FracTracker Alliance

Exploring data, sharing perspectives, and mapping impacts of the oil and natural gas industry

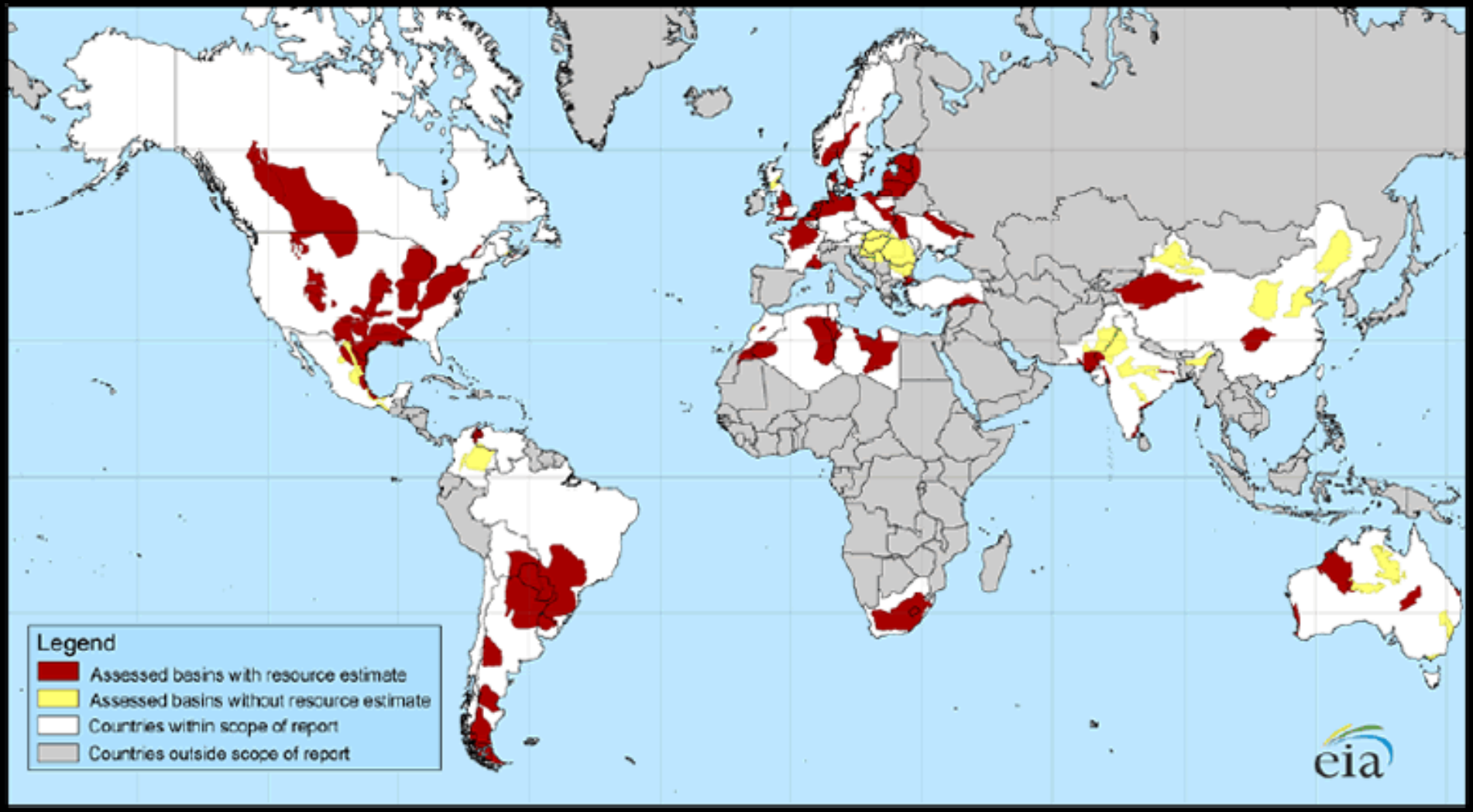
Presented at

NEARC Spring Conference

by Karen Edelstein, FracTracker Alliance

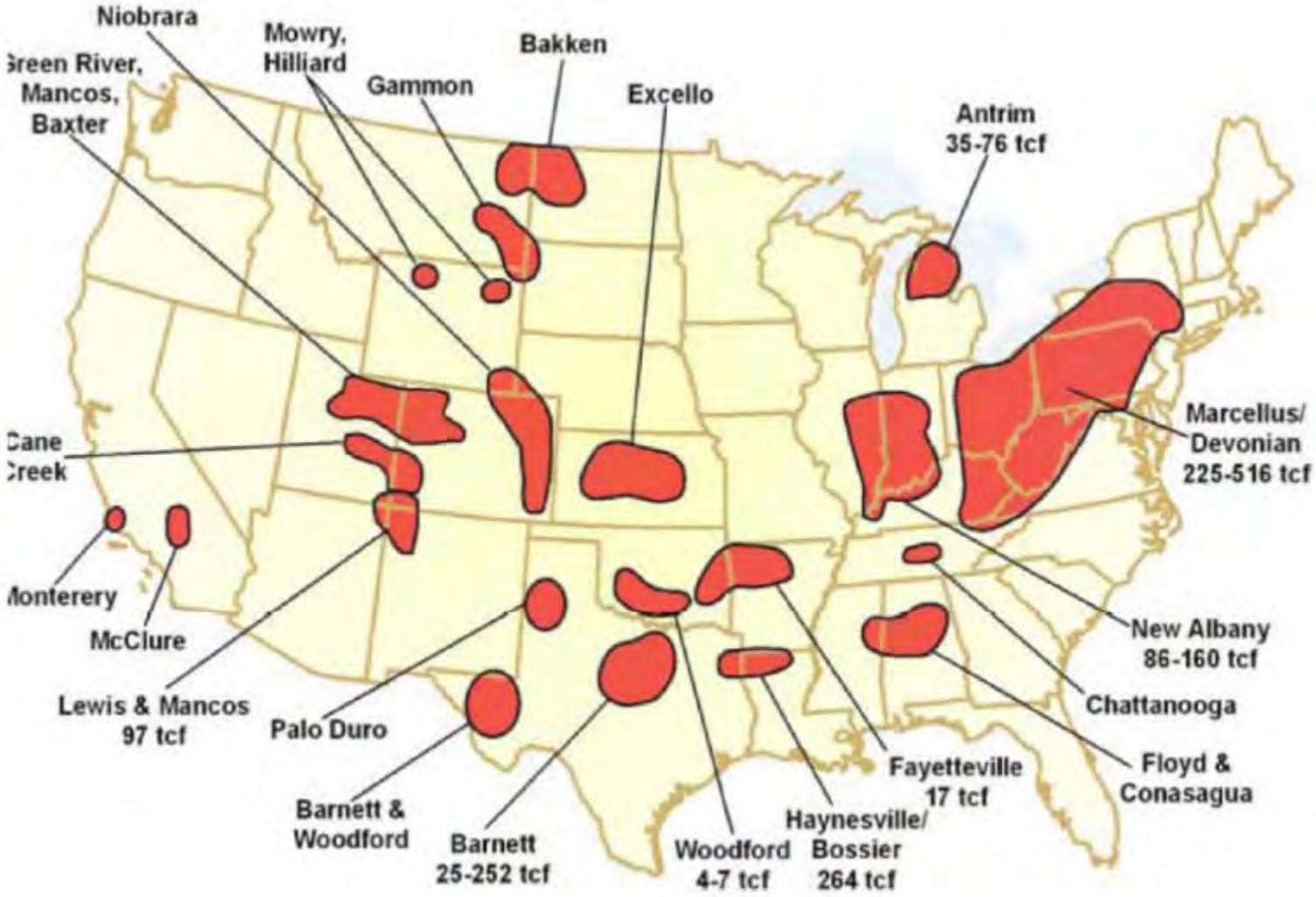
14 May 2013

UMass Amherst



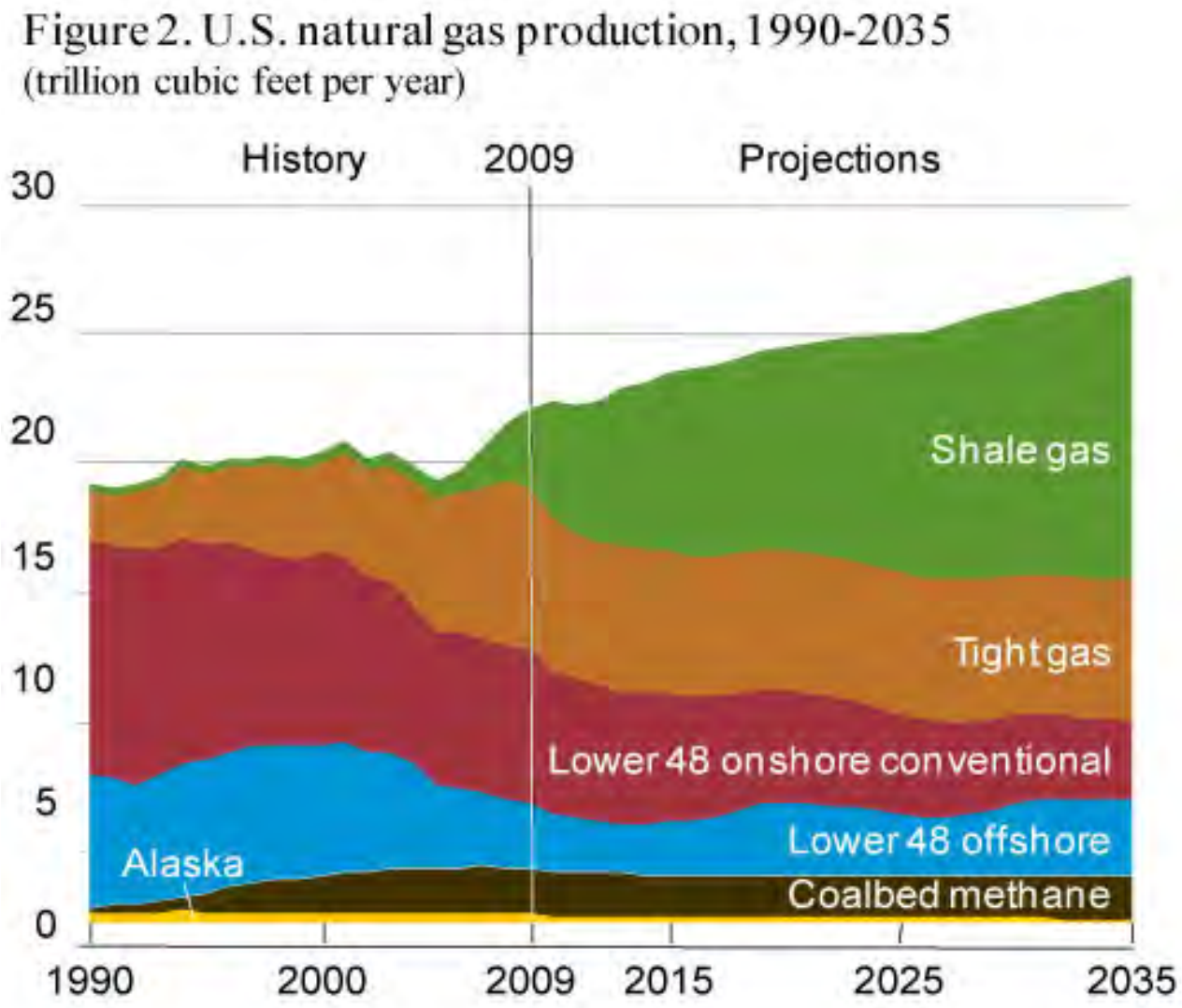
http://www.eia.gov/analysis/studies/worldshalegas/

Shale-gas basins in the continental United States



Source: USGS

Industry predictions of shale gas climb

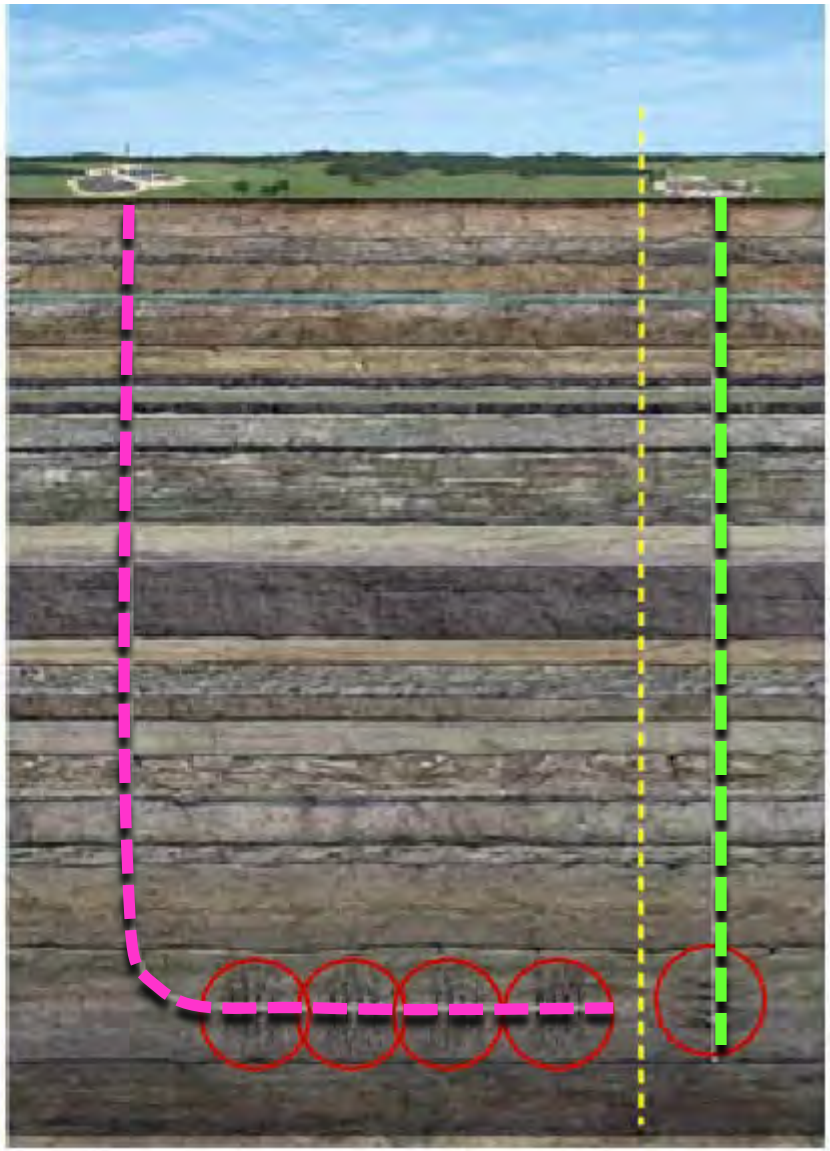


Source: US Energy Information Agency (EIA)
http://205.254.135.24/forecasts/aeo/chapter_executive_summary.cfm

The backdrop: a brief overview

Typical well with horizontal leg and multiple sets of hydro-fractures

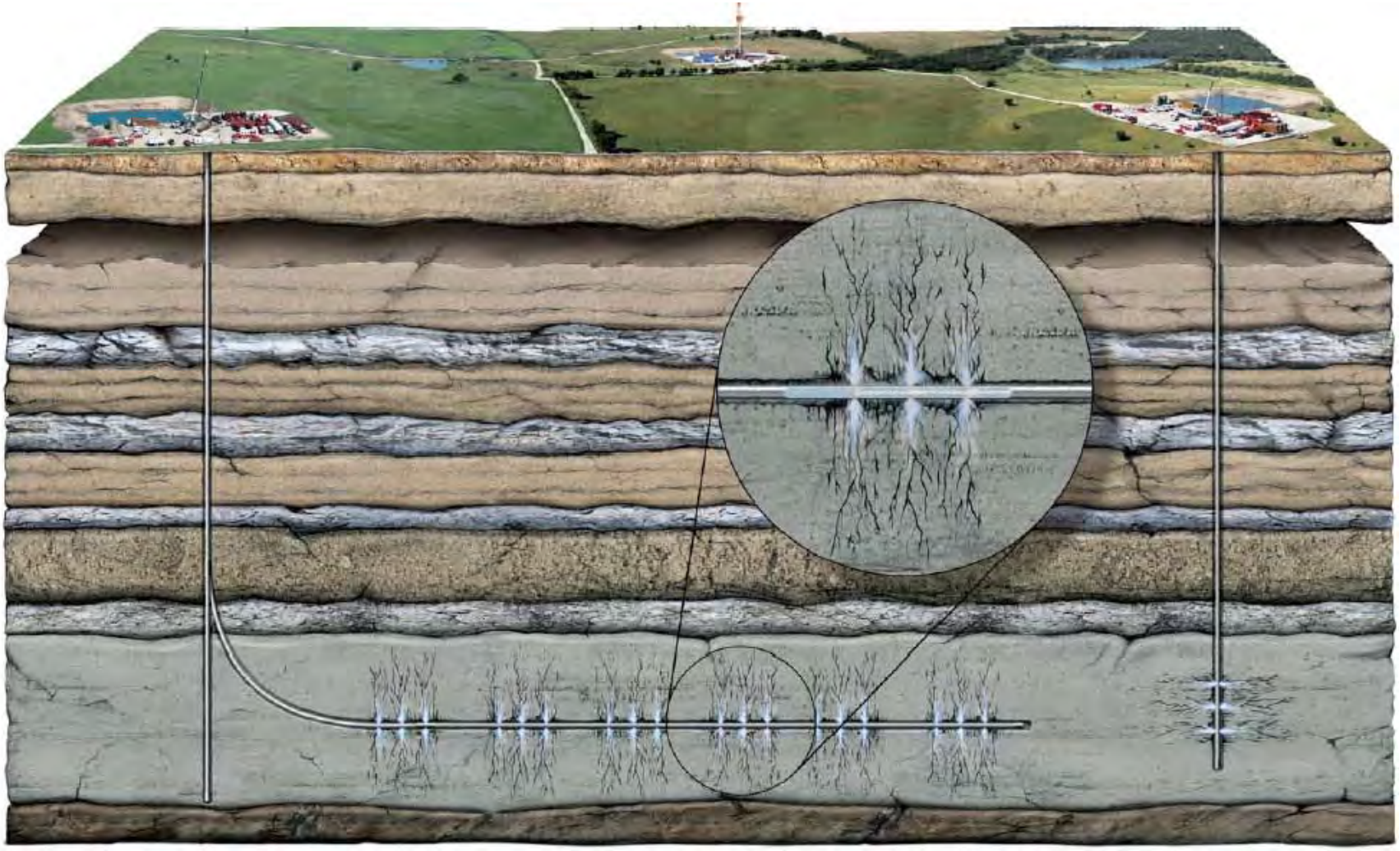
Marcellus Shale

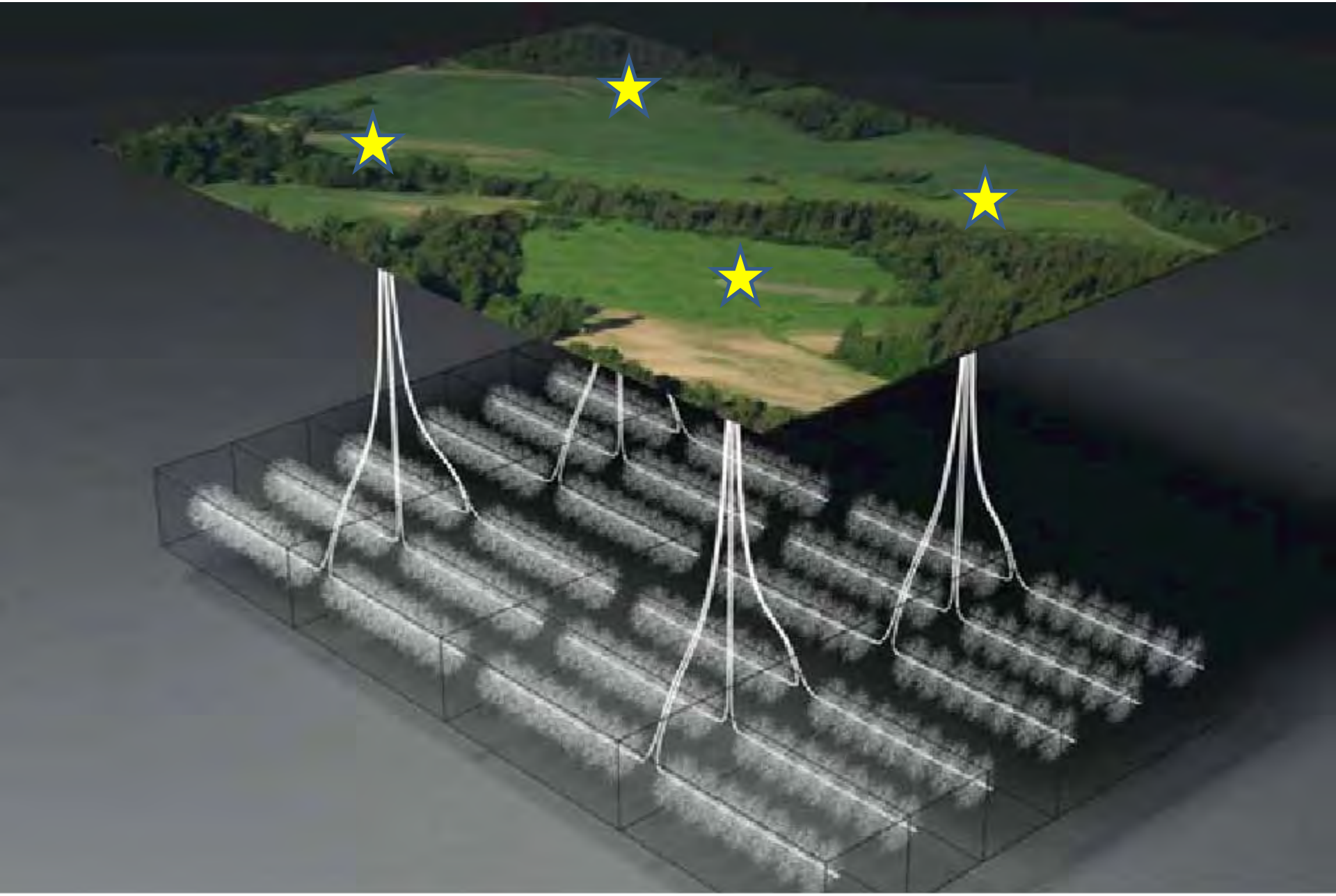


Typical vertical well with hydro-fractures

Source: USGS

Hydrofracturing the rock: Targeting a hydrocarbon-rich rock layer





Source: Chesapeake Energy

Preparing the well pad site

Source: http://naturalgas.psu.edu

Hydro-fracking Phase –
(a week or two)

Injection pumps, supplies and many frack tanks for fresh and flowback waters

The rig goes up

Electric Generators – Active Drilling Site: Source: NTC Consulting

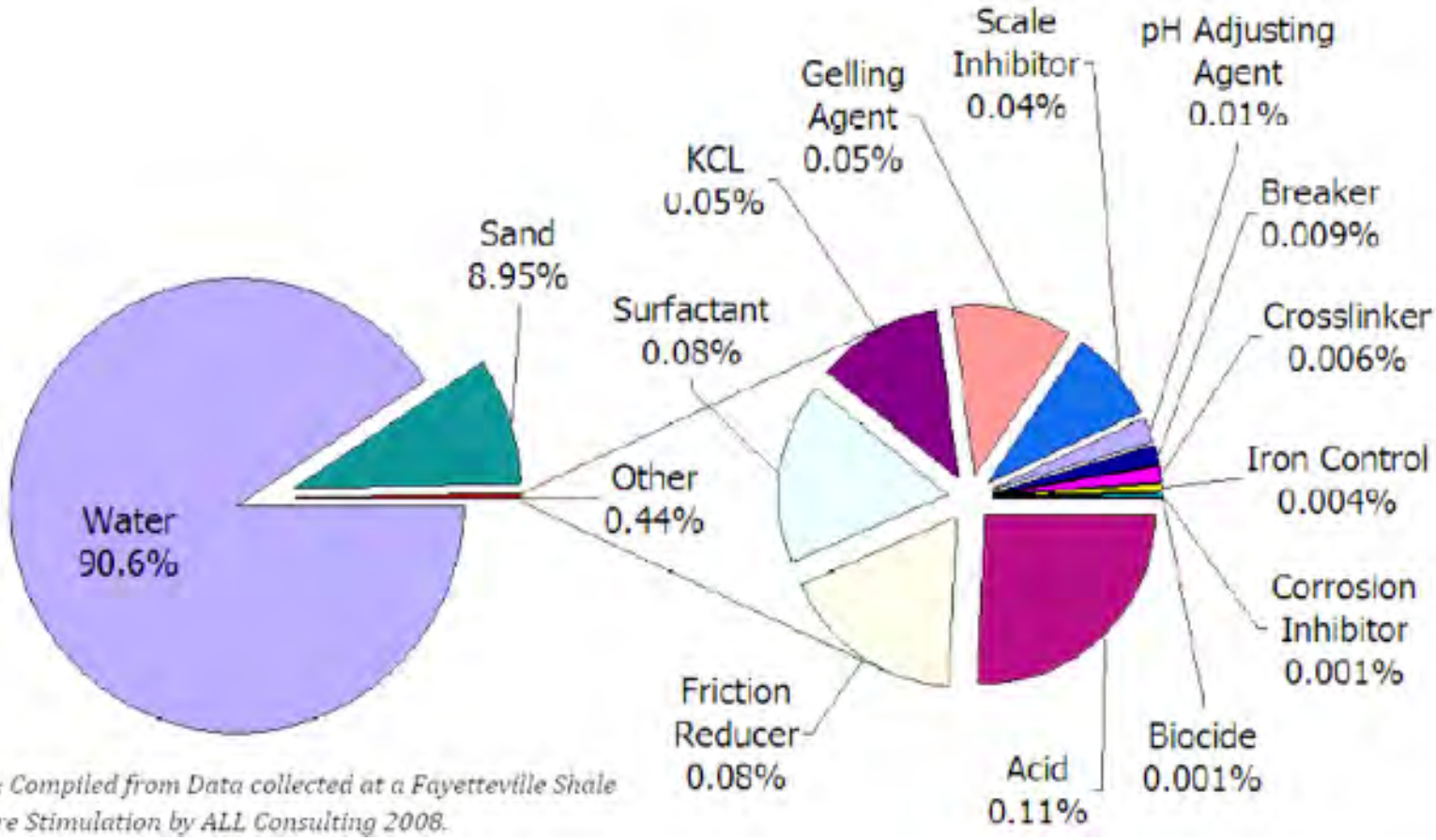
Source: Chesapeake Energy

On-site storage of flowback and produced water

Drilling Phase – drillrig, pumps, supplies, frack tanks
(a month or two)

Typical Components of Slickwater Frack Fluid

For a 6 million-gallon frack job, the 0.5% the total solution injected is equal to **30,000 gallons of additives and chemicals.**



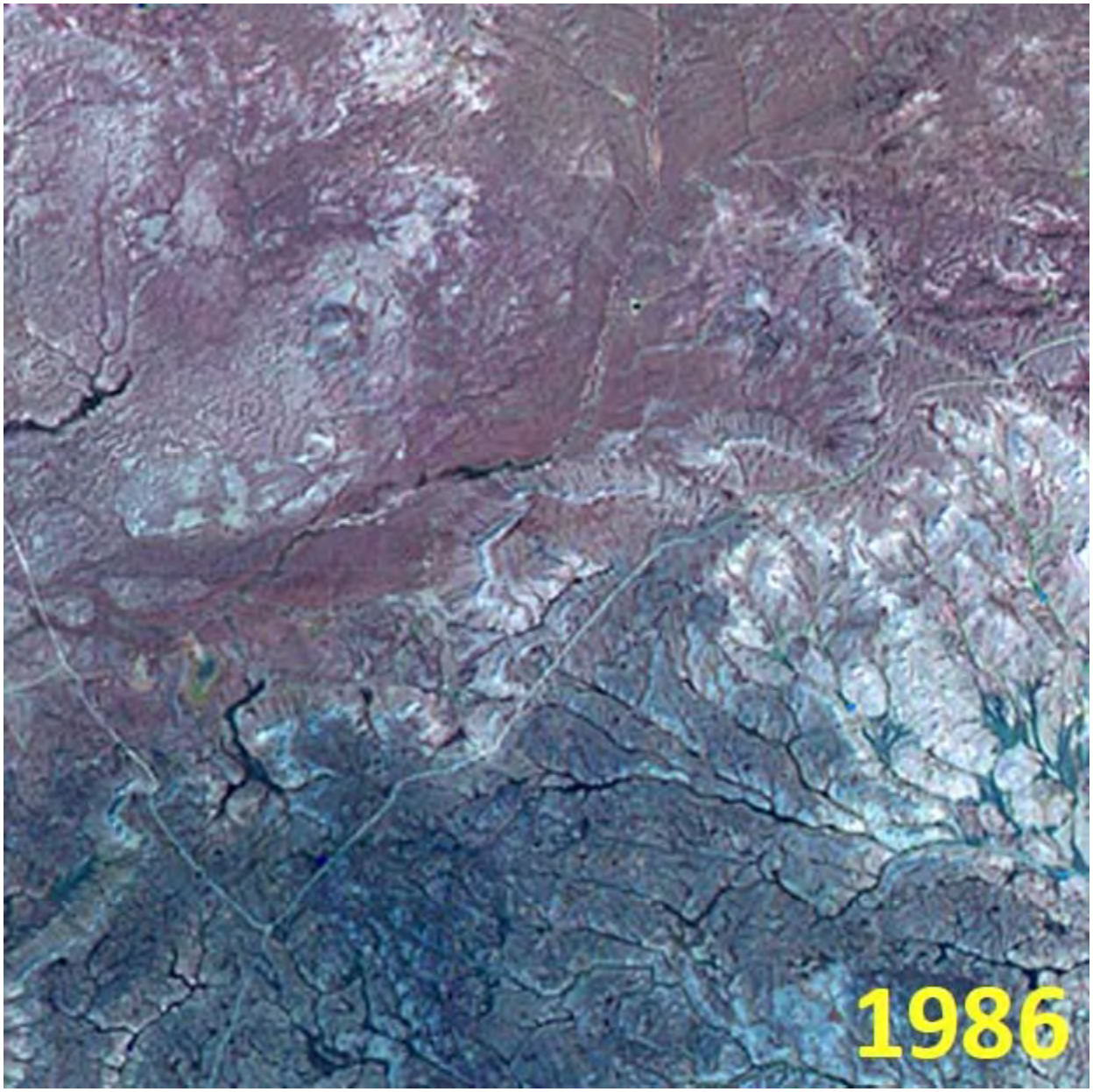
Source: Compiled from Data collected at a Fayetteville Shale Fracture Stimulation by ALL Consulting 2008.

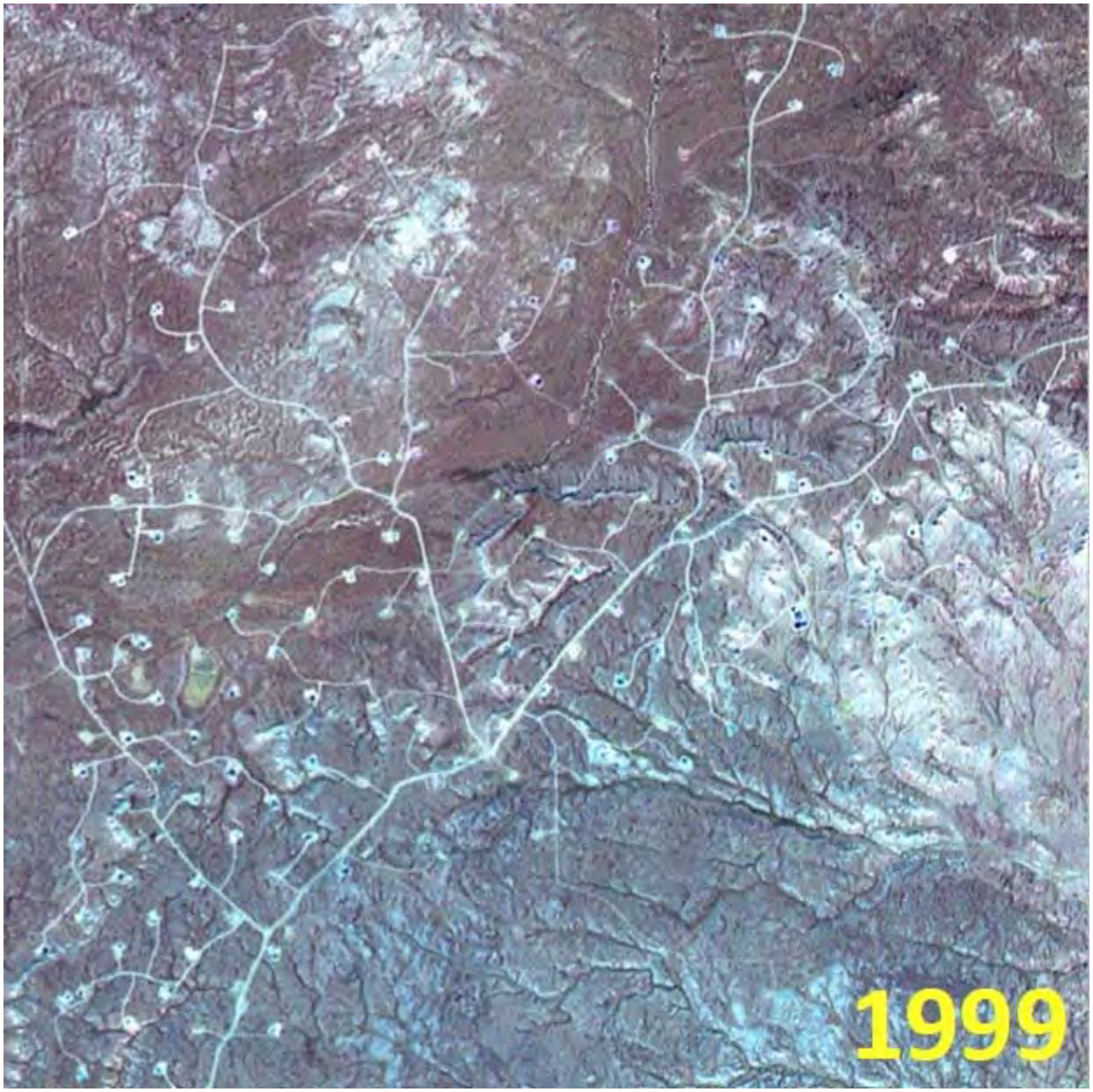
Source: Arthur, Bohn, Layne, 2008, ALL Consulting
http://www.all-llc.com/shale/GWPCMarcellusFinal.pdf

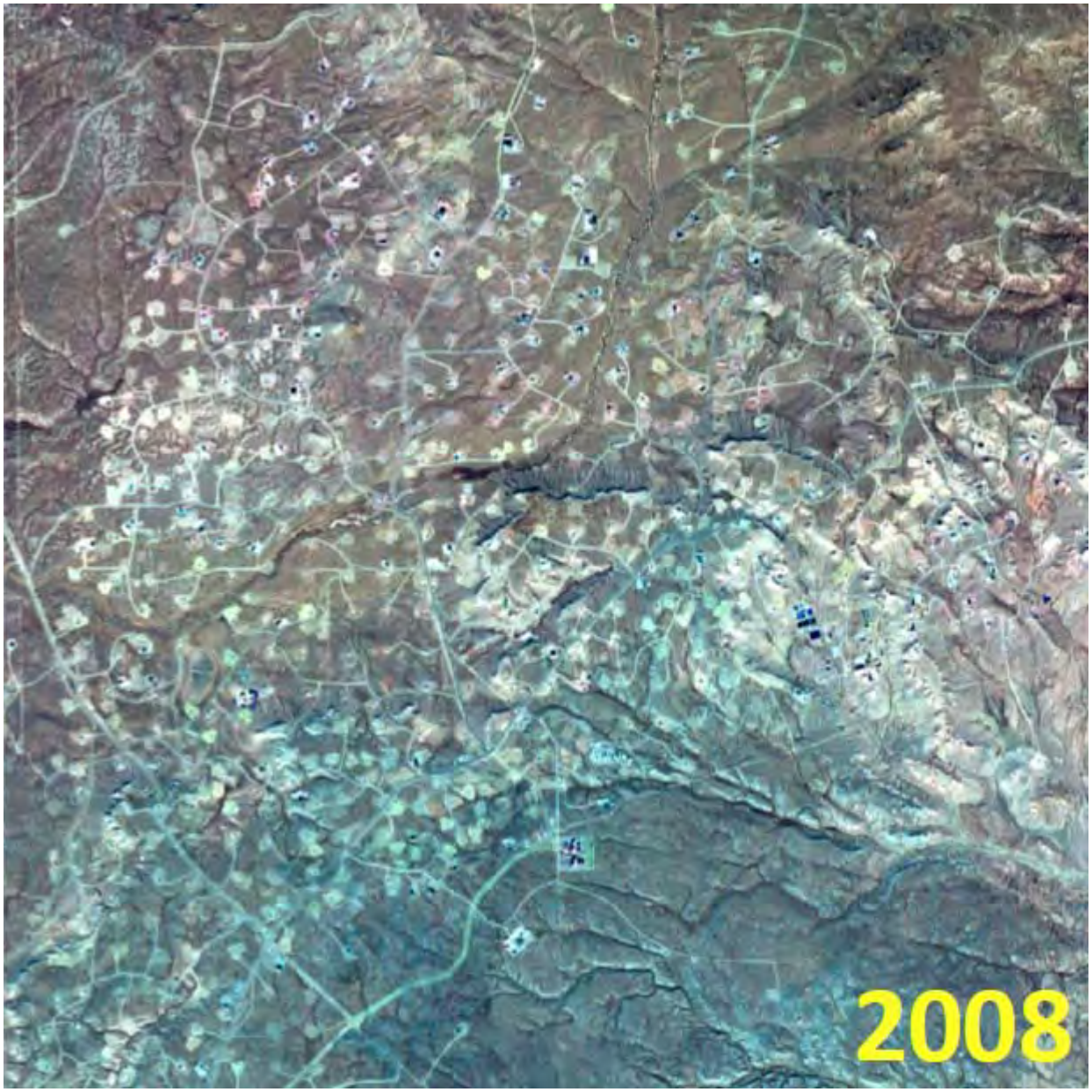
Well pads on the landscape

After the drilling rig is
taken away

PA DCNR July 2010
Loyalsock State Forest


1986


1999


2008

What are some of the complex issues as we consider HVHF?

- Air quality impacts
- Water quality and quantity impacts
- Public health impacts
- Habitat fragmentation
- Waste disposal
- Infrastructure needs and impacts
- Social context and global/regional/local economies
- Known risks and failure rates of current technology
- Differing regulatory structures
- Costs vs. benefits: climate science and calculated impact horizons

[The U.S. Department of Energy] "… report also said the Marcellus region, a rock formation under parts of New York, Ohio, Pennsylvania and West Virginia, contained **141 trillion cubic feet of gas**. That represents a 66 percent drop from the 410 trillion cubic feet estimate offered in the agency's last report."

Source: *The New York Times*, 28 January 2012

Source: http://www.eia.gov/dnav/ng/hist/n9140us2A.htm

Doing the math of "energy independence":

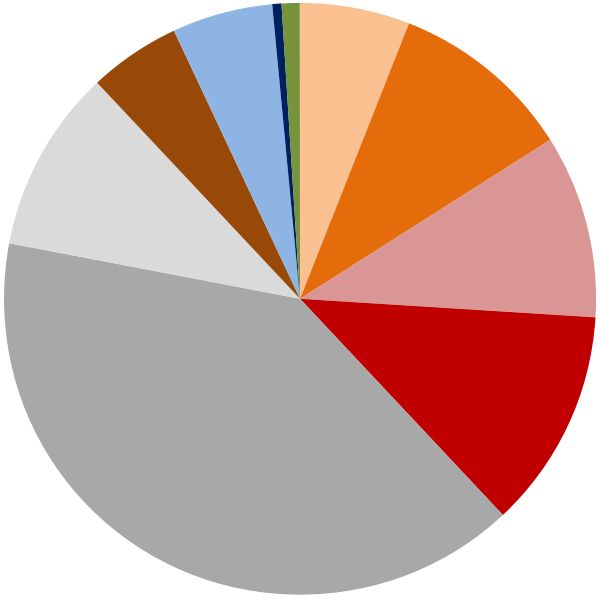
141 trillion cubic feet of reserves in the Marcellus, used at current rate of 25.5 trillion cubic feet/year

= 5.8 years of natural gas reserves in the Marcellus

Or using 2011 USGS estimate that calculates just over half the DOE estimate, 84 tcf (**3.3 yrs**)

Is shale-gas the energy silver bullet for New York State?

Not necessarily!



Percentage of supply of renewable energy

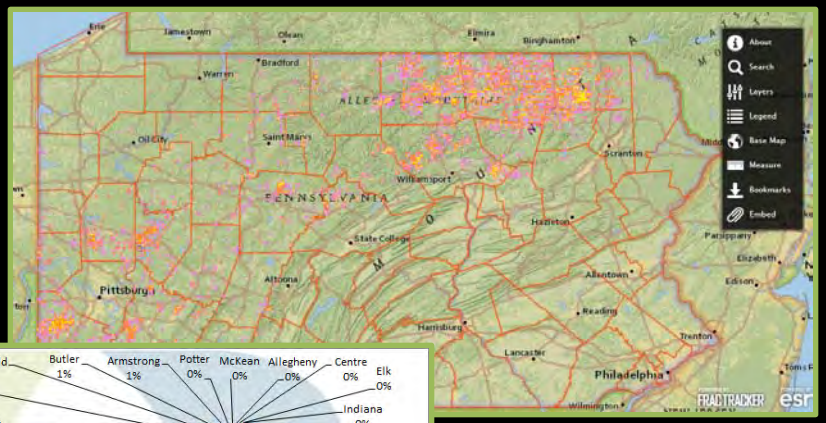
- Residential roof-top PV (6%)
- Concentrated solar (10%)
- Solar PV plants (10%)
- Commercial/gov't rooftop PV (12%)
- Off-shore wind (40%)
- On-shore wind (10%)
- Geothermal (5%)
- Hydroelectric (5.5%)
- Wave (0.5%)
- Tidal (1%)

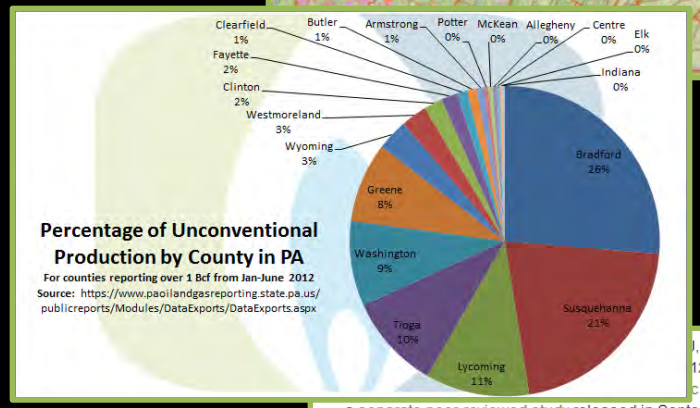
From Jacobson, Howarth, et al. "Examining the feasibility of converting New York State's all-purpose energy infrastructure to one using wind, water, and sunlight" . Energy Policy 57 (2013) 585–601. March 2013.

- New York State's all-purpose energy can be derived from wind, water, and sunlight.
- The conversion reduces NYS end-use power demand by 37%.
- The plan creates more jobs than lost since most energy will be from in-state.
- The plan creates long-term energy price stability since fuel costs will be zero.
- The plan decreases air pollution deaths 4000/yr ($33 billion/yr or 3% of NYS GDP).

Overview

- What is FracTracker Alliance?
- What we do
- Mapping tool demonstration
- Questions, suggestions, etc.



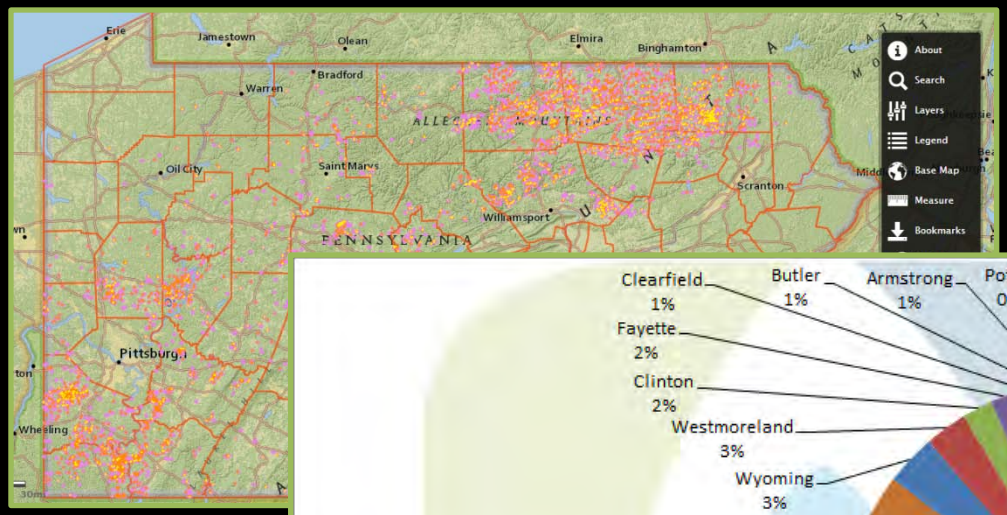


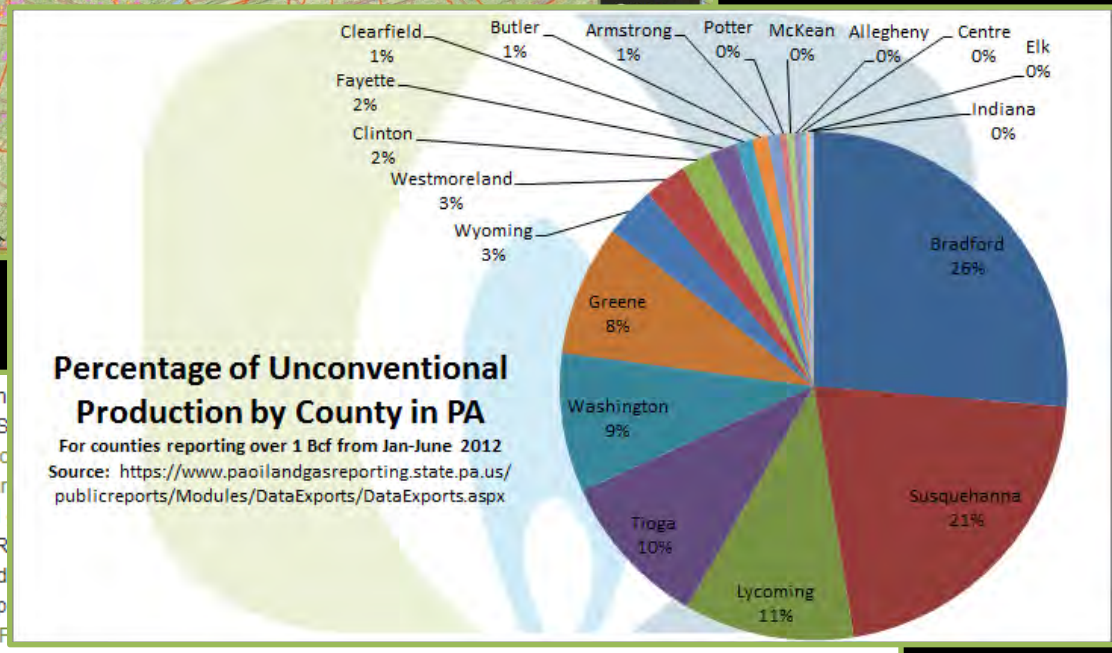
FRACTRACKER Alliance

- Sharing fact-based information and assessing the potential environmental and public health impacts of natural gas extraction activities
- Funding from the Heinz Endowments, the Park Foundation, William Penn Foundation, the George Gund Foundation, the 11th Hour Foundation
- Staff in PA, NY, and Ohio…soon in California
- Launched in June 2010, 501(c)(3) status since 2012
- Over 2600 registered users on original FracTracker.org mapping platform. More now!

Providing…

- Maps
- Analyses
- Resources
- Projects





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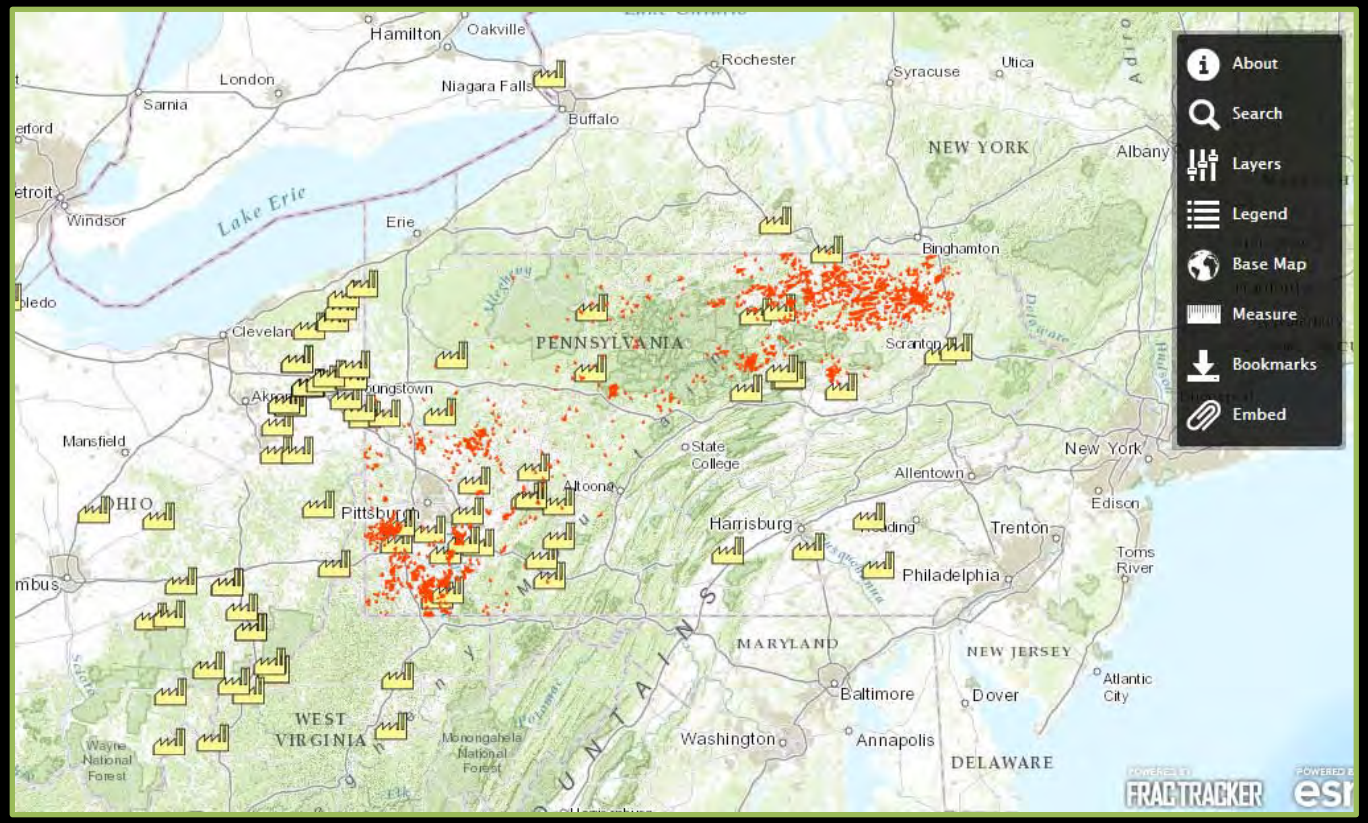
Other Studies

- Arkansas Public Policy Panel - Series of reports on natural gas drilling in Arkansas - Model Oil and Gas Laws, Regulations and Ordinances | Executive Summary | Full Report
- Comparing Pennsylvania and Texas Law on Ownership and Marital Rights: Common Law v. Community Property—Impact On Oil and Gas Leasing. PDF
- Duke U. Study: Methane Contamination of Drinking Water Accompanying Gas-Well Drilling and Hydraulic Fracturing. Read more (available via ProPublica.org)
- Energy Boomtowns & Natural Gas: Implications for Marcellus Shale Local Governments & Rural

Our mapping platform, FracMapper, addresses current issues and user requests

- Simple
- Fast
- Powerful
- Data-driven



Easy-to-use website

- No need to register
- No program to download
- No passwords to forget

FracTracker's optimized content

Large datasets tap resources of servers, and users' computers, too.

- Generalized layers
- Detailed at closer scale
- Links to spatial datasets allow users to create own maps

Maps

Select standard and interactive maps about the impacts of natural gas drilling.

Data Tool

The DataTool is a web-based, public participation geographic information system focusing on the natural gas industry using volunteered geographic information. more »

Pictures

Natural gas related photographs, both from FracTracker and the community. more »

Articles

In depth discussions about gas extraction. more »

Facts

Basic information and statistics about the natural gas industry.

Calendar

Collaborative listing of all the shale gas events that we and several other groups come across. more »

Resources

A list of shale gas extraction resources. more »

Data Index

This page serves as an index of all of the datasets available on FracTracker's DataTool. more »

California

Counties, sub-counties, watersheds, & hydraulically fractured wells

Colorado

FracFocus wells, counties, watersheds, EIA shale basins & plays

Kentucky

Horizontal oil & gas wells, counties, watersheds, EIA shale basins & plays

Michigan

Horizontal oil & gas wells, counties, watersheds, EIA shale basins & plays

New Mexico

Ground water contamination by pits, FracFocus wells, counties, watersheds, EIA shale basins & plays

New York

Follow the above link to view the New York Maps index

North Dakota

Producing Bakken wells & horizontals, rivers, watersheds, & counties

Ohio

County outlines, watersheds (large & small), Utica & Marcellus permits

Oklahoma

Coming soon!

Pennsylvania

Follow the above link to view the PA Maps index

Texas

Leases & pooling agreements

West Virginia

County outlines, rivers, watersheds, Marcellus Shale permits

Wisconsin

Frac sand mining, processing, & distribution operations

Request your state today! info@fractracker.org

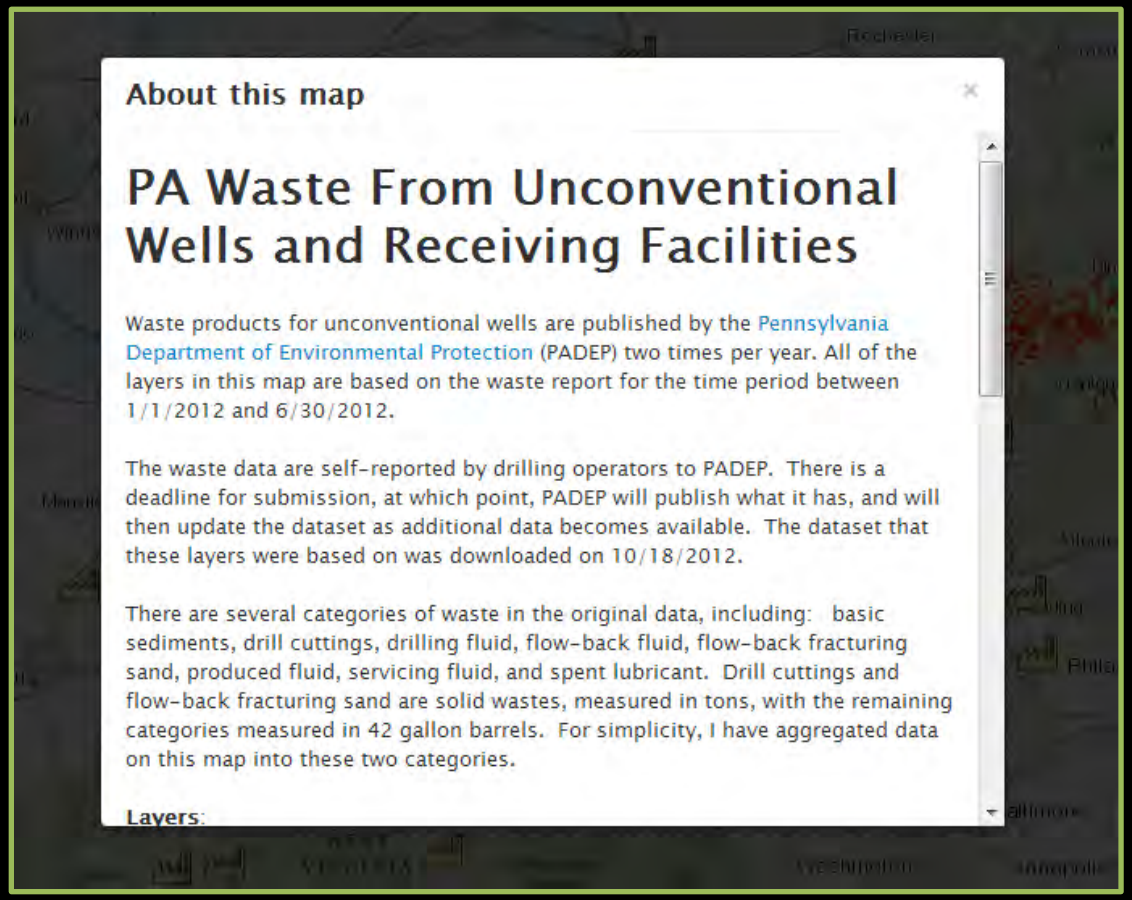
Visualizing Data

- Generalized layers only show locations at large extents
- Access to additional data available at closer zoom range
  - increases loading speed
  - reduces clutter

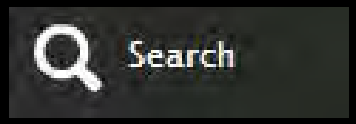
Links to metadata

Tools: About

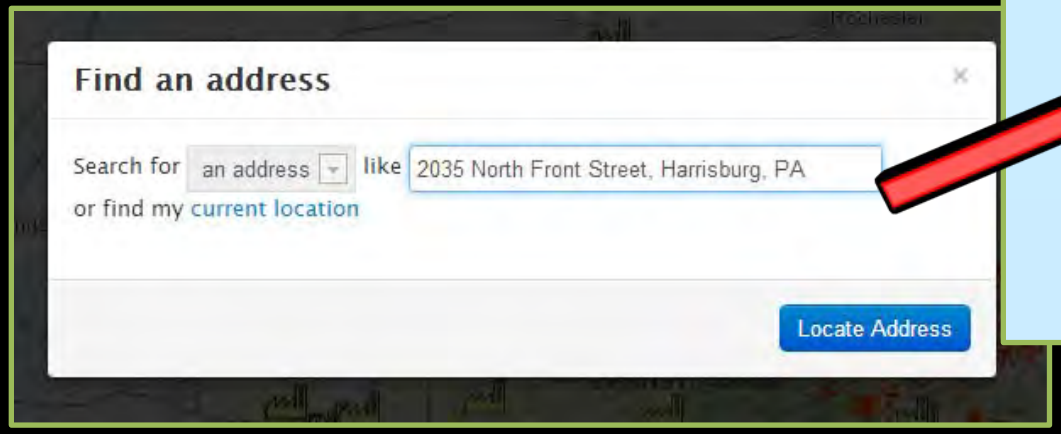
The place to find out more about the map and data that you are looking at, including metadata and links



Search functions

Tools: 

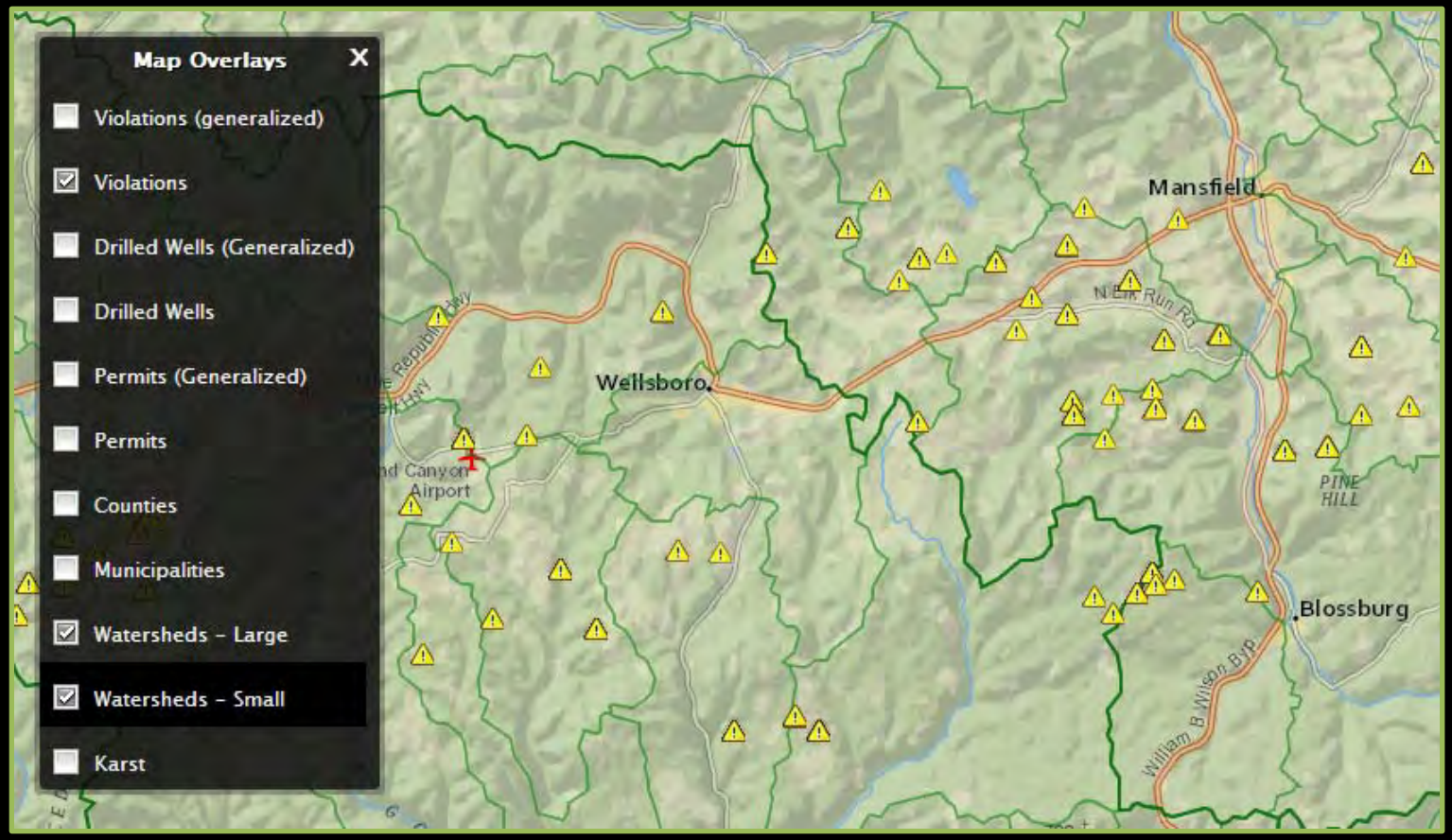
Enter an address in the box and this tool will take you there.



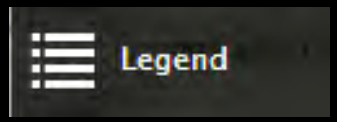
Interactivity with layers

Tools: Layers

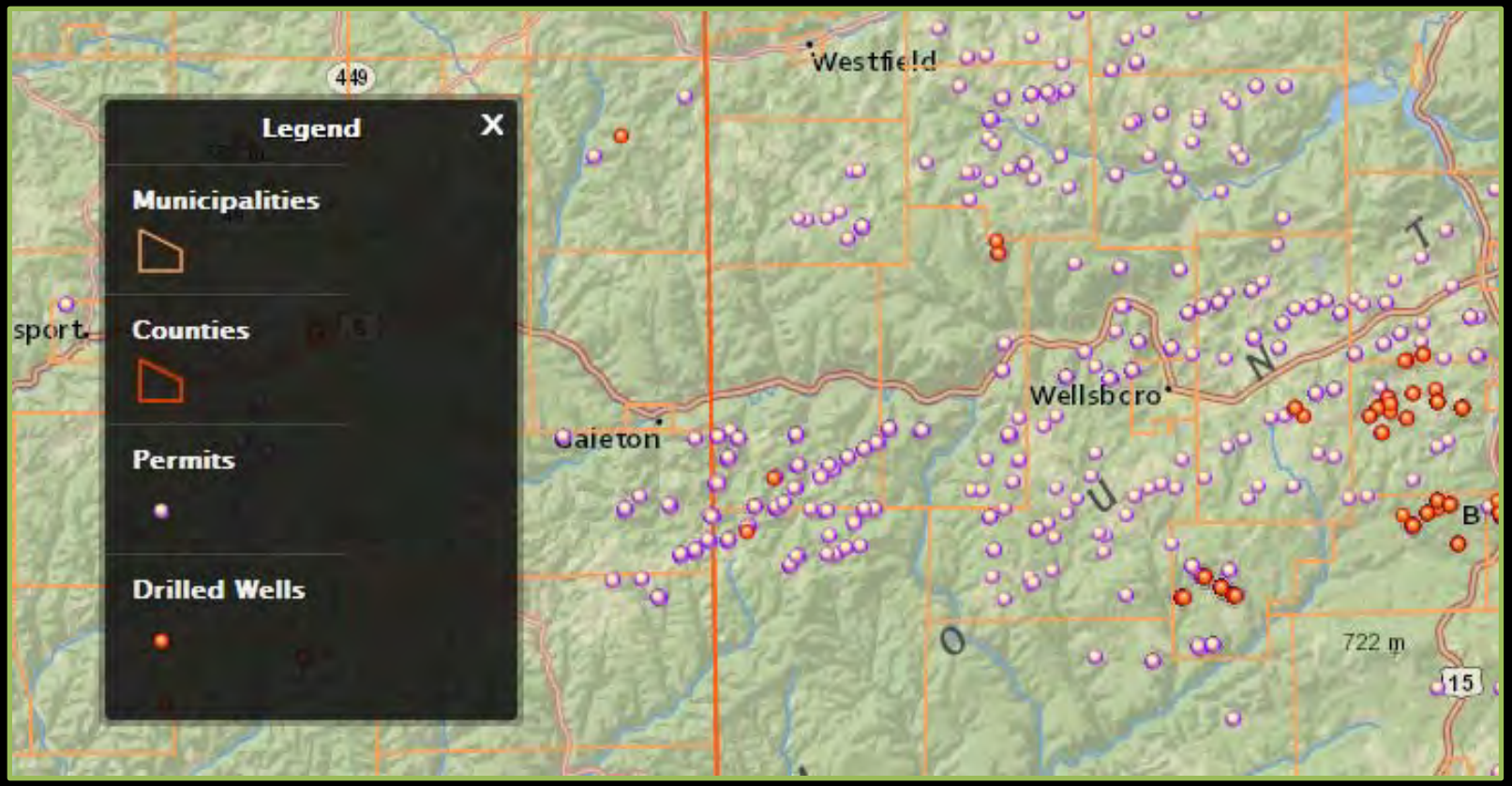
Choose the content that suits your inquiry



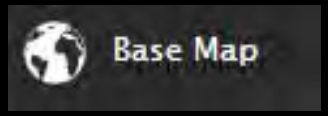
Streamlined

Tools: 

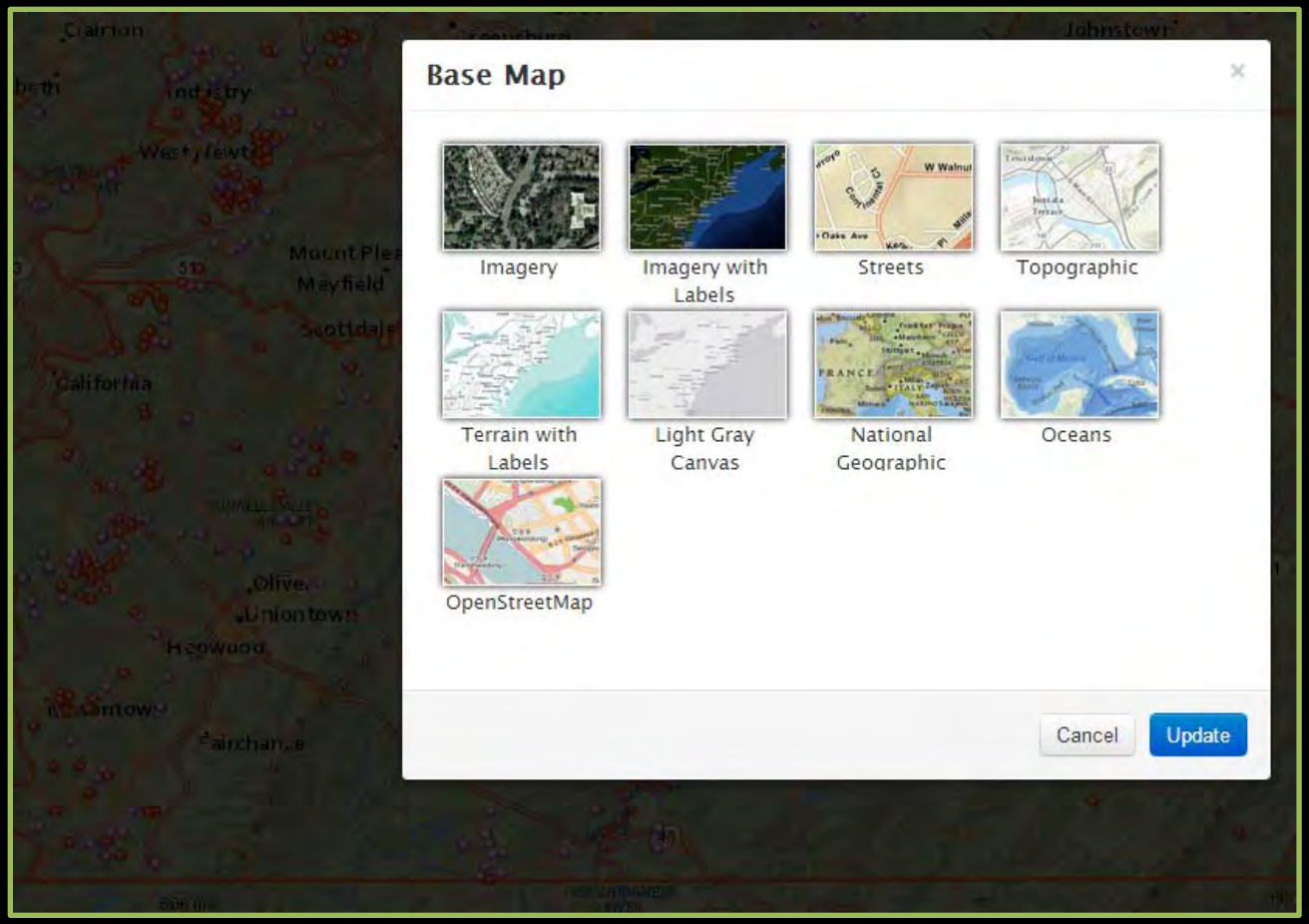
Show symbols only for active map layers



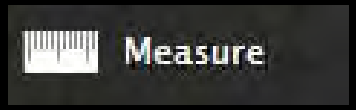
Interchangeable basemaps

Tools: 

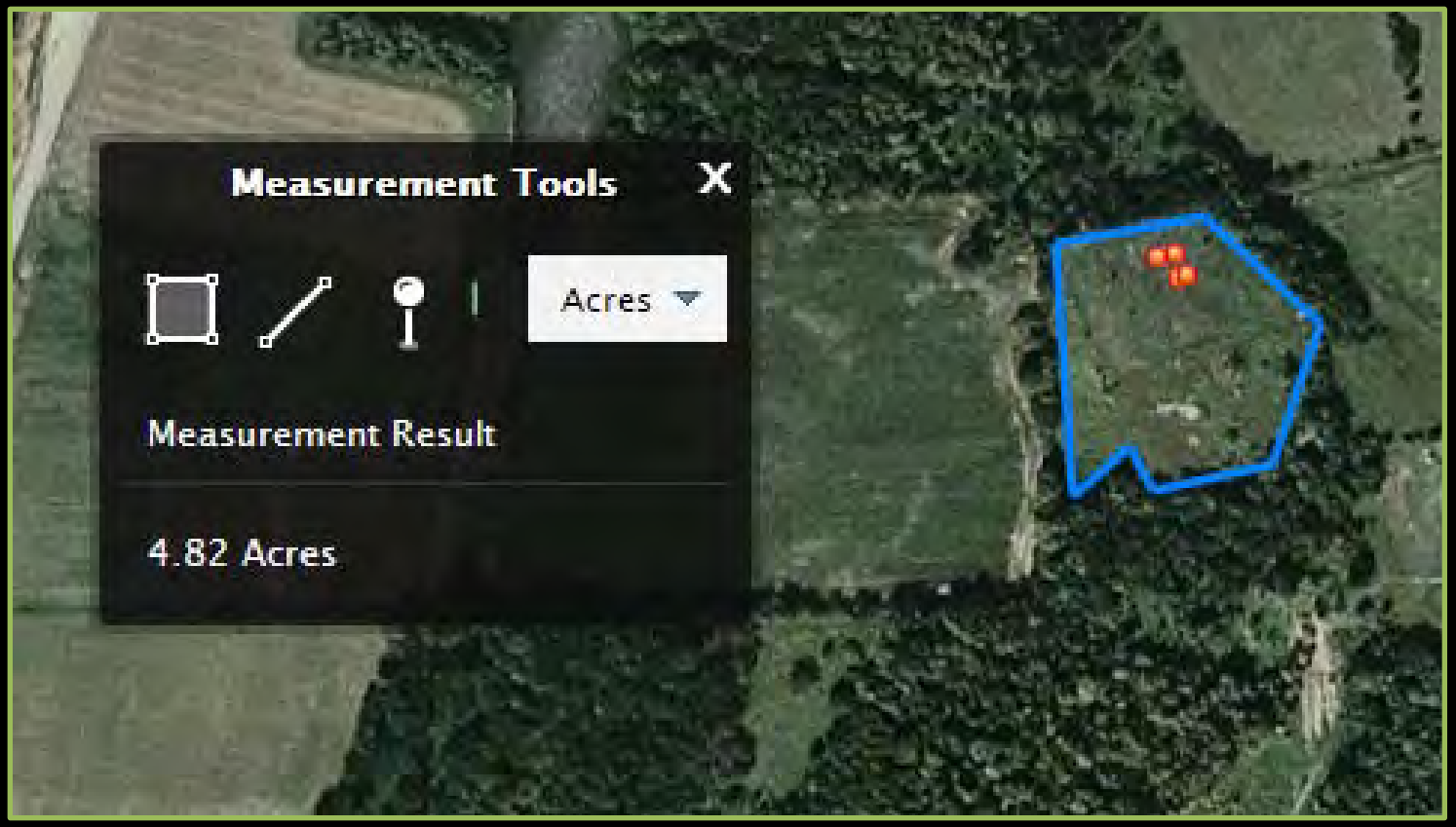
Change the look of the map with a click.



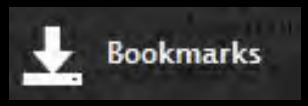
Location and measurement tools

Tools: 

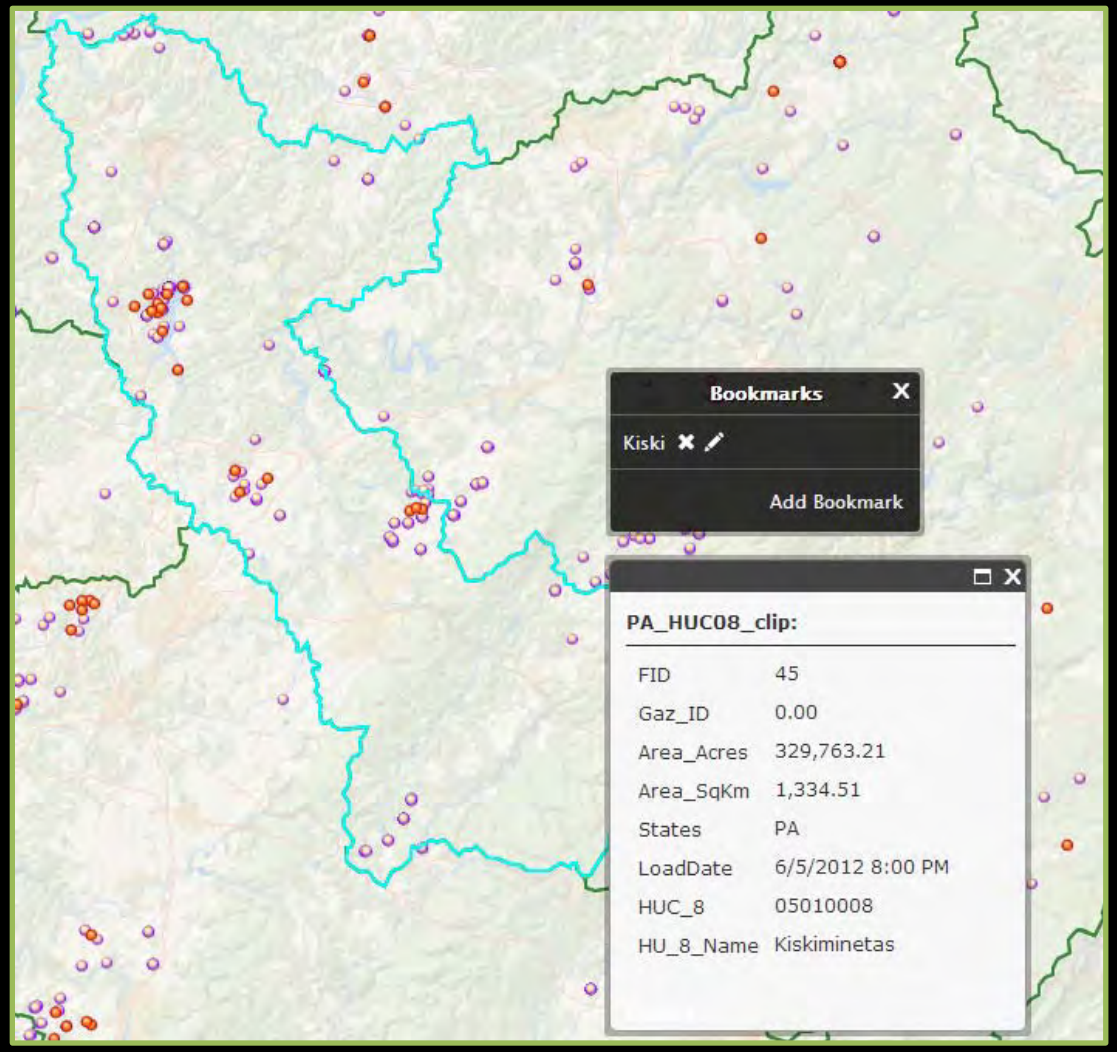
Find latitude/longitude coordinates on the map, or measure area or distance in a variety of units.



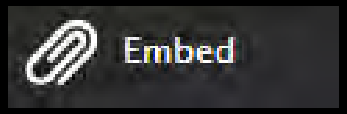
Other conveniences

Tools: 

Bookmark a location to to make it easy to find again.



Embed tools

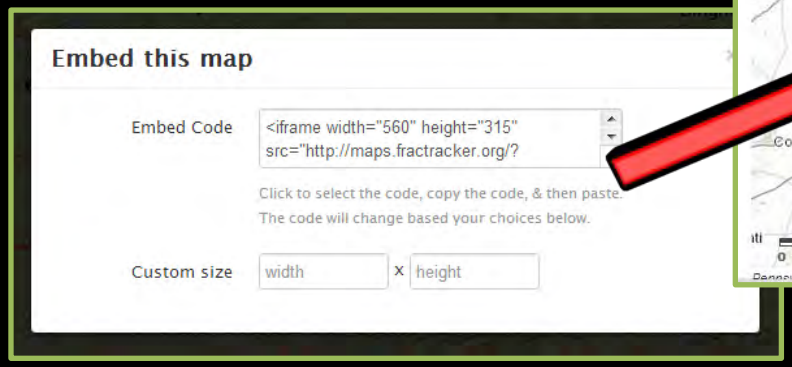
Tools: 

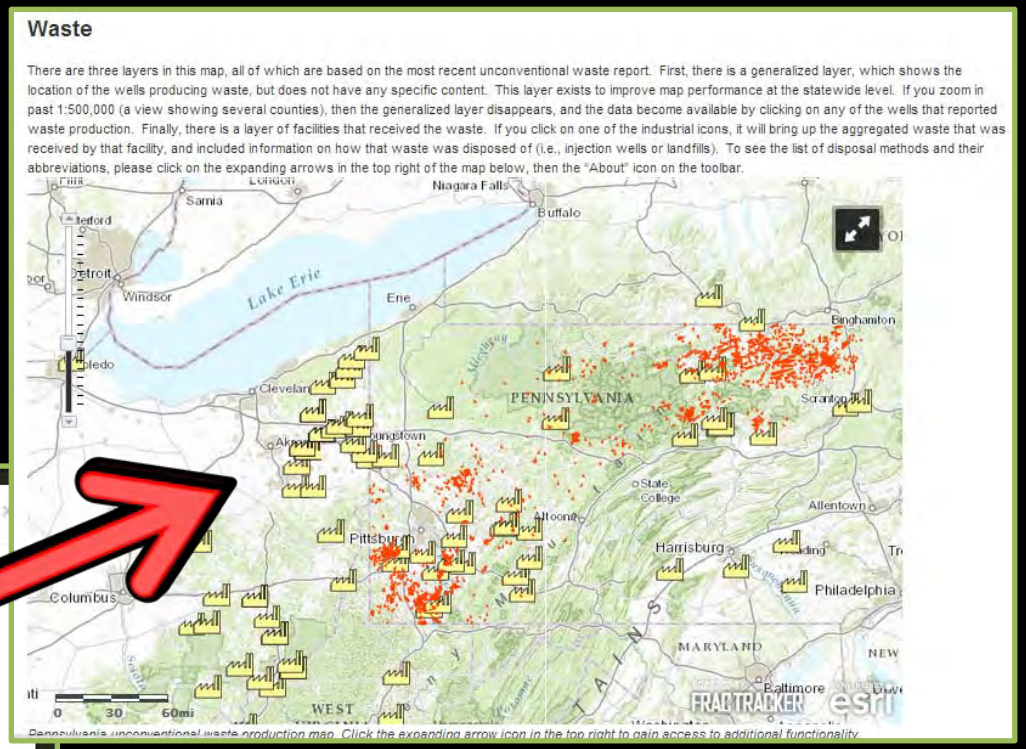
Want to add our maps to your website? Just click for the embed

code, and paste.

You can even set a

custom size.





On the FracMapper horizon

- Temporally-enabled data visualization with time-slider
- Search for data (not just location)

  e.g., zoom to a specific well

- Leave notes that you can see the next time you look at the map
- Download data for specified portion of map
- Create charts

Hundreds of FracTracker spatial datasets

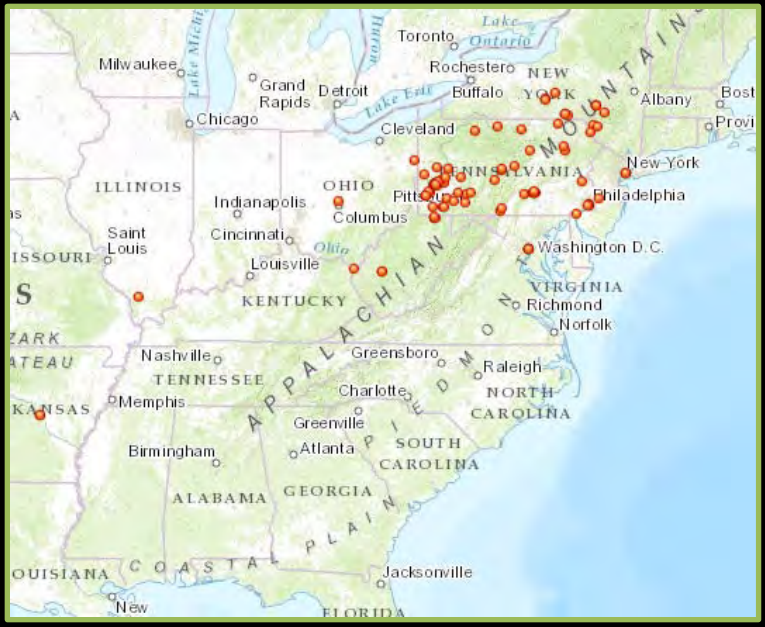
Primarily…

- Geological
- Land and water
- Societal and human health-related
- Oil and gas infrastructure
- Drilling violations

Data sources

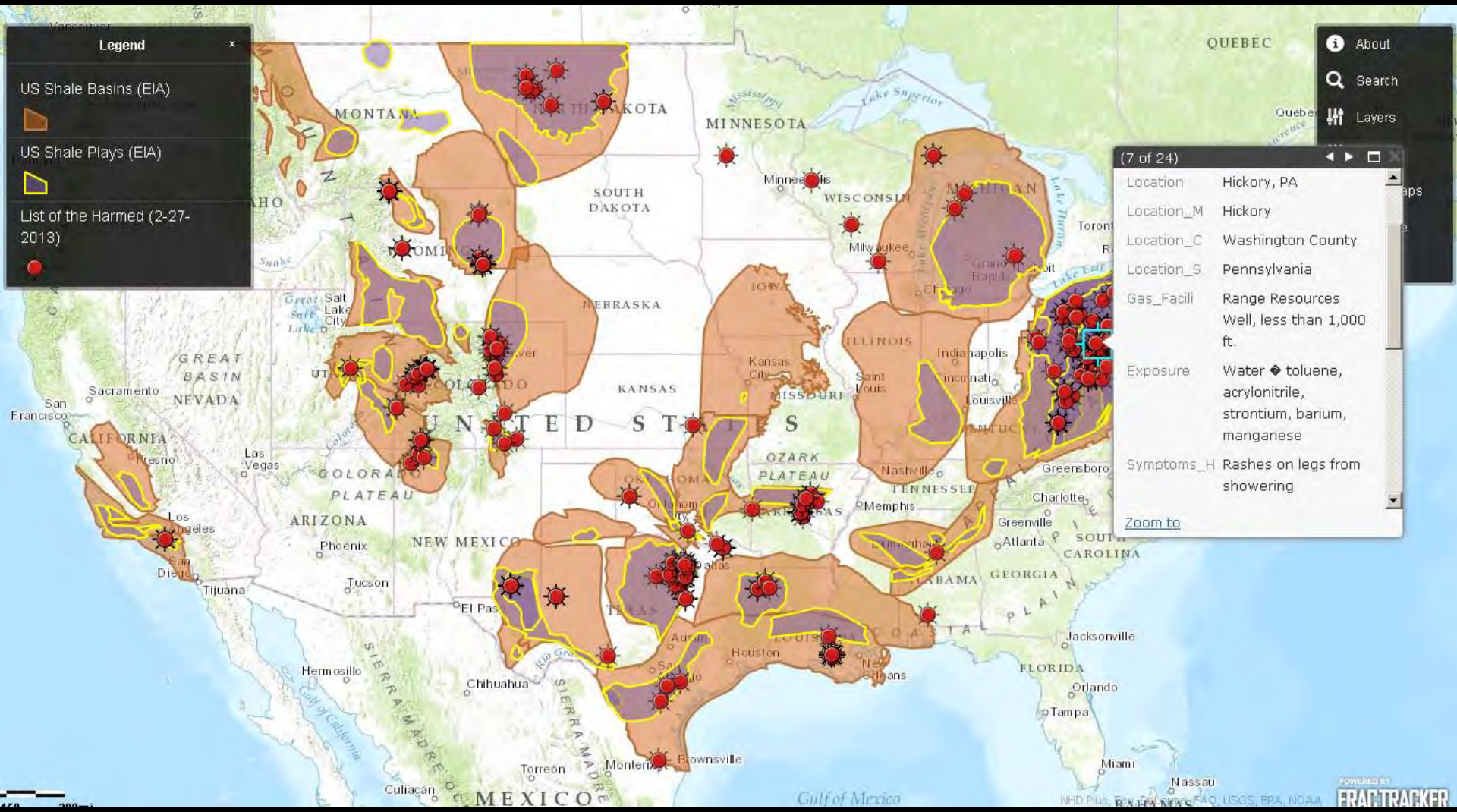
FracMapper data can come from a variety of sources

- Agency: Created from NYS DEC, EPA, EIA, PA DEP, etc. tabular or spatial datasets
- FracTracker staff
- ESRI's ArcGIS Online community
- FracTracker User Community



This map was made by publishing a spreadsheet as a .csv file on Google Drive, which can then be imported to FracMapper.

Pennsylvania Alliance for Clean Air & Water
"List of the Harmed"



Analyses

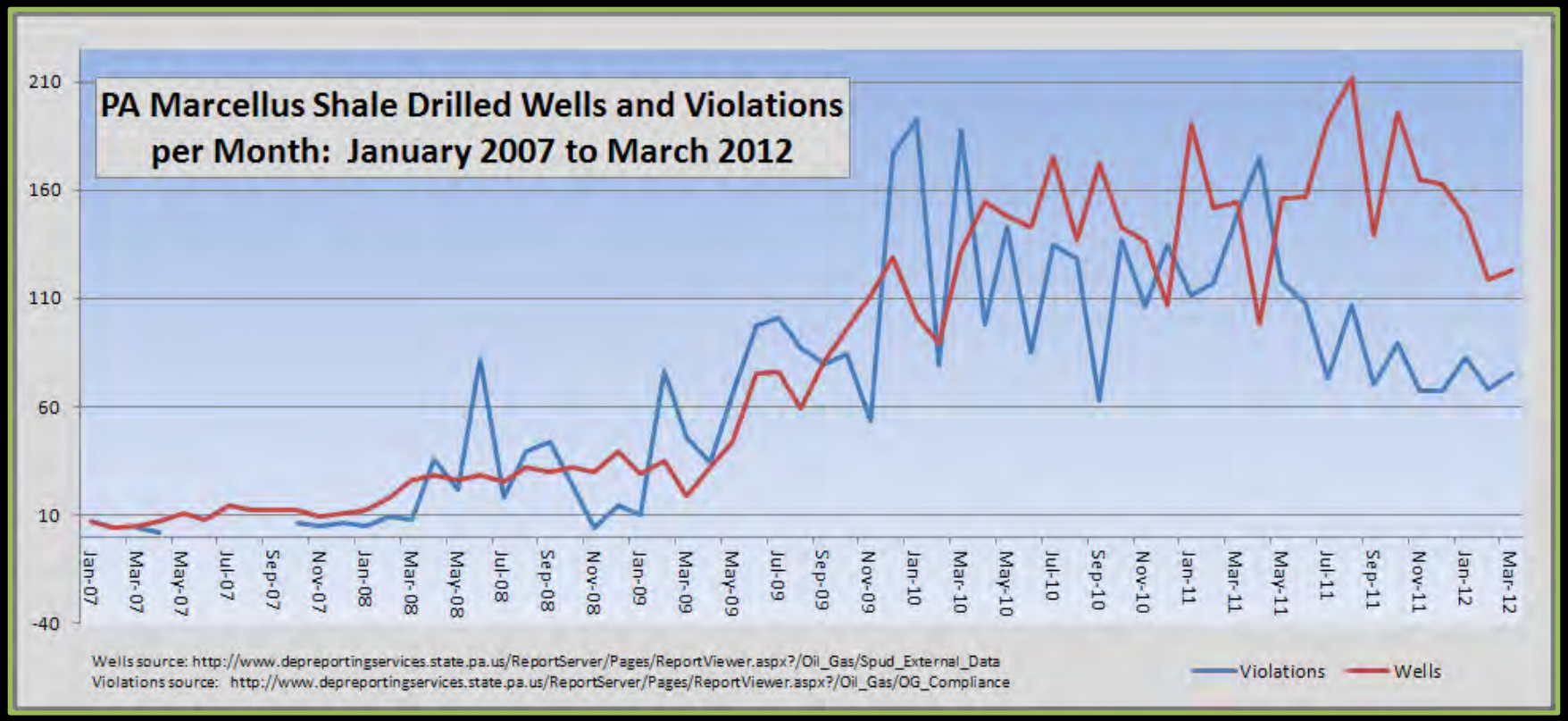
FracTracker does more than provide maps and access to raw data.

Sometimes a closer look

at the data is in order.

Some of our more popular analyses include…

Visualizations of trends over time



Data analyses in our FracTracker Blog

FRACTRACKER

Exploring data, sharing perspectives, and mapping impacts of the gas industry

Home Maps Data Articles Projects Calendar Resources Media About Us

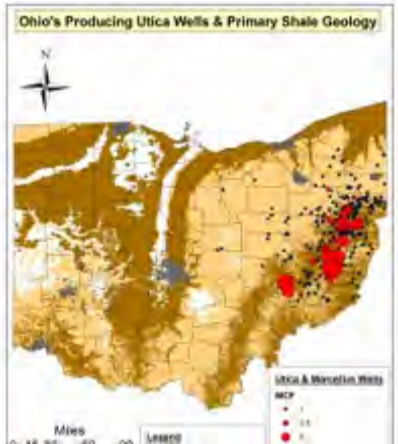
To Severance Tax or not to Severance Tax, that is the question!

BY TED AUCH – FEBRUARY 25, 2013 (EDIT POST)

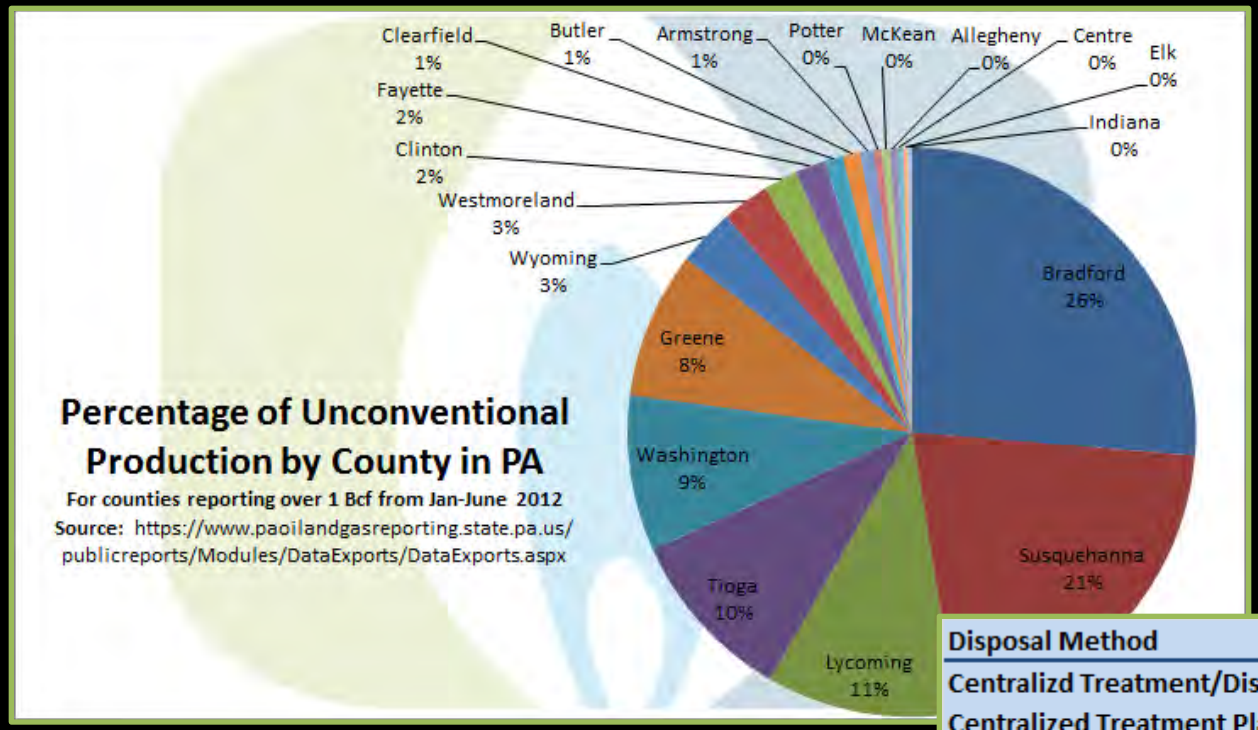
POSTED IN: ARTICLES, DATA AND ANALYSIS, FEATURE

By Ted Auch, PhD – OH Program Coordinator, FracTracker Alliance

The economic opportunities provided by Ohio's Utica Shale play via hydraulic fracturing have been cited repeatedly by the Ohio Oil and Gas Association and industry think-tanks like IHS Inc [1]. Numbers published by the latter last October [2] predicted 143,000 Ohio jobs and $18 billion in state revenue by 2020. However, these projections are accompanied by substantial amounts of error. Given that the state's Utica Shale well movement is now more than 500 wells permitted strong, we thought it was time to take a closer look at the demographics and economics of the Utica Play, given that there will be a strong geographic component being inserted into the "To Drill Or Not To Drill" and waste disposal debate here in Ohio. This is an especially important issue given that the state is wrestling with either implementing an *ad valorem* [3] tax or raising the state's industry-low severance taxes, which currently stands at 0.5-0.8% but would be raised to 1% under the governor's budget. In contrast, proposals from Policy Matters Ohio and northeast Ohio Democrats seek 5% – 7%, respectively.



Summaries of Production and Waste



Disposal Method	Bbl	Tons
Centralizd Treatment/Discharge(>500Mg/L)	306	
Centralized Treatment Plant For Recycle	1,687,984	13,549
Encapsulation		1,090
Injection Disposal Well	1,043,088	
Landfill	85,952	617,049
Reuse Other Than Road Spreading	9,247,272	
Storage Pending Disposal Or Reuse	83,478	6
Treated On-Site, NPDES Discharge		7
Grand Total	**12,148,081**	**631,701**

Resources

Calendar

Shale Gas Events

Today | October 2012 | Week | Month | Agenda

Sun	Mon	Tue	Wed	Thu	Fri	Sat
30	Oct 1	2	3	4	5	6 9am Monitoring Marcell 9am PA Stream Monito
7	8	9	10 (9:30am) Syracuse Center of Excellence's 12th Annual Symposium	11 6pm Marcellus Shale D	12	13
14 1pm 2nd annual Susta 4pm Compulsory Integ	15 6:30pm Act 13 Educatic 7:30pm What's Happen	16 6pm "Open Meetings a	17	18 (9:00am) Berkeley Energy Symposium and I 6pm 2012 Berkeley En	19 8:30am Our Water is Nc	20 9am PA Stream Monito
21	22	23	24 5:30pm Estate Planning 7pm New Scoping Mee	25 10am FracTracker Medi 7pm Community Forun	26	27 2pm YMCA Halloween 3pm Rally for a Frack 7pm Party for a Frack
28 3pm Celebration of W	29 7pm Greg Pahl 7:30pm Understanding	30 7pm Shale: The StateI	31	Nov 1	2	3

Events shown in time zone: Eastern Time

Google Calendar

Community Resources

Pennsylvania

- Allegheny Defense Project
- Alliance for Aquatic Resource Monitoring (ALLARM), Dickinson College
- Berks Gas Truth
- Carbon County Groundwater Guardians
- Center for Coalfield Justice
- Center for Healthy Environments & Communities, Univ. of Pgh.
- Center for Natural Resources Development & Protection, Temple University
- Citizen Groundwater / Surfacewater Database for NE Pennsylvania
- Clean Water Action (PA)
- Concerned Clearville Citizens (Blog)
- Damascus Citizens for Sustainability
- Delaware Riverkeeper Network
- Environmental Law Clinic, Univ. of Pgh.
- Gas Drilling Awareness Coalition of Luzerne County
- Group Against Smog and Pollution
- Kiski-Conemaugh Stream Team, a program of the Conemaugh Valley Conservancy.
- Lawrenceville Marcellus Action Group
- Lincoln Place Action Group
- The Marcellus Effect (blog)
- Marcellus Outreach Butler

Photos

FracTracker .org includes over 100 photos relating to gas field operations.

Monthly e-Newsletter

FRACTRACKER Alliance

E-Newsletter

November 30, 2012 - Edition 20

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SkyTruth Aggregates FracFocus Data

For those of you who are familiar with shale gas drilling, you might be wondering if some operators are putting diesel fuel into the hydraulic fracturing fluid they use, or whether some anti-bacterial agents are more prominent in certain geographies than others. You might want to do a comparison on which companies claim data to be proprietary, relative to the industry as a whole, or whether there is any correlation between particularly noxious chemical additives and well production. To answer questions like these, you just need a summary of

Upcoming Events

MWA and FracTracker Training Series

Beginning in Jan. 2013, Mountain Watershed Association and the

Academic Research

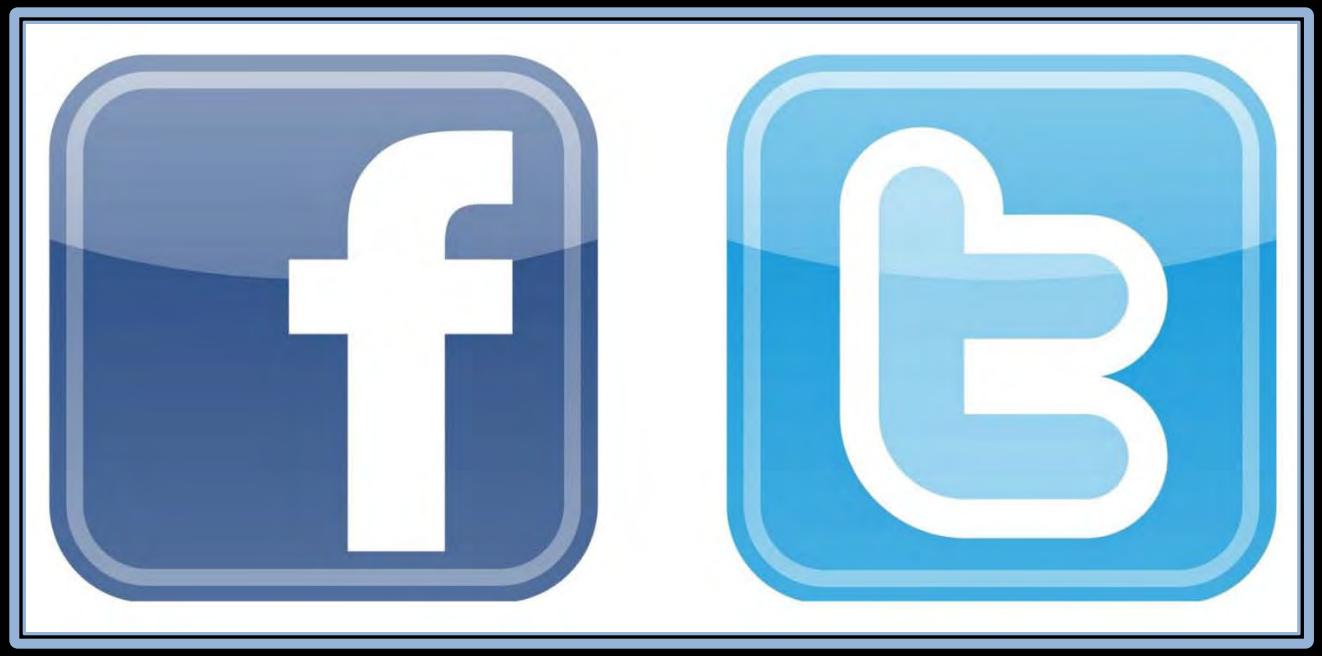
Published Research

To search a more comprehensive database of academic publications, visit Bucknell's Marcellus Shale Initiative site.

Health Studies

- Bamberger, M., Oswald, R. (2012). Impacts of Gas Drilling on Animal and Human Health. *New Solutions: A Journal of Environmental and Occupational Health*, 22(1): 51-77.
- Bishop RE. 2011. Chemical and Biological Risk Assessment for Natural Gas Extraction in New York, State University of New York.
- Colborn T, Kwiatkowski C, Schultz K, Bachran M. 2012. Natural Gas Operations from a Public Health Perspective, *Human and Ecological Risk Assessment: an International Journal* 17(5):1039-1056.
- Goldstein BD, Kriesky J, Pavliakova B. 2012. Missing from the Table: Role of the Environmental Public Health Community in Governmental Advisory Commissions Related to Marcellus Shale Drilling. *Environ Health Perspect* 120(4). http://dx.doi.org/10.1289/ehp.1104594
- McKenzie L, Witter RZ, Newman LS, Adgate JL, 2012, Human Health Risk Assessment of Air Emissions from Development of Unconventional Natural Gas Resources, *Science of the Total Environment*, 424:79-87.
- Vandenberg LN, Colborn T, Hayes TB, Heindel JJ, Jacobs Jr. DR, Lee D, Shioda T, Soto AM, vom Saal FS, Welshons WV, Zoeller RT, Myers JP. 2012. Hormones and Endocrine-Disrupting Chemicals: Low-Dose Effects and Nonmonotonic Dose Responses, *Endocrine Reviews*. - Plus a separate peer-reviewed study released in September 2012 identifying 649 chemicals used during natural gas production; more than 130 could affect the endocrine system.
- Witter RZ et al. 2008. Human Health Effects of Oil & Gas Development. While more research is needed to properly assess risk, Witter said volatile organic compounds churned into the

Social media



Projects

Trail Logbook

Trail Logbook

Reporting Gas Industry Impacts on Pennsylvania Trail Experiences

A Partnership of FracTracker and Keystone Trails Association

Run off your right-of-way by a gas company employee or truck? Concerned ab
you're putting in your canteen? Riled about the forced relocation of your favorit
its associated activities have put a rut in your trail adventure, FracTracker and
(KTA) want to know! It is time to collect the stories and experiences of hikers a
better understand the impacts of the shale gas industry and outfit trail advoca
and seek remedies. If you have an experience to share, please fill out the forr

To submit photos, email them as attachments along with their descriptions to
Please include as much information about the incident as possible, including
credited as the photographer or not. All photos will be loaded by the Logbook
online photo album. By submitting your photos to us, you grant FracTracker a
them – with proper attribution of course. If you are having trouble with this pag
mail it in.

Trail Logbook Submission Form

* Required

Your Name *

Observer details and contact info

Location

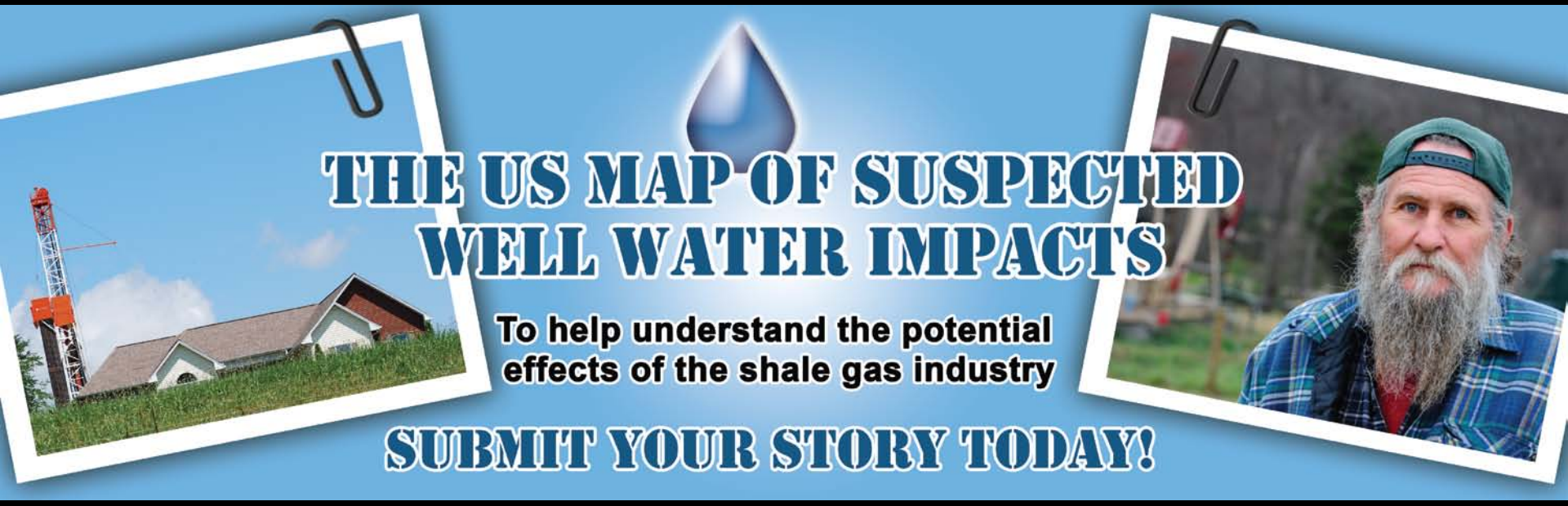
Observation details

- Stream degradation
- Noise
- Odors
- Dead wildlife
- Human interaction

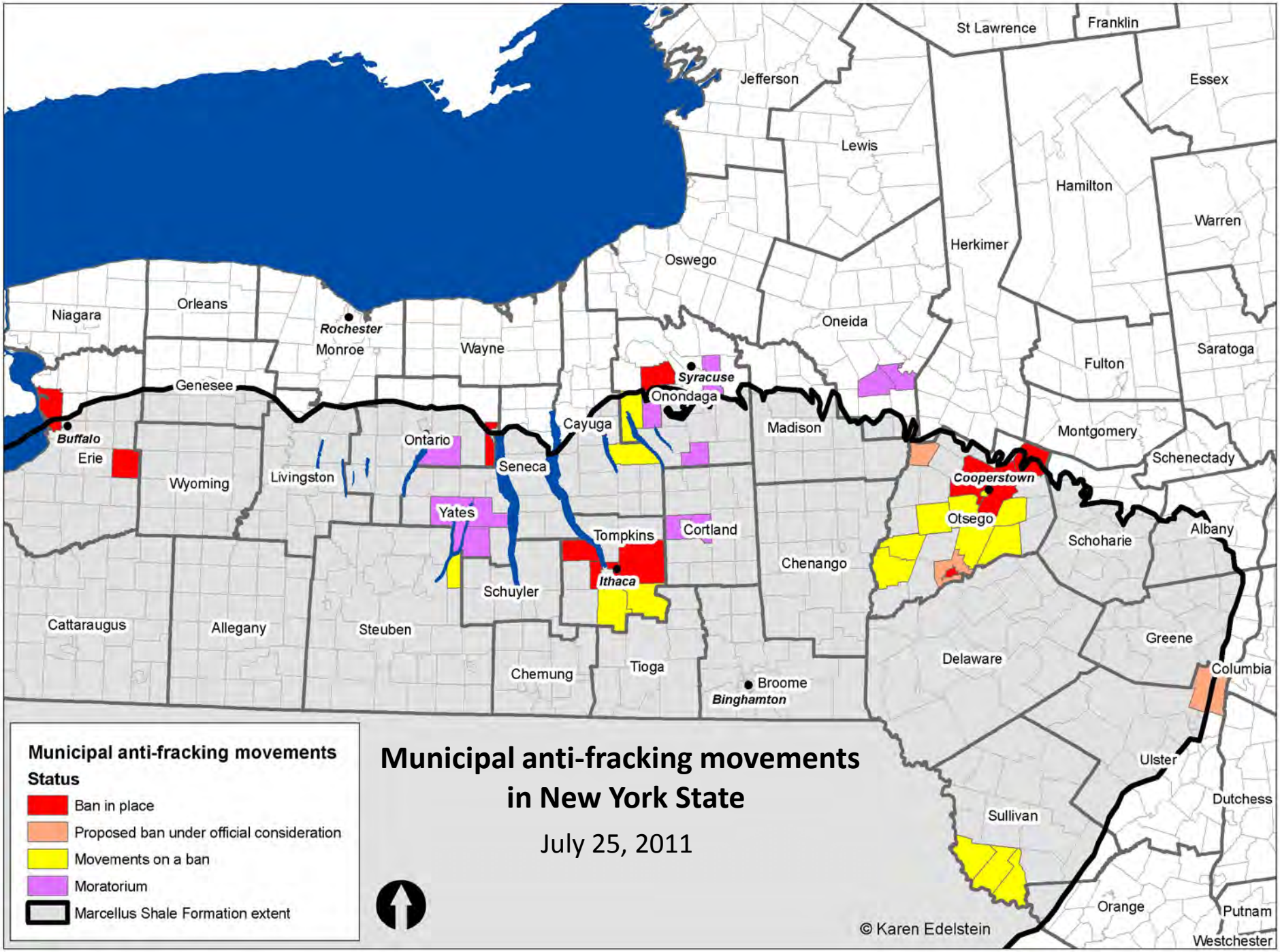
Associated facilities/ activities

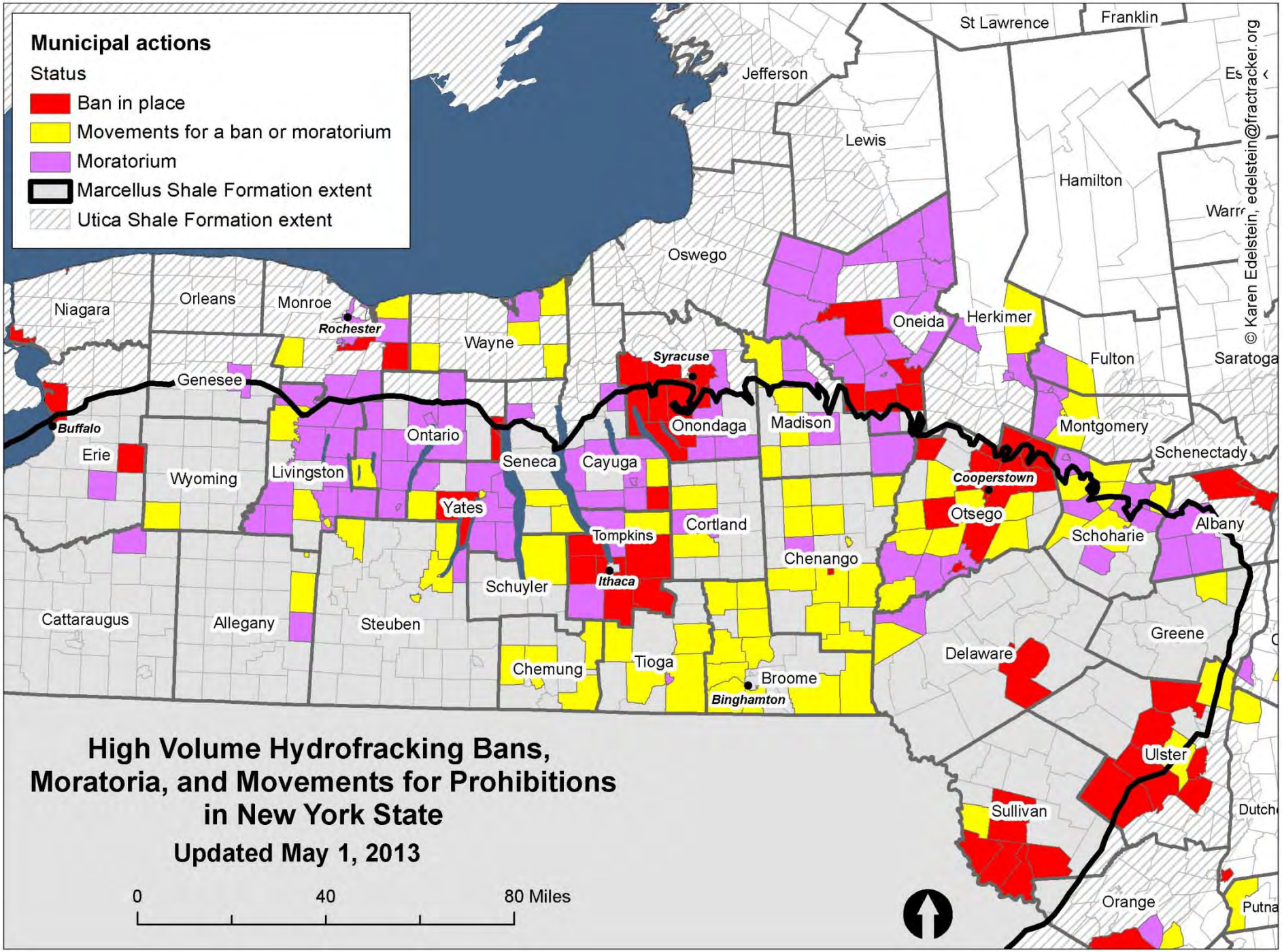
- Pipelines
- Truck traffic
- Compressor station
- Helicopters
- Impoundments

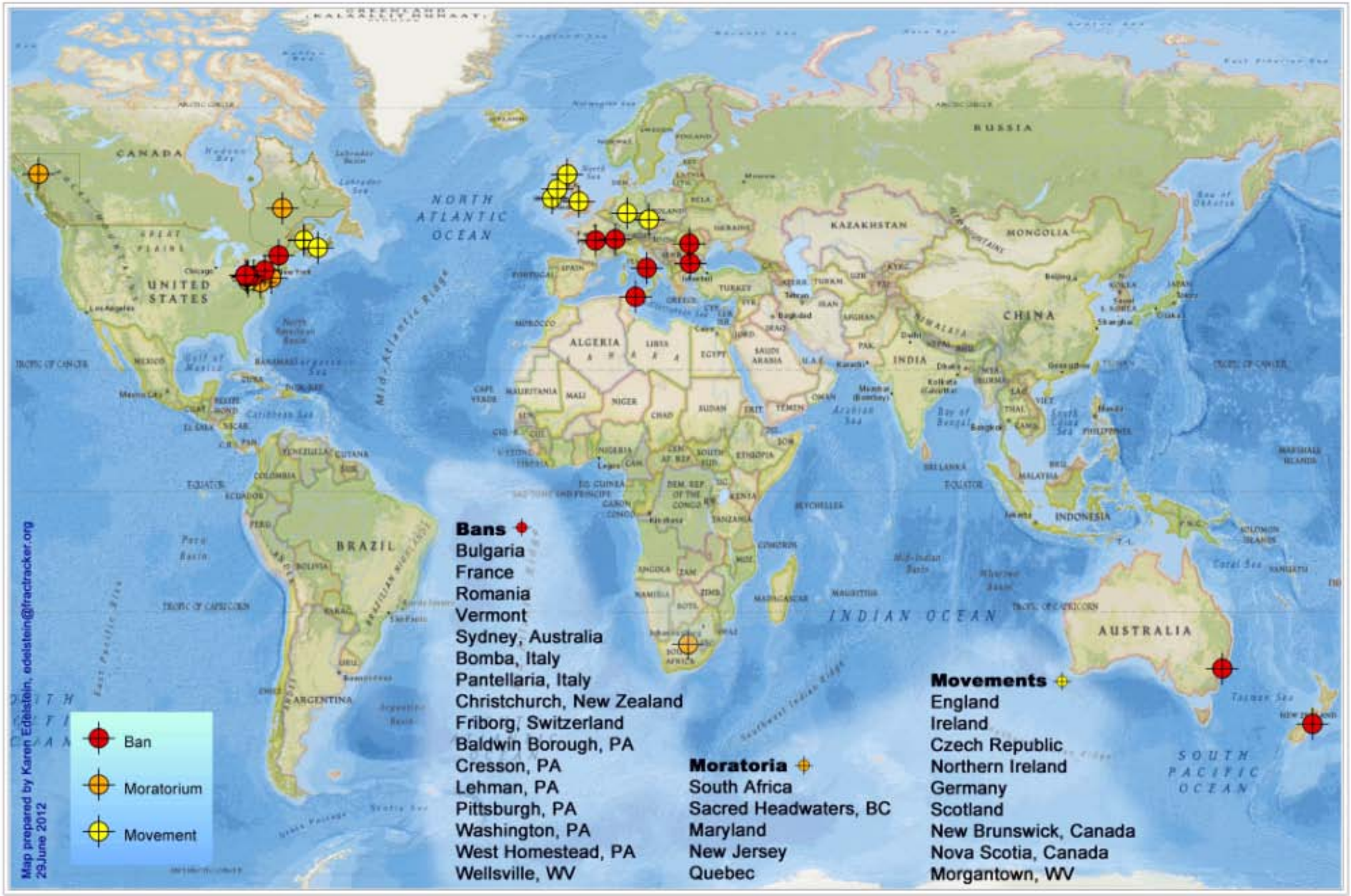
Our newest inter-state project (just launched!)



Building on similar models as “List of the Harmed” to collect anecdotes and local data that may suggest patterns worth exploring in greater detail.

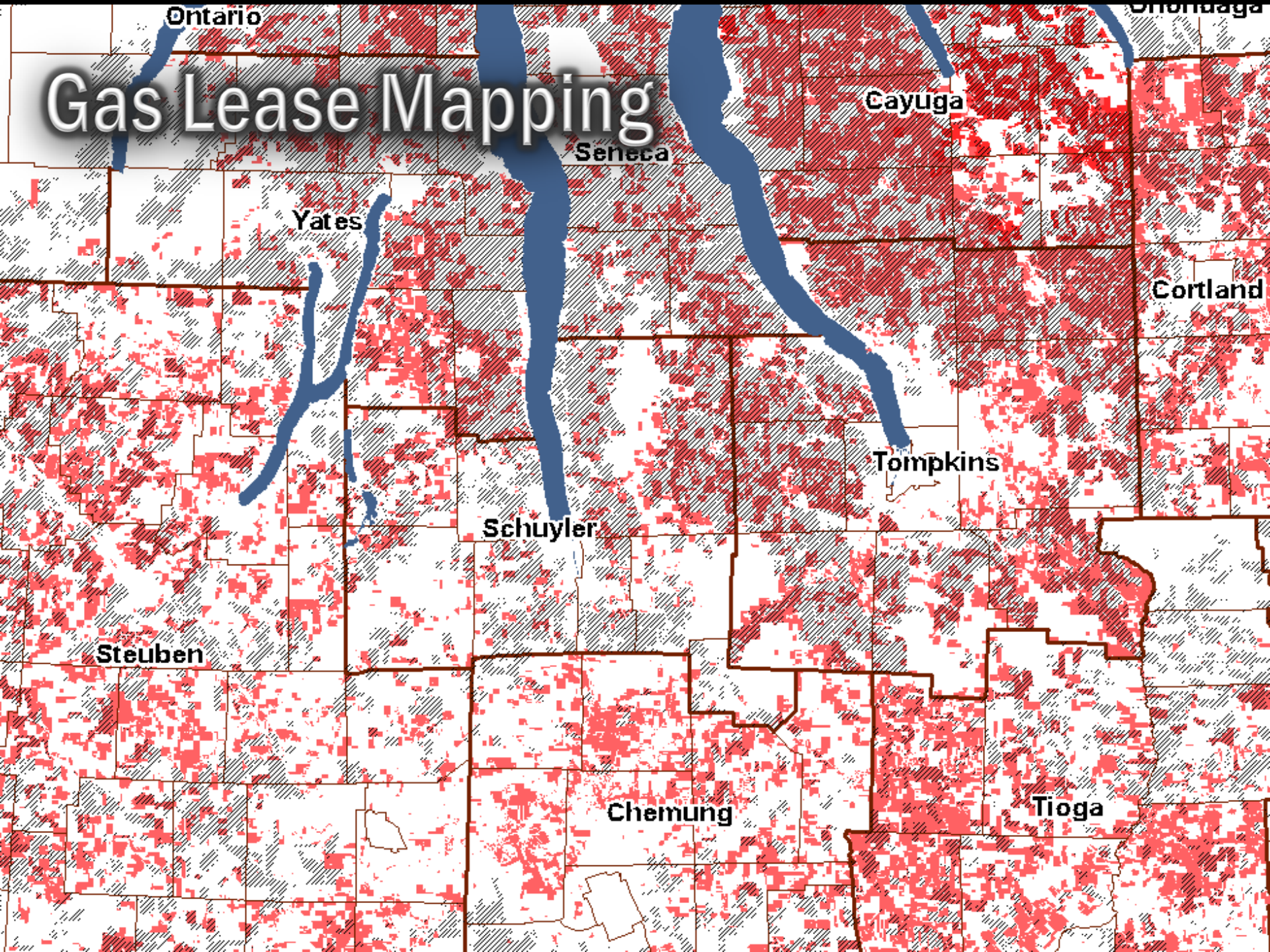

Municipal anti-fracking movements
in New York State
July 25, 2011
Municipal anti-fracking movements
Status
Ban in place
Proposed ban under official consideration
Movements on a ban
Moratorium
Marcellus Shale Formation extent
© Karen Edelstein
St Lawrence
Franklin
Jefferson
Essex
Lewis
Hamilton
Warren
Herkimer
Oswego
Oneida
Niagara
Orleans
Rochester
Monroe
Wayne
Fulton
Saratoga
Syracuse
Genesee
Onondaga
Cayuga
Madison
Buffalo
Ontario
Montgomery
Erie
Seneca
Schenectady
Wyoming
Livingston
Cooperstown
Yates
Otsego
Tompkins
Cortland
Schoharie
Albany
Chenango
Ithaca
Schuyler
Cattaraugus
Allegany
Steuben
Greene
Delaware
Columbia
Chemung
Tioga
Broome
Binghamton
Ulster
Dutchess
Sullivan
Orange
Putnam
Westchester


Municipal actions
Status
Ban in place
Movements for a ban or moratorium
Moratorium
Marcellus Shale Formation extent
Utica Shale Formation extent
St Lawrence
Franklin
Jefferson
Lewis
Hamilton
Oswego
Niagara
Orleans
Monroe
Rochester
Wayne
Oneida
Herkimer
Syracuse
Fulton
Saratoga
Genesee
Buffalo
Onondaga
Madison
Montgomery
Ontario
Erie
Seneca
Cayuga
Schenectady
Wyoming
Livingston
Cooperstown
Yates
Otsego
Cortland
Albany
Tompkins
Schoharie
Chenango
Ithaca
Schuyler
Cattaraugus
Allegany
Steuben
Greene
Delaware
Chemung
Tioga
Broome
Binghamton
Ulster
Sullivan
Orange
© Karen Edelstein, edelstein@fractracker.org
High Volume Hydrofracking Bans, Moratoria, and Movements for Prohibitions in New York State
Updated May 1, 2013
0
40
80 Miles



High Volume Hydrofracking Prohibitions Outside of New York State

Gas Lease Mapping



FracTracker resources picked up by media

- New York Times
- National Geographic
- Associated Press
- Bloomberg News
- Pittsburgh Post Gazette: “PG Pipeline”
- The Allegheny Front
- Truth-out.org

Local publications

- No Frack Almanac
- Flowback Newsletter
- Cayuga Lake Watershed Network newsletter

FracTracker

- A tool for visualizing data
- A tool for sharing community information
- A tool for democractizing access to scientific knowledge
- A tool for analysis, planning, education, and empowerment

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More information

Visit www.fractracker.org

Karen Edelstein, NYS Program Coordinator
edelstein@fractracker.org

FracMapper Links

Basic (we're just providing data)

- NYS Well Viewer
- Marcellus and Utica Formations
- Bans and moratoria
- Health

Overlay data to forward discussion on current topics

- Potential risks related to LPG storage in Central New York (information not gathered by DEC/USGS for Inergy EIS and expansion)
- List of the harmed (NYS Health Regs review)
- Priority to plug wells (DEC regs review)
- Waste destinations from PA DEC regs review)
- Municipally- and privately-owned landfills, and publicly-owned wastewater treatment plants in NYS (DEC regs review)