling a liquid mixture into the earth to extract oil or natural gas. The fracturing fluid and a solid material are injected into an underground reservoir under very high pressure, creating fractures to help release the fuel for energy use. The practice has spurred an ongoing energy boom but has raised widespread concerns that it might lead to groundwater contamination, increased air pollution and even earthquakes.



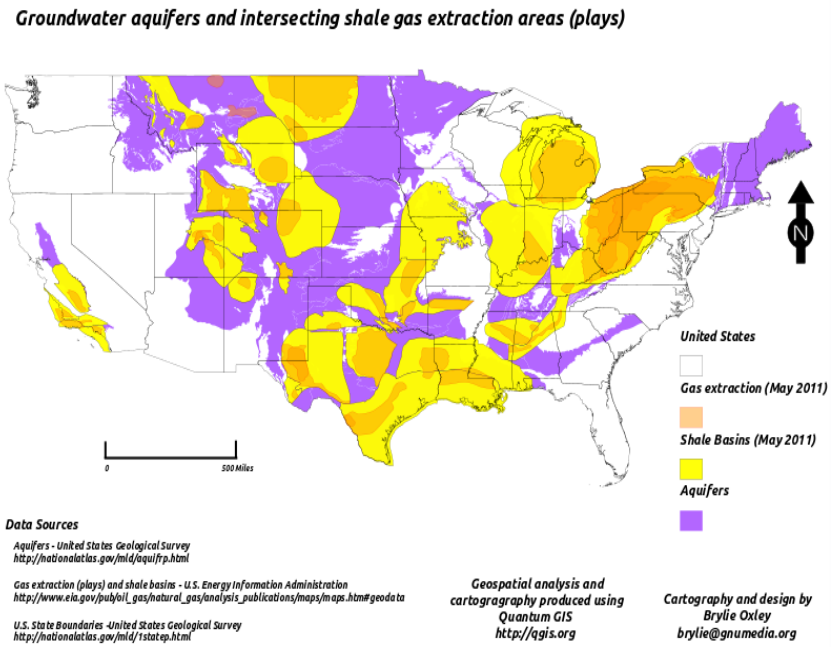

With fracking, huge volumes of water, sand and chemicals are pumped underground to split open rock formations so oil and gas will flow. Then the wastewater from this process flows back to the surface and is disposed of or reused. The liquid wastewater can contain dissolved salt, petroleum and other organic compounds, suspended solids, trace elements, bacteria, naturally occurring radioactive materials and anything injected into wells. Such water is recycled, treated and discharged; spread on roads, evaporated or infiltrated; or injected back into deep wells.

Here's a video explaining fracking: https://vimeo.com/63591436

Fracking for natural gas and oil and its wastewater has increased dramatically in recent years. And that could overwhelm local infrastructure and strain many systems, including the storage, treatment, reuse, transportation or disposal of the wastewater.

## EPA 2016 Report on Fracking

To address environmental concerns, the Environmental Protection Agency scientists tracked water used throughout the fracking process -- from acquiring the water to mixing chemicals at the well site and injecting so-called “fracking fluids” into wells, to collection of wastewater, wastewater treatment and disposal.




The report identified combinations of activities and factors that are likely to result in more frequent or more severe impacts to drinking water resources including:

- fracking’s effect on drought-stricken areas can be severe
- inadequately cased or cemented wells resulting in below-ground migration of gases and liquids can allow contamination
- inadequately treated wastewater discharged into drinking water resources is a problem
- spills of hydraulic fluids and wastewater can impact surface and ground waters.

https://www.epa.gov/sites/production/files/2016-12/documents/hfdwa_executive_summary.pdf

## Altered Microbes found in West Virginia Waters

Wastewater from oil and gas operations – including fracking for shale gas – at a West Virginia site altered microbes downstream, according to a Rutgers-led study.

The study, published recently in *Science of the Total Environment*, showed that wastewater released into the environment, including briny water that contained

petroleum and other pollutants, altered the diversity, numbers and functions of microbes. The shifts in the microbial community indicated changes in their respiration and nutrient cycling, along with signs of stress.
http://news.rutgers.edu/research-news/oil-and-gas-wastewater-spills-including-fracking-wastewater-alter-microbes-west-virginia-waters/20170222#.WK8hPvJr9QP

## A New Life Discovery

Microbiologists often seek life in the planet's extremes from below ice sheets to within geysers. Ohio State University scientists found hydraulic fracturing also provides its own extreme ecosystem.

The process has revealed a new bacterium *Candidatus frackibacter* thriving 1.5 miles deep in the salty wastewater leftovers of the fracking process!

For nearly a year researchers sampled and grew bacteria from the wastewater of two wells hundreds of miles apart in different rock formations, according to this study in *Nature Microbiology*. Surprisingly, the wells had nearly identical ecosystems and *C. frackibacter* lived in both. The scientists did find other known organisms living there which were likely injected into fracking wells from surface ponds. The researchers are looking for *C. frackibacter* in other wells and in rock cores in unfracked sites -- perhaps entombed in rock eons ago and dormant until the wastewater arrived!
https://www.nature.com/articles/nmicrobiol2016146

## New Georgia Bill will Regulate Fracking Here

Even though fracking hasn't taken place yet in Georgia, lawmakers set up a process to develop regulations if that happens. With support from several cities and counties across Northwest Georgia, a bill to update Georgia law related to oil and natural gas exploration sailed through the Georgia House during the last week of February and in late March it gained unanimous approval in the Senate.

House Bill 205 regulates an eight-county region in northwest Georgia prime for fracking. The new law also creates a severance tax of $0.03 a barrel for oil and $0.01 per thousand cubic of natural gas that would be paid to the state. It allows local governments to adopt a tax of up to $0.09 per barrel for oil and up to $0.02 per cubic feet of natural gas.

The bill provides the first updates to fracking regulations in Georgia since the state collected a $25 fee for the right to search for underground natural gas in 1975!

To find more Project WET workshops visit EEinGeorgia.org

TOP

## Fewer Earthquakes?

Human-induced earthquakes can be triggered when fracking wastewater is injected deep underground for disposal. But the number of Americans, primarily in Oklahoma and Kansas, at risk from fracking earthquakes has dropped from 7 million to 3 million over the past couple of years, according to the U.S. Geological Survey.

The drop may be due to a decrease in wastewater injection as a result of new regulations for its disposal, or slowed due to lower oil prices and less overall production.

Despite the decrease in the number of quakes in 2016, a 5.0-magnitude quake rocked Cushing, Oklahoma, the state's largest quake ever recorded. In addition, the state recorded the highest number of large earthquakes, USGS reported.

## WET in the Classroom

**Explore this topic with your students**

These activities from *Project WET* fit well with this topic:

**Sum of the Parts, pg. 283** -- Have students imagine how a fracking operation might impact their property and the river ecology.

**Macroinvertebrate Mayhem, pg. 343** -- add fracking waste water as one of the stressors in the stream.

**Get the Ground Water Picture, pg. 143** -- Substitute one of the Land Use activities for fracking (pg. 154) and have students discuss how this activity might affect ground water.

**Grave Mistake, pg. 315** -- With a little creativity, you could change the mystery of the contamination source to a fracking well, instead of a graveyard.

**Make-a-Mural, pg. 515** -- Have students visualize what is happening below the surface and create a mural of local area to show fracking's effects.

**Your students may be interested in:**

Alternative fuel solutions -- How Antiferroelectric materials help store more energy from solar and wind sources

https://phys.org/news/2017-06-energy-renewable-sources-scientists-antiferroelectrics.html#jCp


**Happy News!** Georgia students and teachers learned about the big changes to Georgia River of Words this year and responded with a record number of entries into the art and poetry contest! We had 2000 pieces to judge and fell in love with so many we ended up with more winners than we usually have. View this year's winners on our website!


We would love to hear your stories about using Project WET with your students. Send us pictures too and we will feature them in our next newsletter.

**While you are at it, nominate an educator or a great water program for our annual awards:**

Nomination (pdf form)


## Getting Little Feet WET!

Our newest publication for our youngest learners debuted March 22, World Water Day! Getting Little Feet WET features 11 fun activities for ages 3-6, correlated to national standards and reflects all of Project WET's water principles. Visit the Project WET store to purchase your digital or printed copy.

Many of the activities are linked to "Water We Singing About", a volume of kid-

friendly songs about water written by the NJ WET coordinator, Keven Kopp! Purchase the CD here.

If you would be interested in helping us develop training workshops for this publication, let us know!

## Save the dates and join us!

**The Outdoor Learning Symposium,** October 10, 2017 at the Southwest Atlanta Christian Academy. Registration information available here.

**The Environmental Education Alliance of GA's Annual Conference**, March 2-4, 2018 at Unicoi State Park. Learn more.

## Our new website is full of resources for you

Be sure to visit us here often to find the latest information and stuff!

ProjectWET.Georgia.gov

## Searchable database for Standards

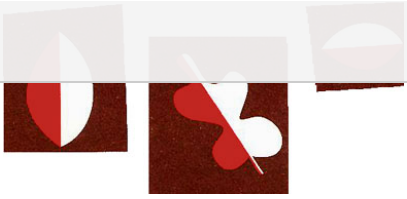
**UPDATED!** With the standards database, all of the correlations are easy to access for WET 2.0 activities covering Georgia and National subject area standards. Try it out!


Find more workshops on EE in Georgia!

## Project WET Workshop for Educators

**Wednesday, October 11, 2017**

The Piedmont Park Conservancy is hosting a Project WET certification workshop for K-12 educators in the Piedmont Park Community Center in Atlanta. $35 Registration fee. Contact Natalie Brett at fieldtrips@piedmontpark.org or 404-314-8385 for more information.



**Your Georgia Project WET Coordinators:**

Jo Adang

Monica Kilpatrick

Project WET



To PRINT this edition of the Dragonfly Gazette as a pdf, view in your browser through the link provided at the top, and then using a PDF converter like http://dopdf.com to create or print PDF.