



Marcellus Shale Drilling Surface Water Impacts

Ben Pelto

Pad Clearing Phase-SkyTruth Overflight



Courtesy of:



Waiting Phase



Drilling Phase



Fracking Phase



PA Marcellus Drilling Permits-2005



0 12.5 25 50 75 100 Miles

Map Created by:
Ben Peltó
October 2 2011



Legend

◆ 2005Permits

PA Marcellus Drilling Permits-2006



0 12.5 25 50 75 100 Miles

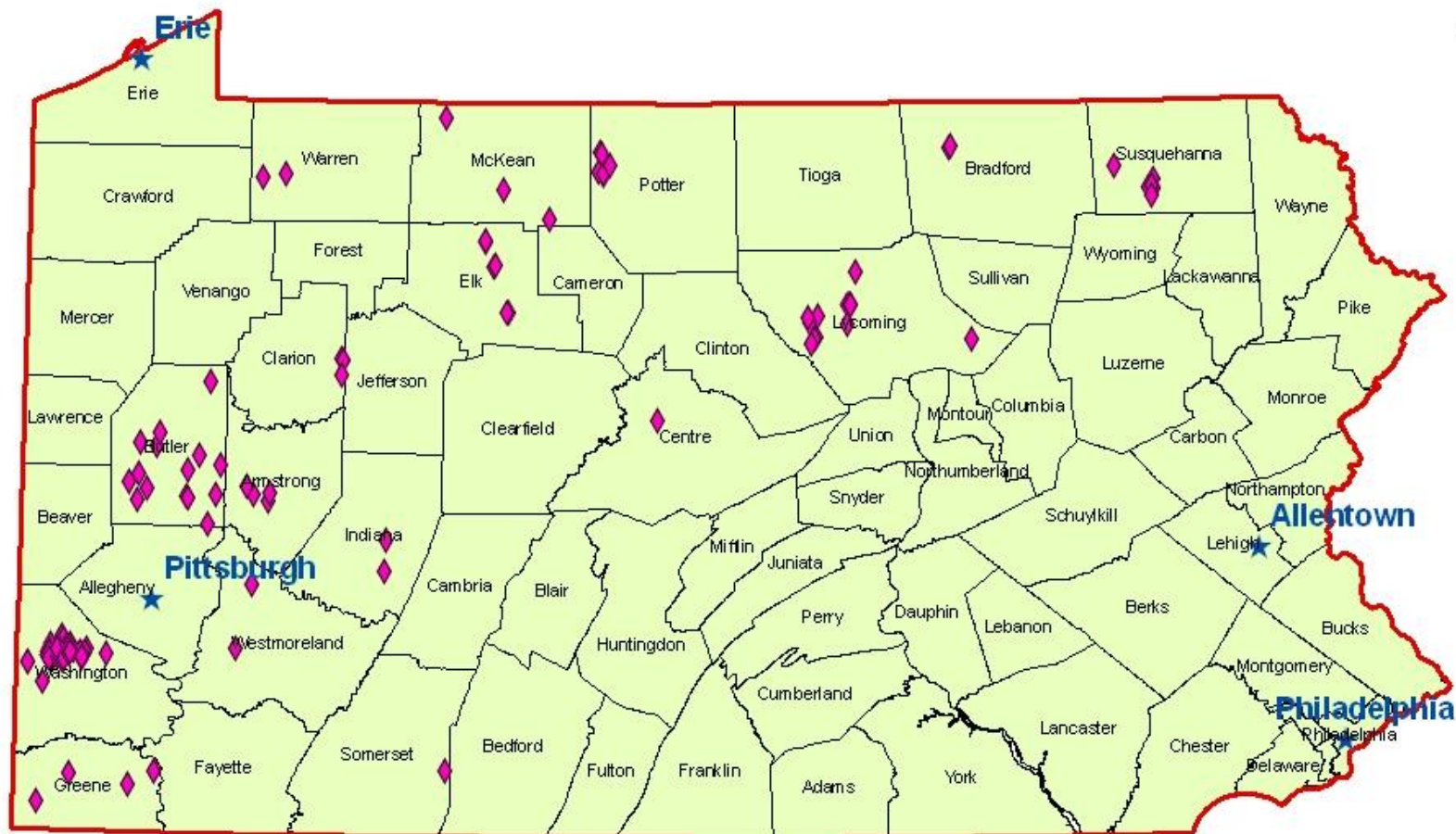
Map Created by:
Ben Peltó
October 2 2011



Legend

♦ 2006Permits

PA Marcellus Drilling Permits-2007



0 12.5 25 50 75 100
Miles

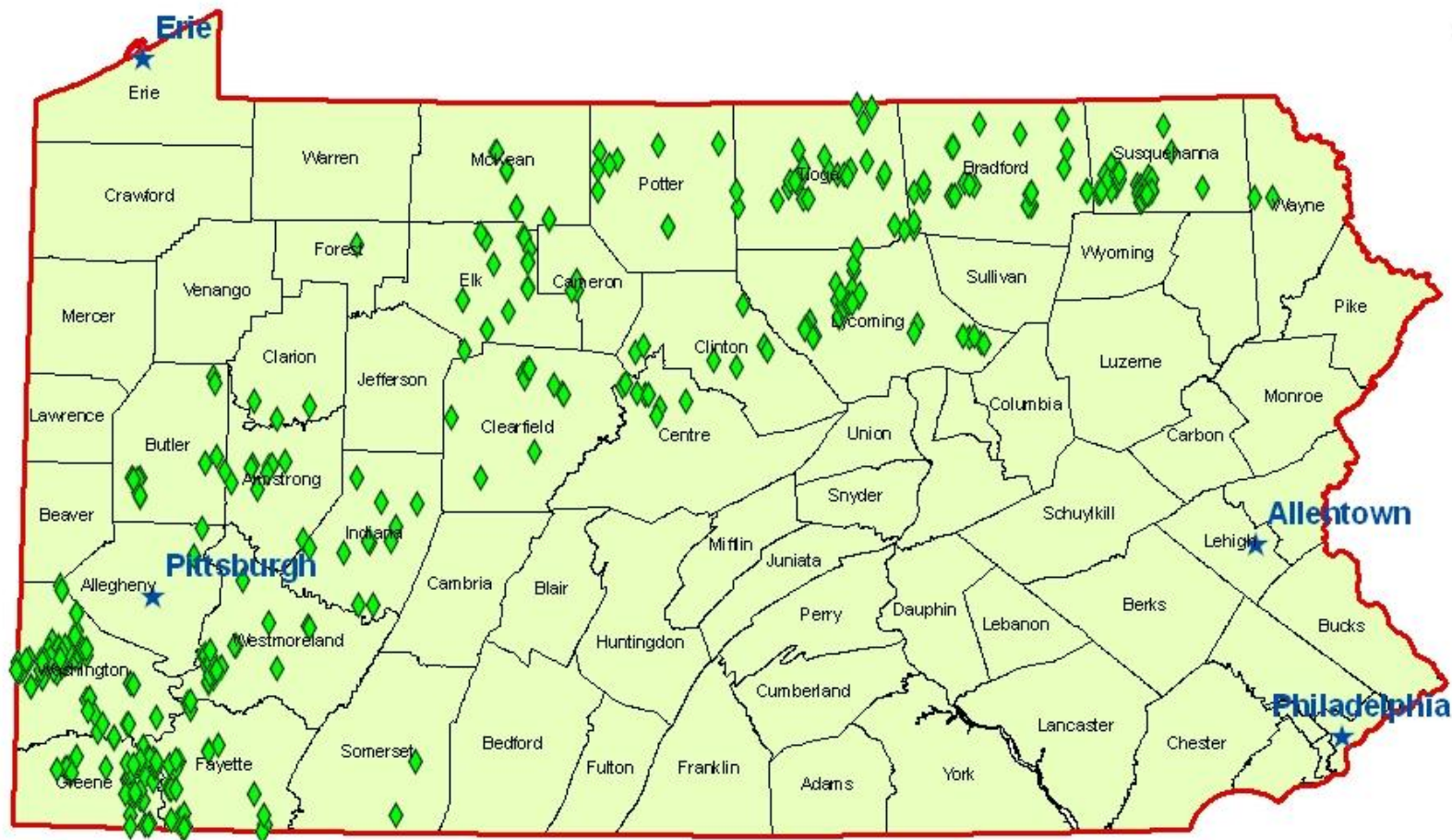


Legend

◆ 2007 Permits

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PA Marcellus Drilling Permits-2008



0 12.5 25 50 75 100
Miles

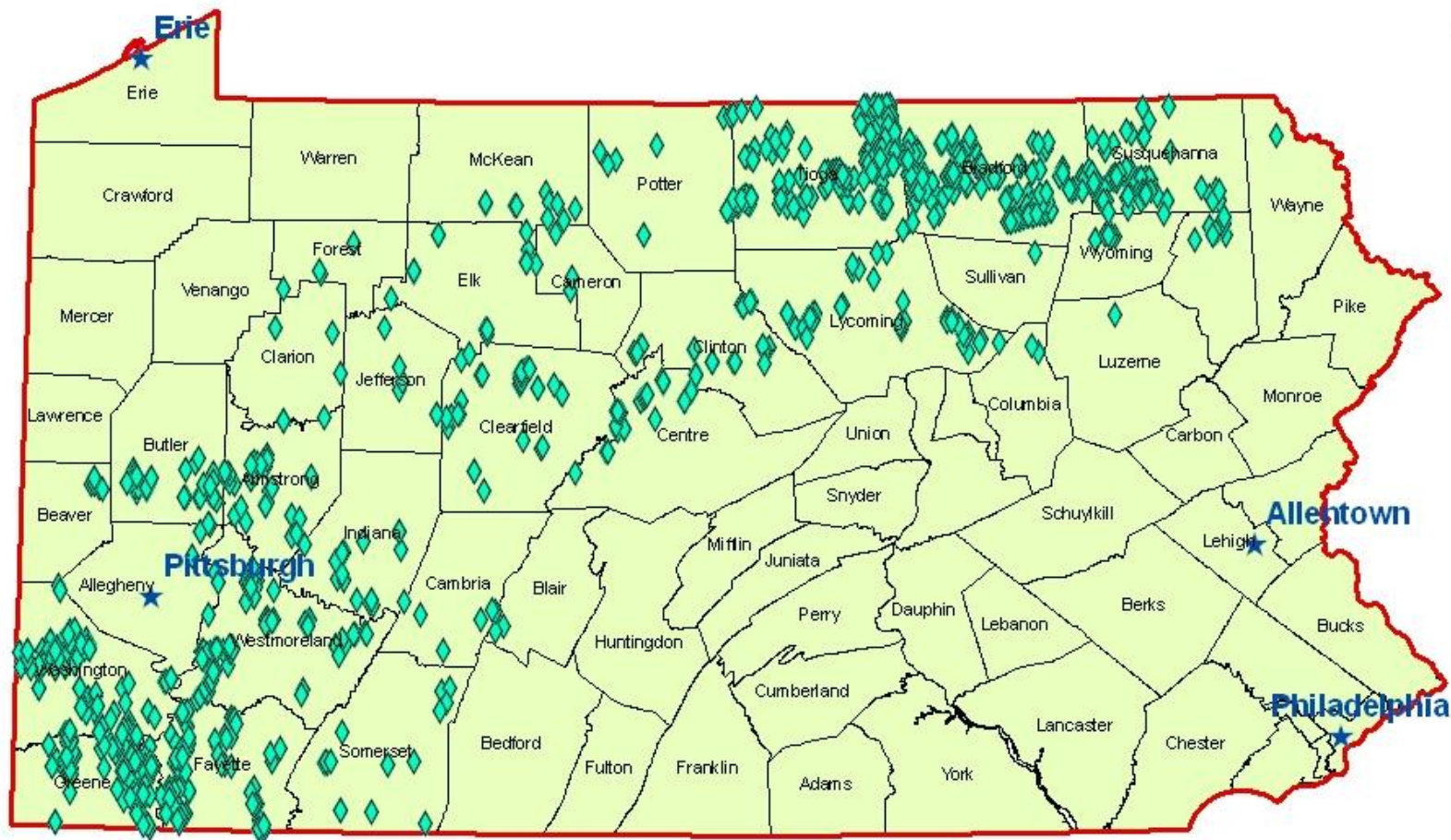
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Legend

◆ 2008Permits

PA Marcellus Drilling Permits-2009



0 12.5 25 50 75 100
Miles

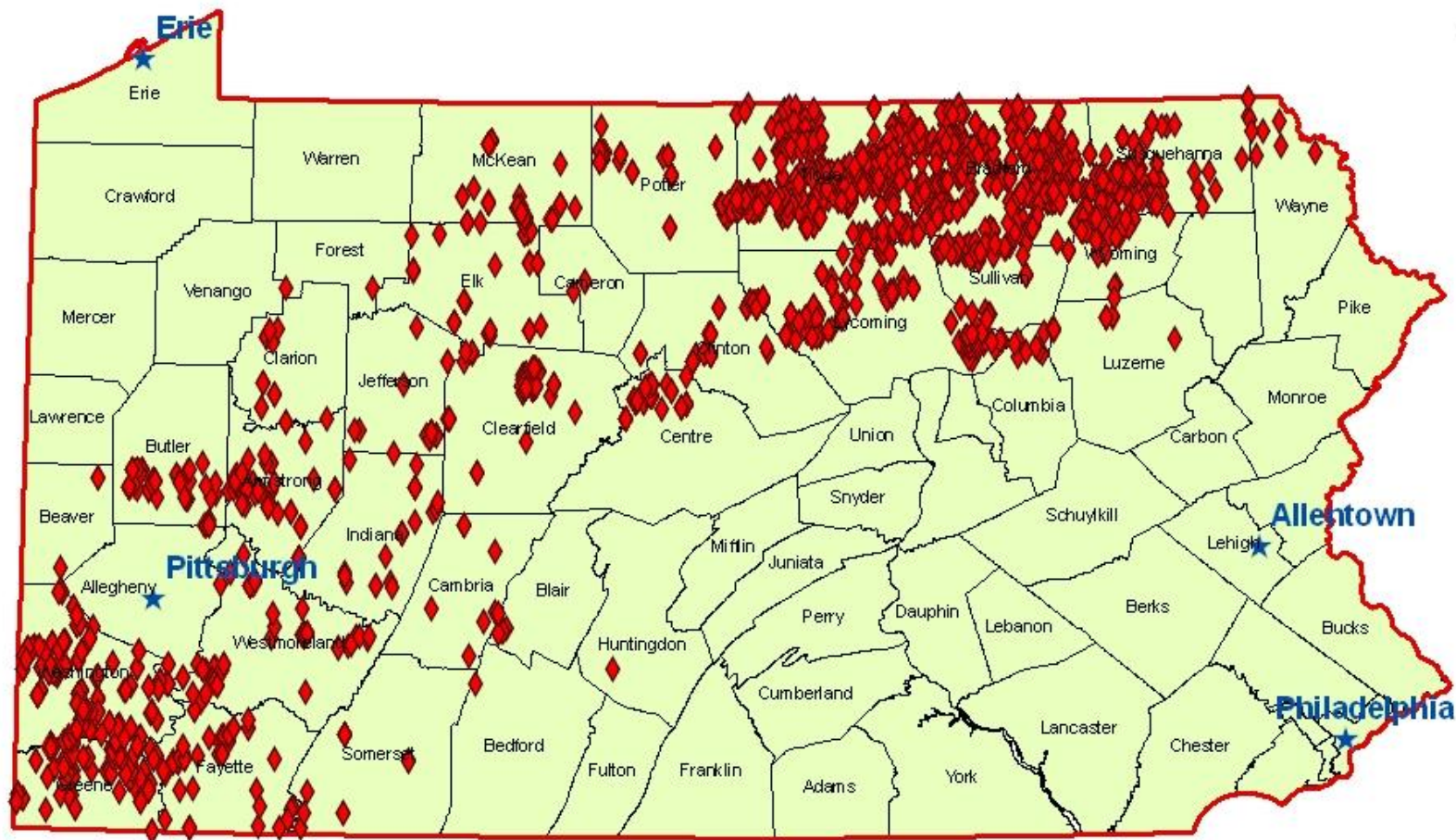


Legend

◆ 2009Permits

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PA Marcellus Drilling Permits-2010



0 12.5 25 50 75 100 Miles

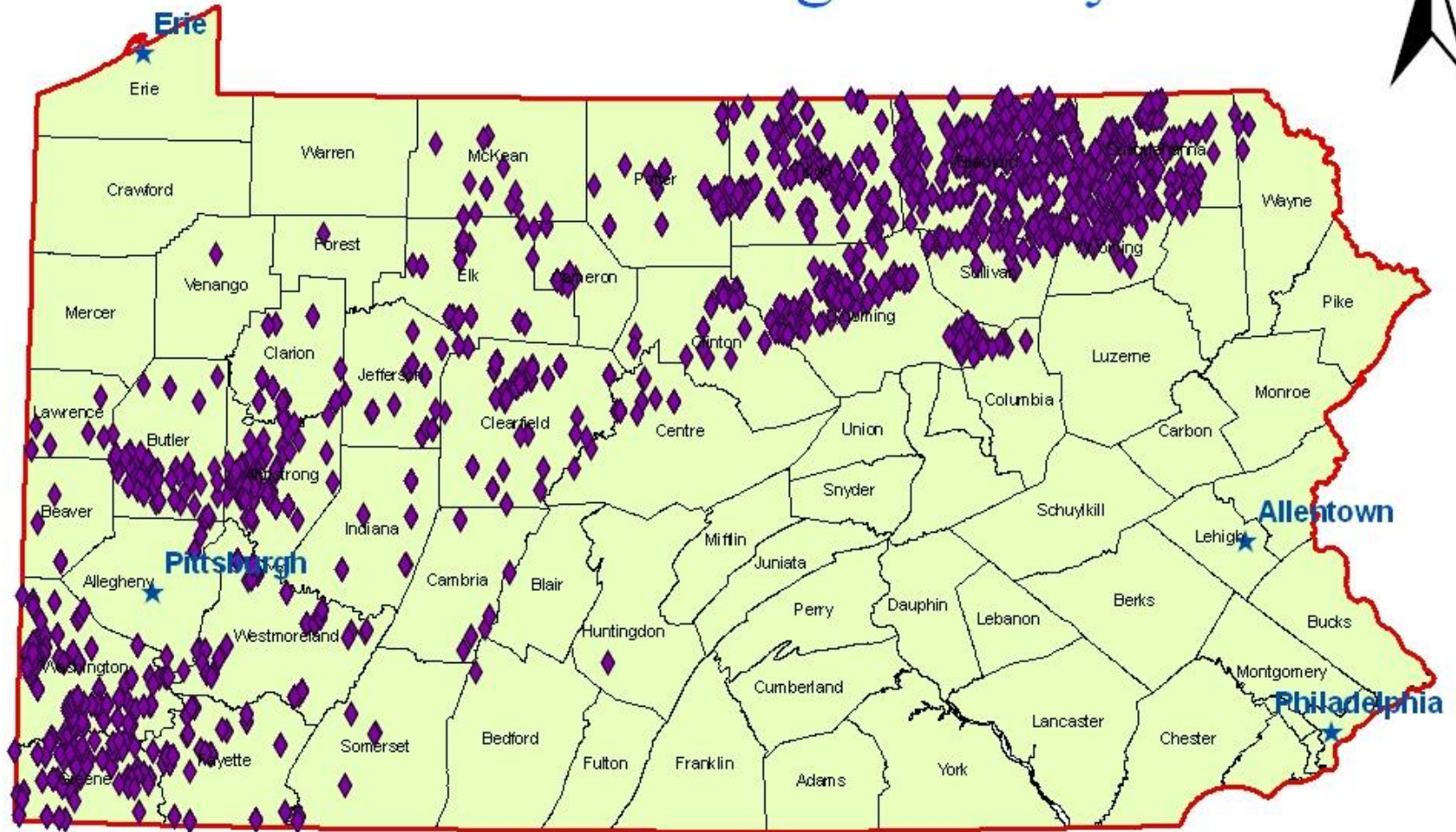
Map Created by:
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October 2 2011



Legend

◆ 2010Permits

PA Marcellus Drilling Activity-2011



0 12.5 25 50 75 100 Miles

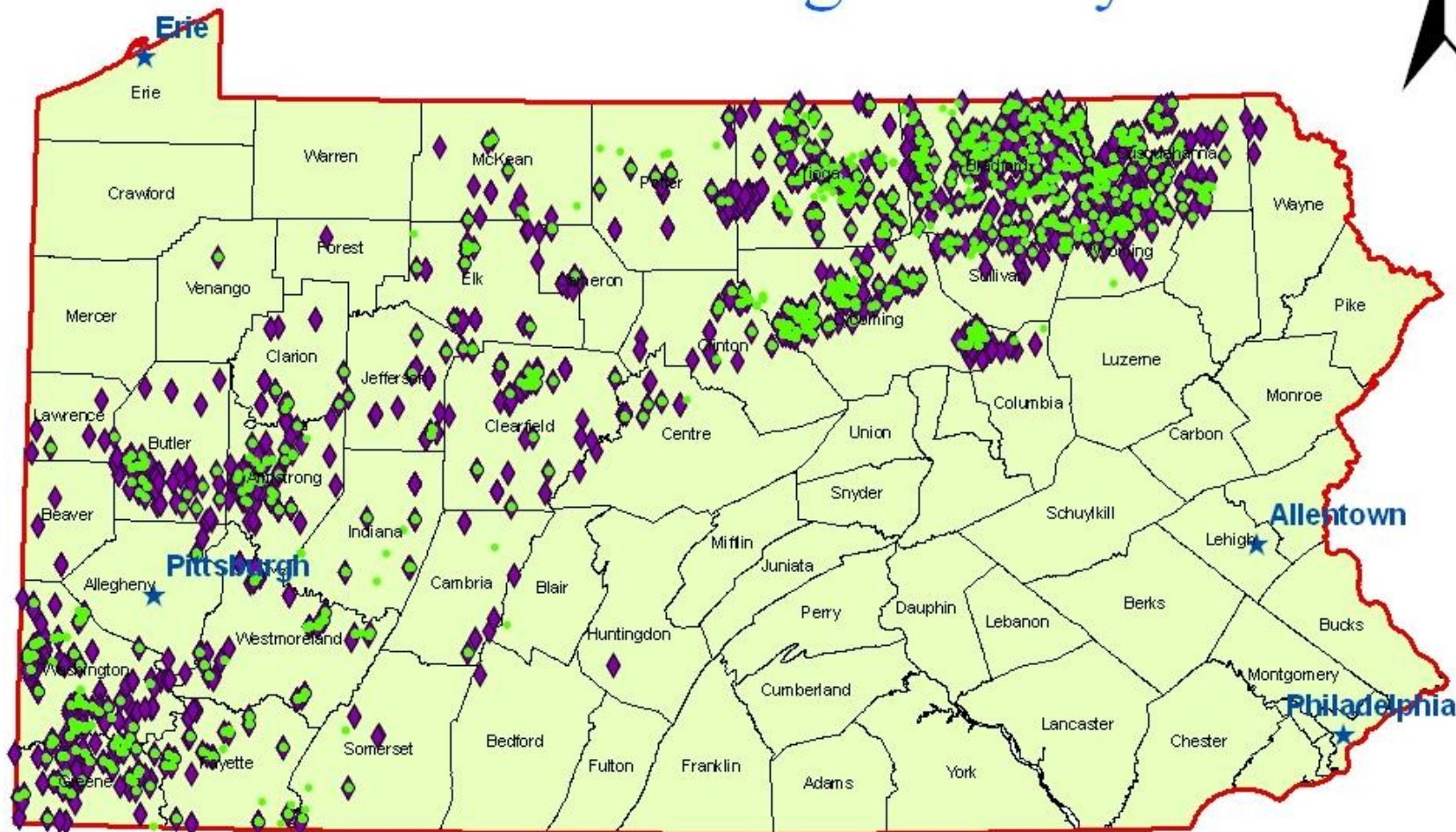
Map Created by:
Ben Peltó
March 12 2012



Legend

◆ 2011 Permits

PA Marcellus Drilling Activity-2011



0 12.5 25 50 75 100 Miles

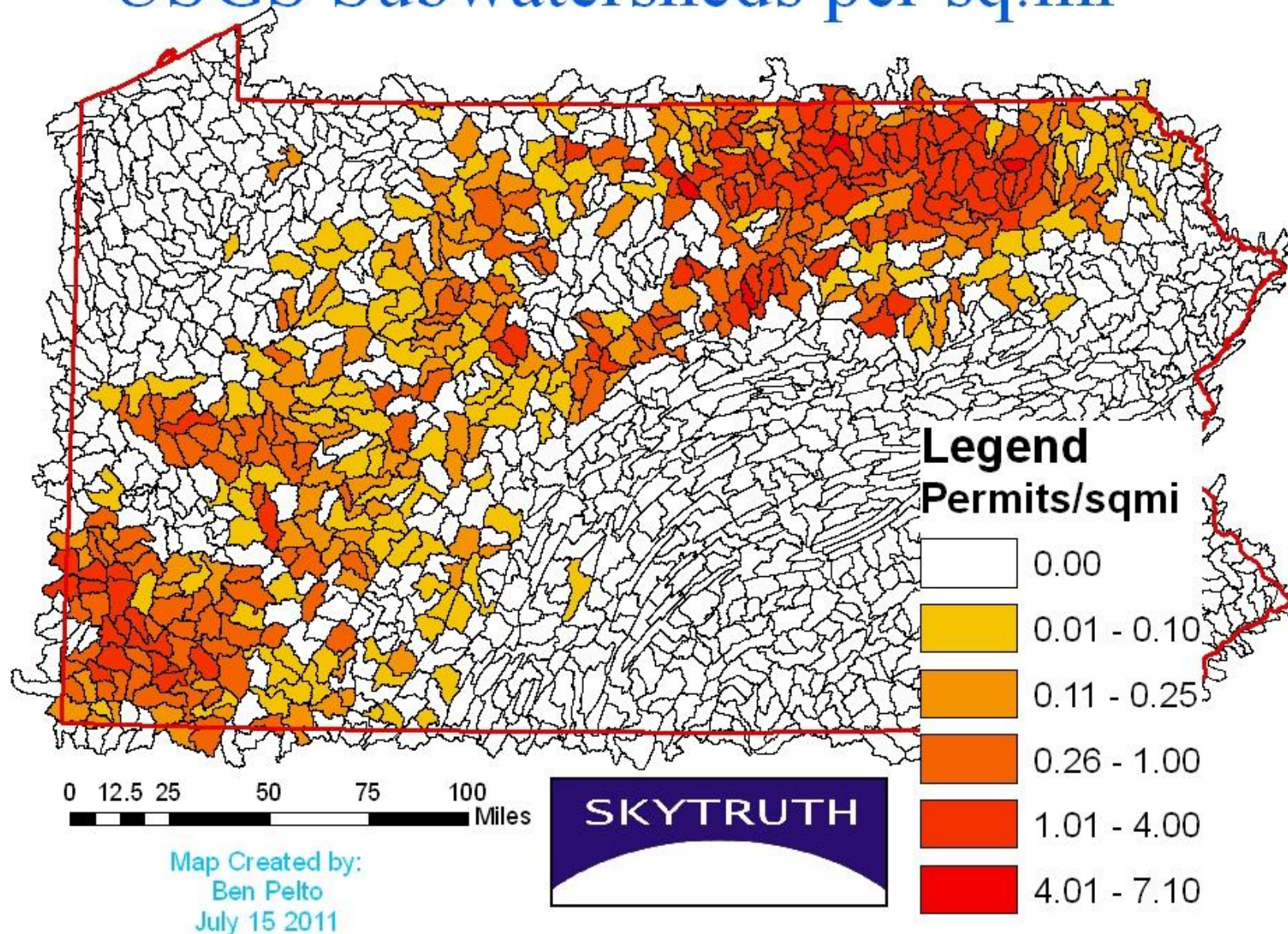
Map Created by:
Ben Peltó
March 12 2012



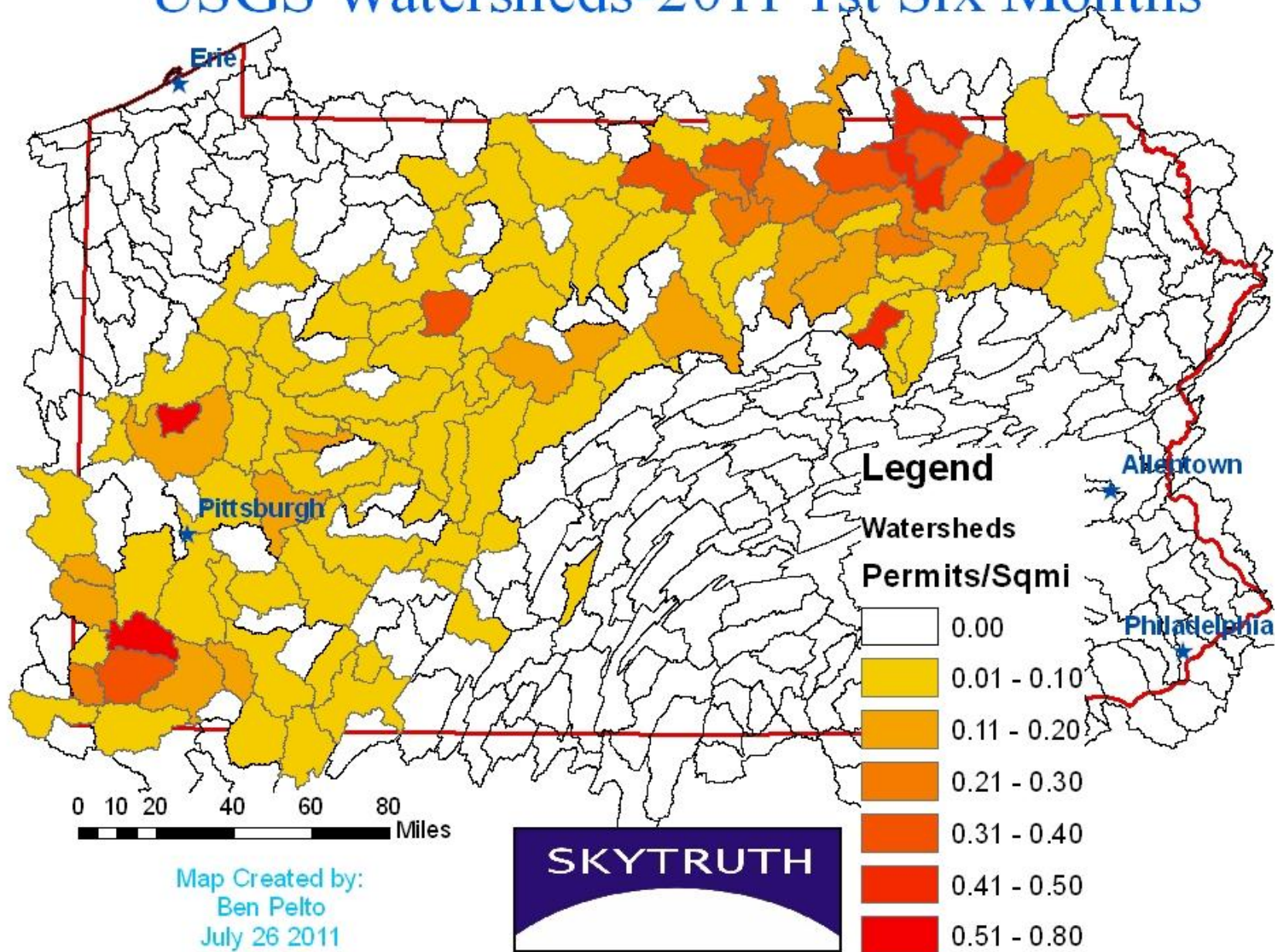
Legend

- 2011 Spuds
- ◆ 2011 Permits

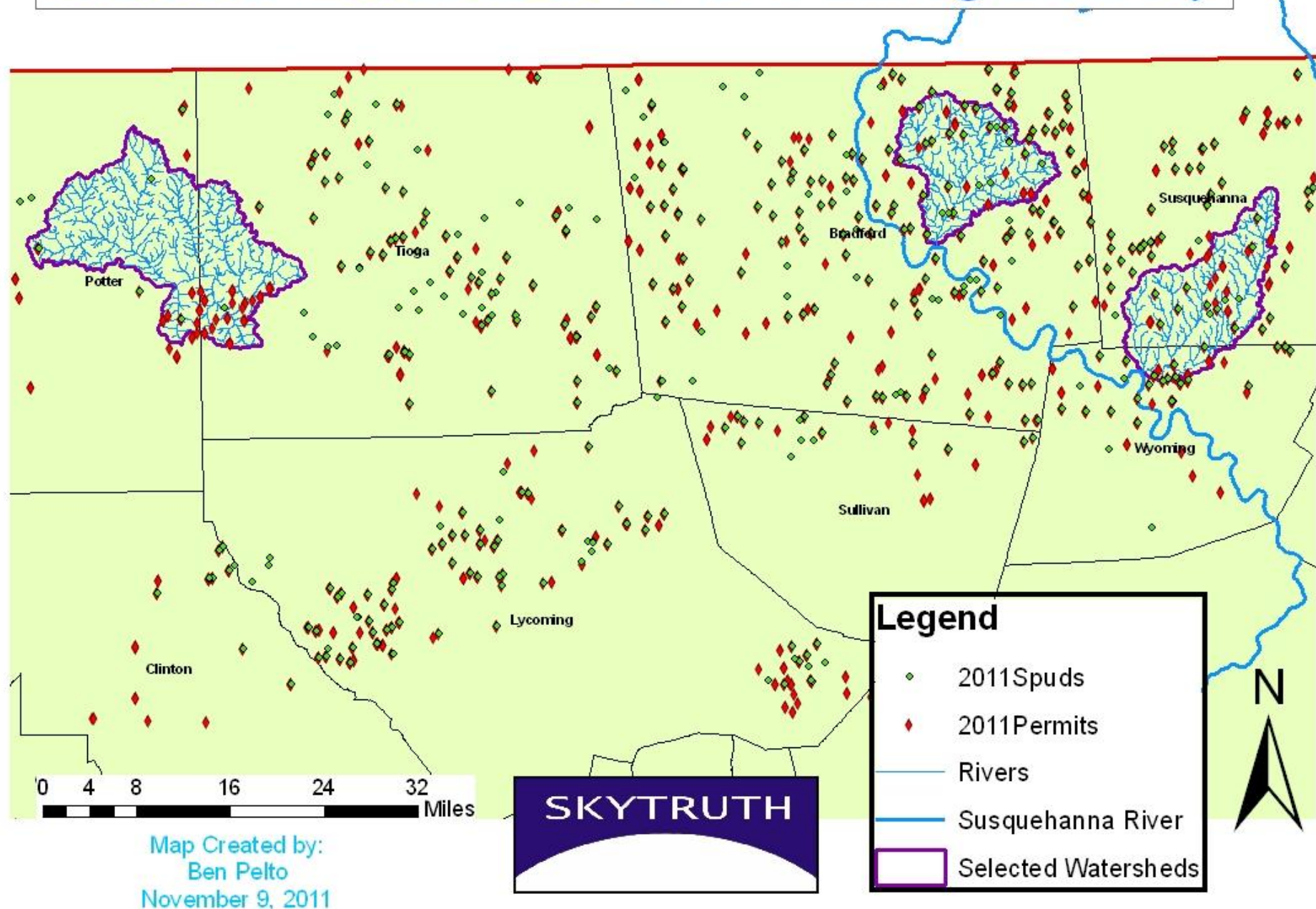
Marcellus Drilling Permits Density USGS Subwatersheds per sq.mi



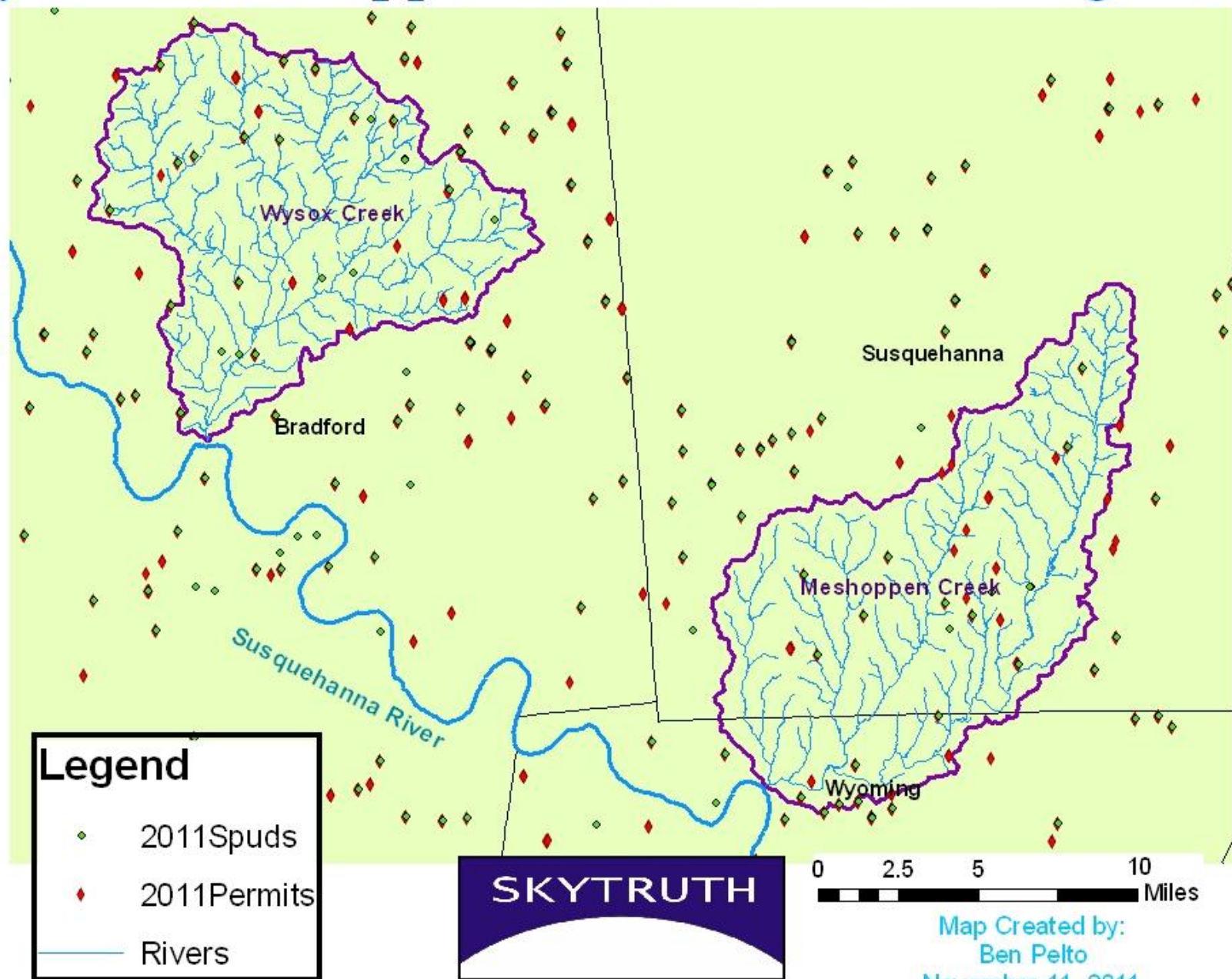
PA Marcellus Drilling Permits Per Sqmi USGS Watersheds-2011 1st Six Months



Selected Watersheds-2011 Drilling Activity



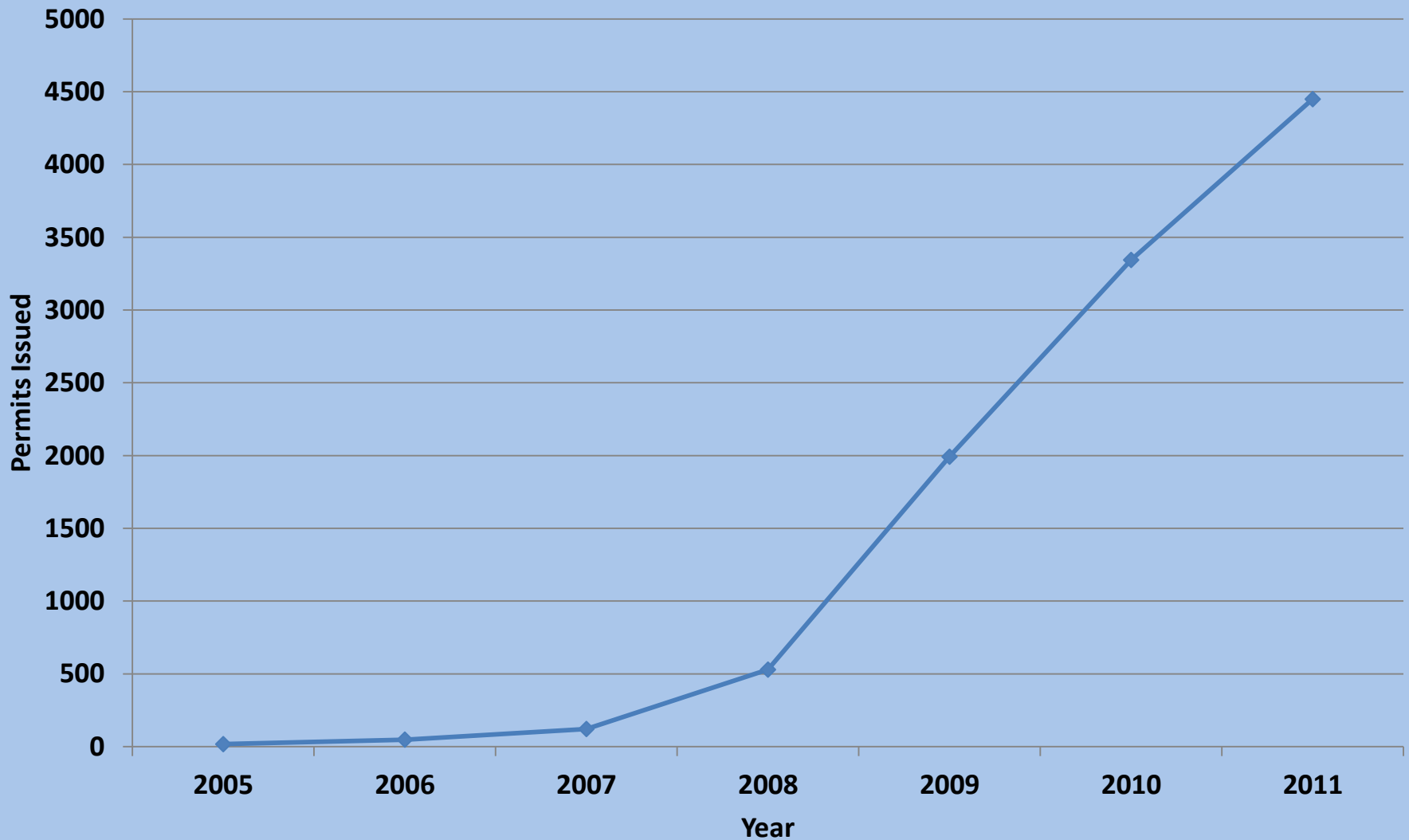
Wysox+Meshoppen Creek-2011 Drilling Activity



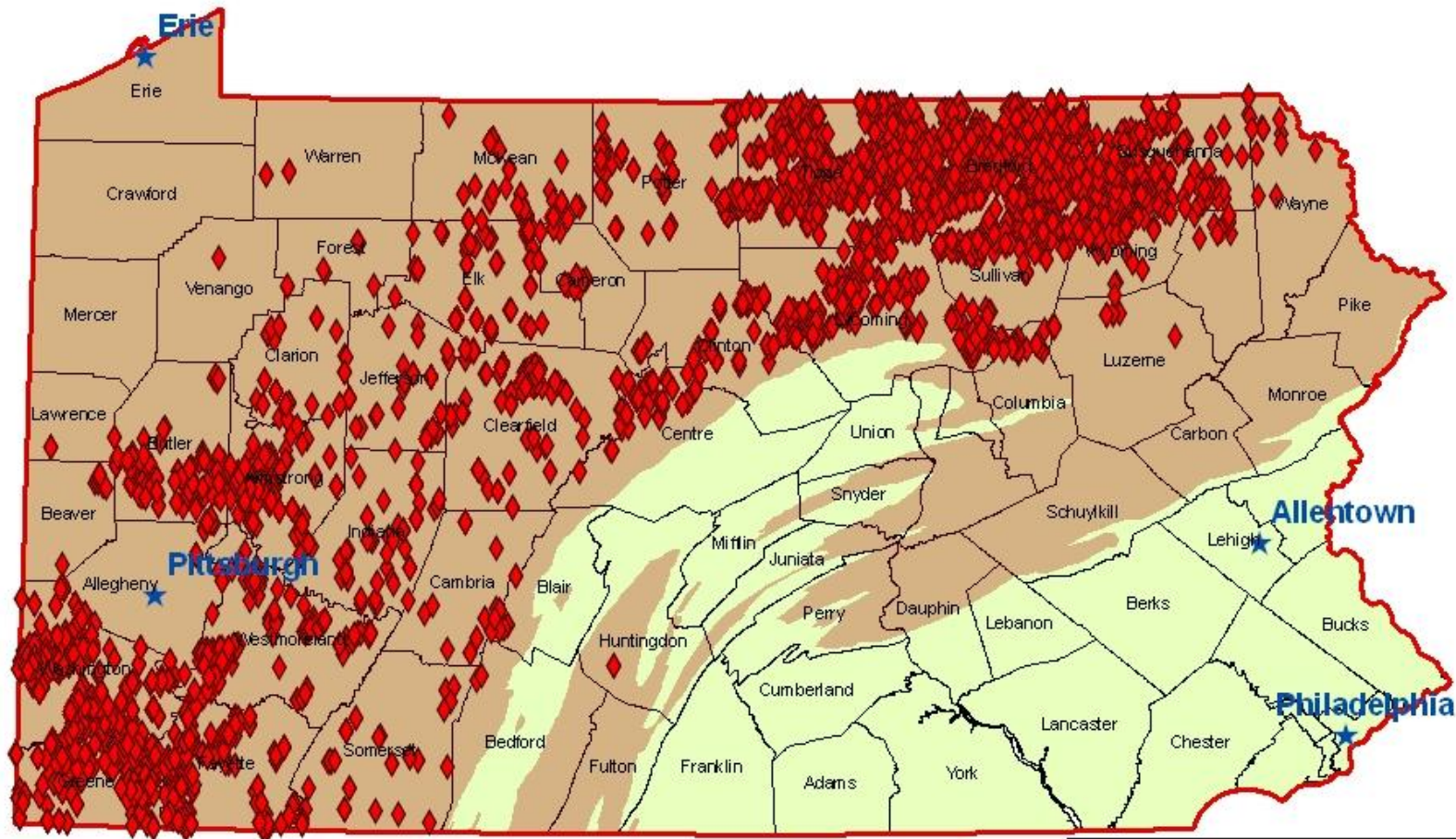
24/7

365

PA Marcellus Shale Drilling Permits per Year



All Time PA Marcellus Drilling Permits To November 2011



0 12.5 25 50 75 100
Miles

Map Created by:
Ben Peltó
November 9, 2011



Legend



Permits



Marcellus Shale

Pipeline



Pipeline



Pipeline



Pipeline Stream



Watershed Protection



Total Drilling Footprint

- Sediment Sources:
 - Pipelines:**89** acres/mi
 - Drilling Pads:**2** to **5** acres
 - Access Roads:**0.5** to **5+** acres
 - Road Improvements

Sediment Load

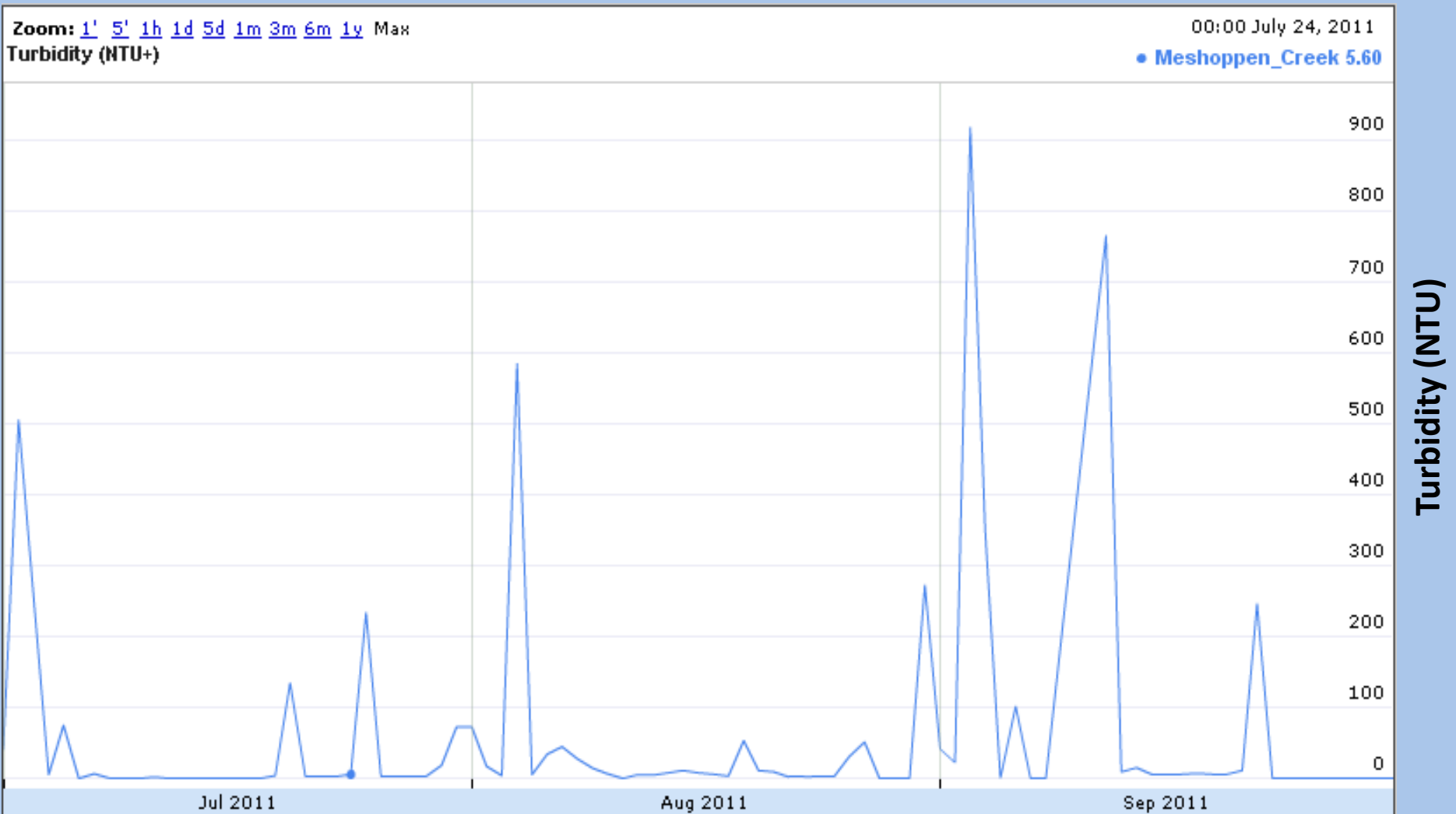


Meshoppen Creek Sediment Load

- Flow of 20cfs/mi²+turbidity of 12NTU = Sediment Load of 0.85kg/sec
- Flow of 20cfs/mi²+turbidity of 50NTU= Sediment Load of 3.8kg/sec

J. J. Packman, K. J., Comings, and D. B. Booth, 1999, Using turbidity to determine total suspended solids in urbanizing streams in the Puget Lowlands: in *Confronting Uncertainty: Managing Change in Water Resources and the Environment*, Canadian Water Resources Association annual meeting, Vancouver, BC, 27–29 October 1999, p. 158–165.

Meshoppen River Turbidity



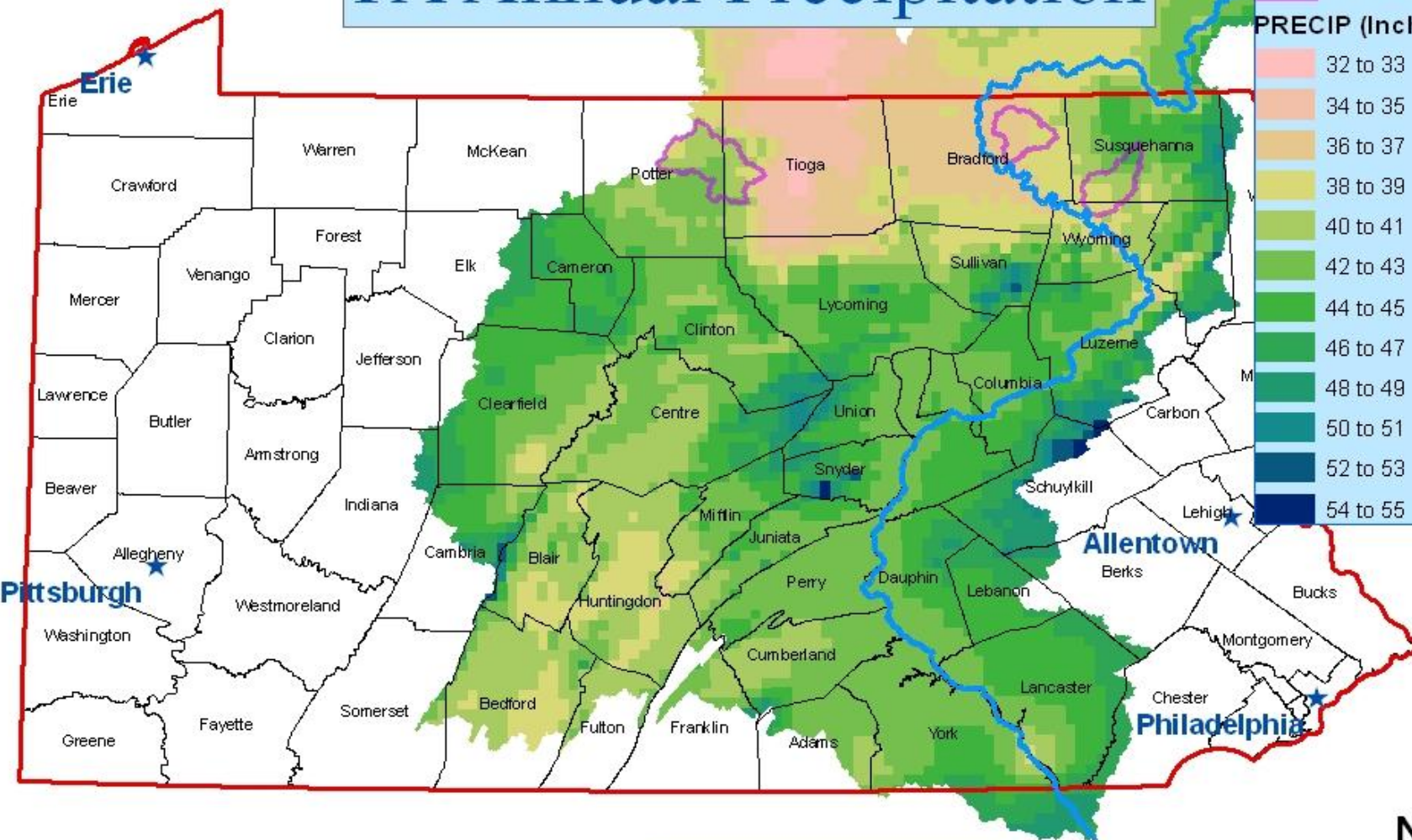
PA Annual Precipitation

Legend

- Susquehanna River
- Selected watersheds

PRECIP (Inches)

- 32 to 33
- 34 to 35
- 36 to 37
- 38 to 39
- 40 to 41
- 42 to 43
- 44 to 45
- 46 to 47
- 48 to 49
- 50 to 51
- 52 to 53
- 54 to 55



0 12.5 25 50 75 100 Miles



Map Created by:
Ben Peltó
October 29 2011





Philadelphia

DELAWARE BAY

★ Washington D.C.

Stafford

CHESAPEAKE BAY

SKYTRUTH

52 mi

GIS Data Sources

- Permit+Spuds: PADEP-Pennsylvania Department of Environmental Protection
<http://www.dep.state.pa.us/dep/deputate/minres/OILGAS/RIG11.htm>
- Watersheds+Streams: USGS-U.S. Geological Survey
<http://viewer.nationalmap.gov/viewer/nhd.html?p=nhd>
- County+State Boundaries: PASDA-Pennsylvania Spatial Data Access
<http://www.pasda.psu.edu/>
- Marcellus Shale: PASDA
- Precipitation: SRBC-Susquehanna River Basin Commission
<http://srbc.net/atlas/bwmg.asp>