Coordinated Monitoring Efforts in Shale-Gas Plays

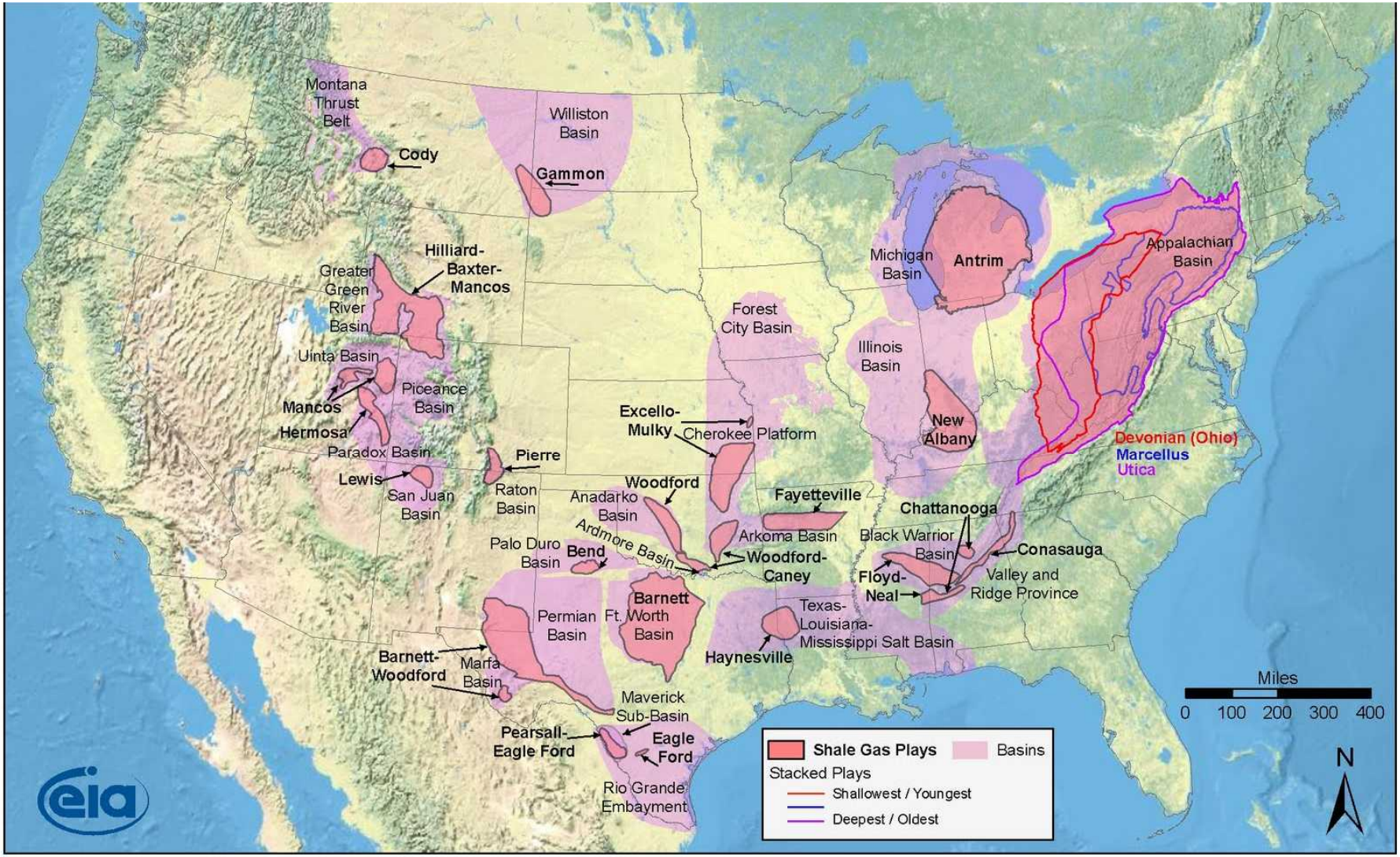
Katie Tomsho & Julie Vastine
Alliance for Aquatic Resource Monitoring
NWQMC 2012

ALLARM Background

Empower communities with scientific tools to monitor, protect, and restore PA streams.

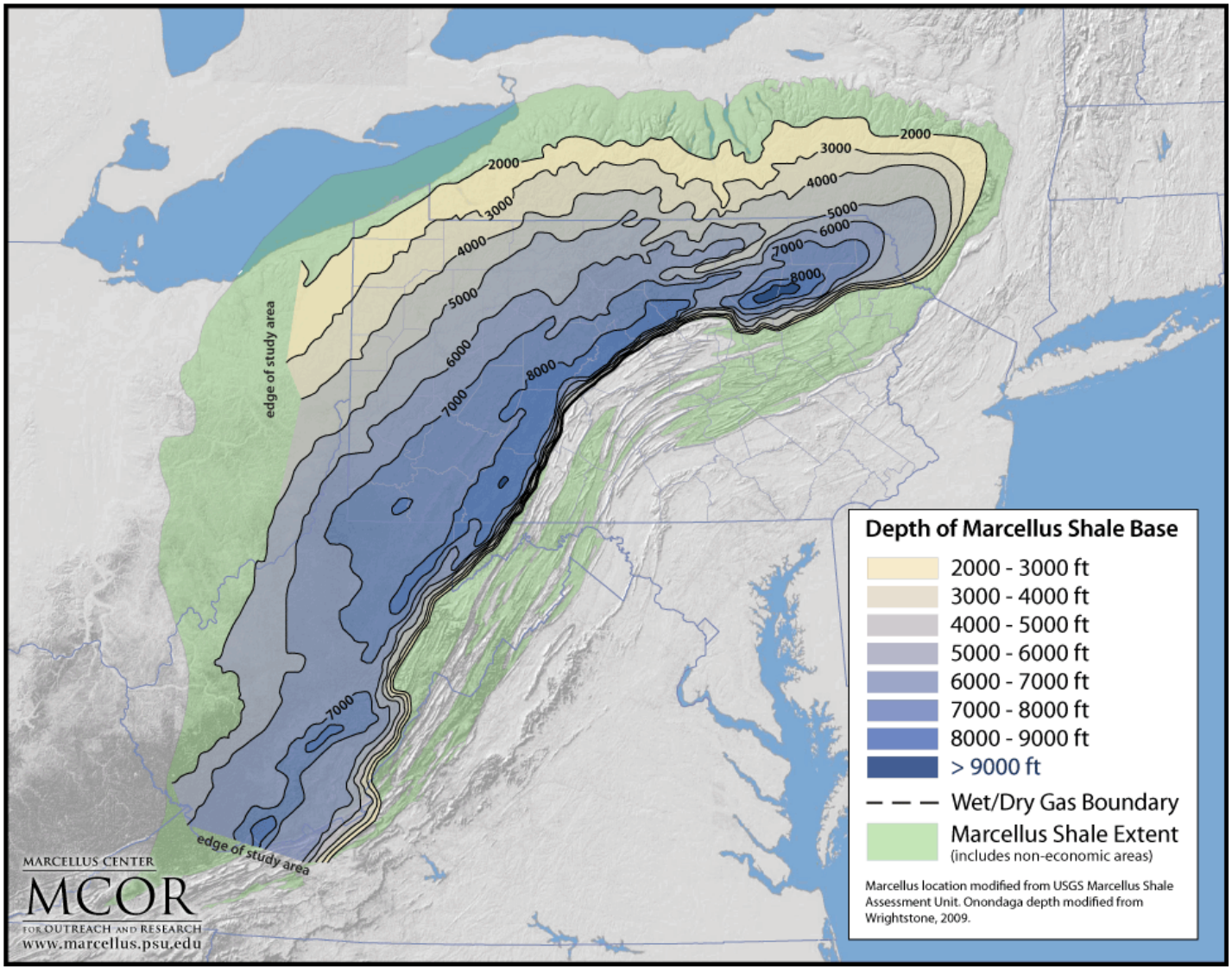
Educate. Engage. Empower.

Shale Gas Plays

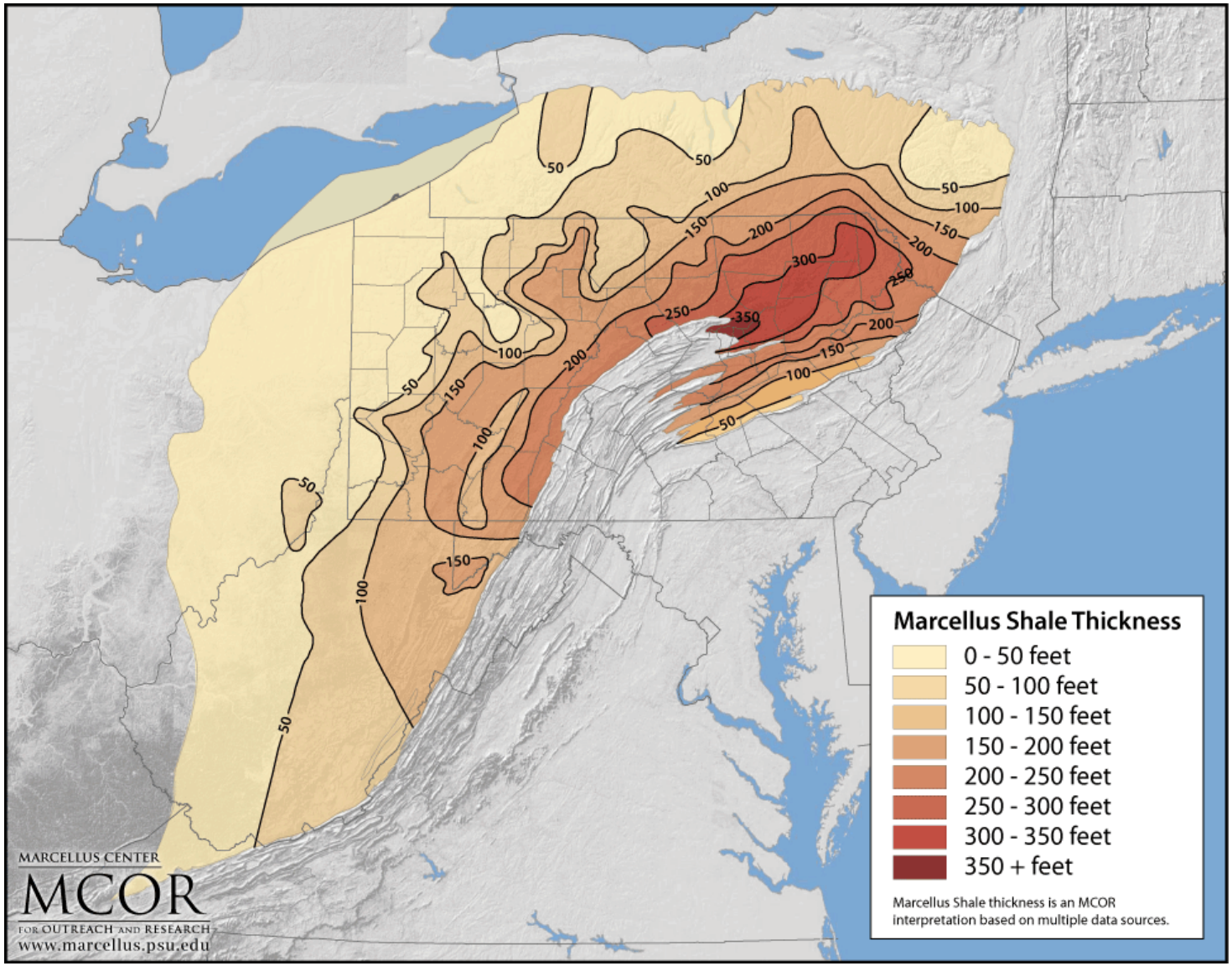


Source: Energy Information Administration based on data from various published studies
Updated: May 28, 2009

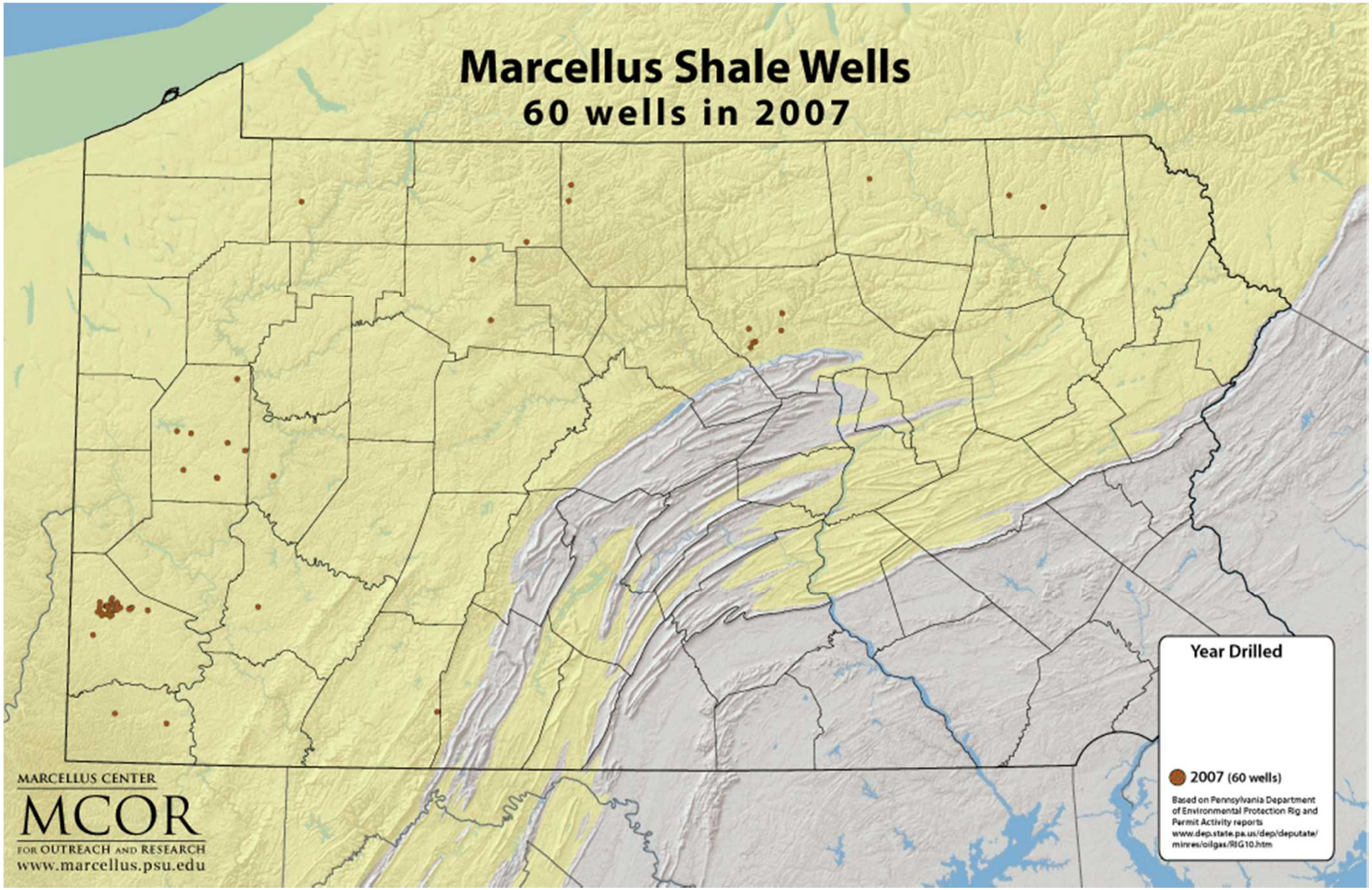
Depth to Marcellus Shale



Thickness of Marcellus Shale



Marcellus Wells in PA



ALLARM's Marcellus Monitoring Story

- Clean Water Campaign -2008
- First phone calls & initial research – fall 2009
- Spent 6 months in 2010 developing manual
- First workshops – summer 2010
- 31 workshops, 700 volunteers

Marcellus Monitoring

A. Citizen surveillance
B. Baseline monitoring
C. Continuous monitoring

Great network of partners



What to Monitor?

1. **Chemical Monitoring:**

   Indicator chemicals
   - Conductivity -> TDS

   Signature chemicals
   - Barium
   - Strontium
   - Exploring others

2. **Visual Assessment:**

   Land disturbances
   Spills and discharges
   Gas migration/leakages
   Illegal dumping

3. **Water Quantity Monitoring:**

   Relationship to conductivity

Why TDS & Conductivity?

- Frack water mixes with natural brine, found in the shale
- Flowback water contains high concentrations of salts and metals

Picture by Amy Bergdale, US EPA

Flowback Water Concentrations

TDS: 70,000 mg/L

TDS: 211,000 mg/L

TDS: 132,000 mg/L

TDS: 217,000 mg/L

Source: Amy Bergdale, USEPA

Partners, Partners, Partners

Agencies

- EPA – Region 3
- PADEP
- Susquehanna River Basin Commission
- MD-DNR
- NWQMC

Implementation

- Trout Unlimited
- Mountain Watershed Association
- PA Assoc. Sustainable Ag
- Sierra Club
- Allegheny College
- WRI- Mon River Quest
- Delaware Riverkeeper Network

Local

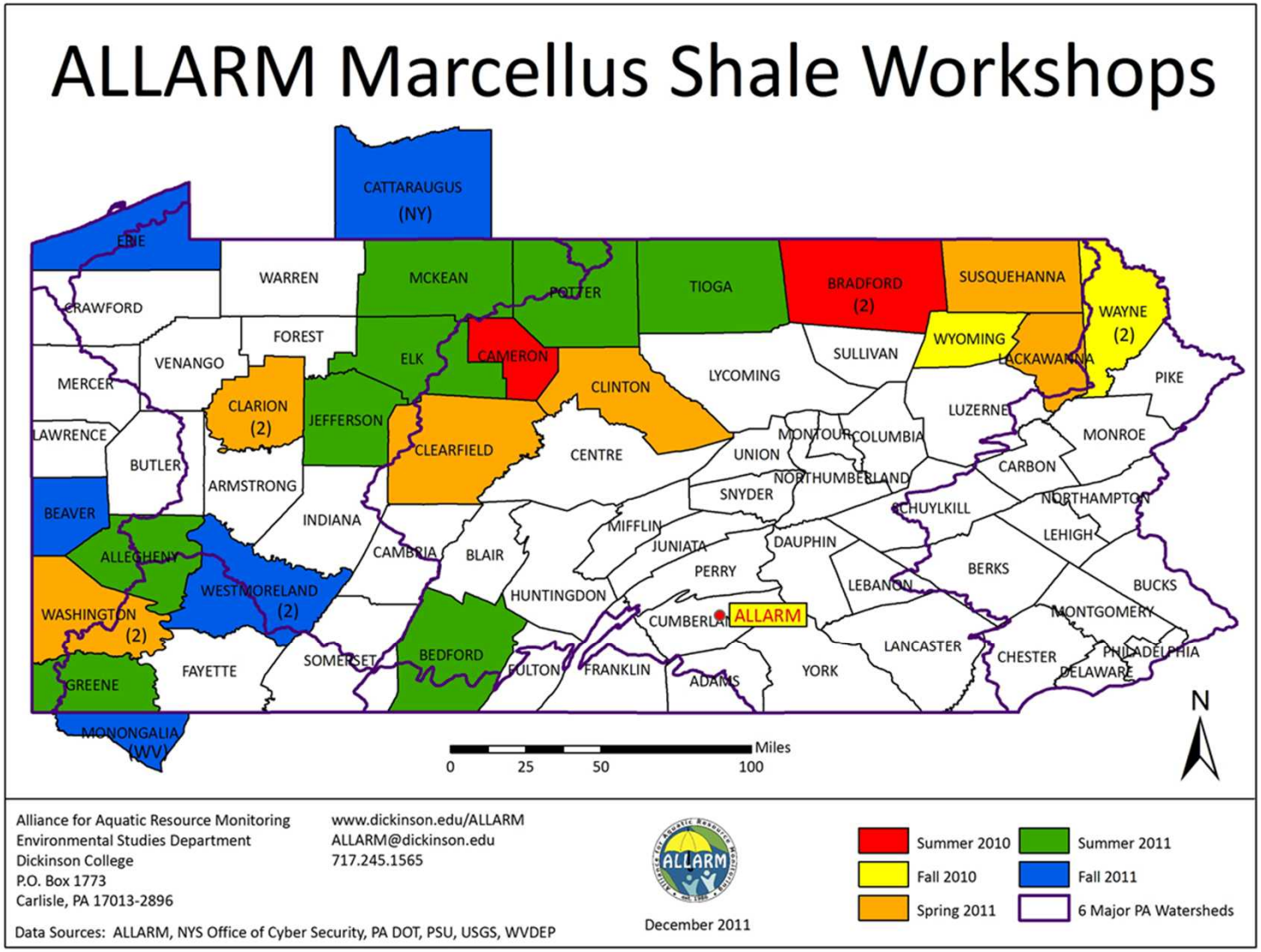
- Watershed Groups
- Community Groups
- Fracking Groups
- Individuals
- Over 60 shale-gas partners

County Conservation Districts

The Boom

- 2010 – 5 workshops, 3 conferences
- 2011 – 23 workshops, 3 webinars
- 2012 – 3 winter workshops, booked 12 summer in January

So Far…


ALLARM Marcellus Shale Workshops
CATTARAUGUS (NY)
ERIE
WARREN
MCKEAN
POTTER
TIOGA
BRADFORD (2)
SUSQUEHANNA
WAYNE (2)
CRAWFORD
FOREST
WYOMING
LACKAWANNA
VENANGO
ELK
CAMERON
SULLIVAN
MERCER
CLARION (2)
JEFFERSON
CLINTON
LYCOMING
PIKE
LUZERNE
LAWRENCE
CLEARFIELD
CENTRE
MONTOUR
COLUMBIA
MONROE
BUTLER
UNION
CARBON
ARMSTRONG
NORTHUMBERLAND
SNYDER
BEAVER
INDIANA
SCHUYLKILL
NORTHAMPTON
MIFFLIN
LEHIGH
ALLEGHENY
CAMBRIA
BLAIR
JUNIATA
DAUPHIN
PERRY
BERKS
WESTMORELAND (2)
LEBANON
BUCKS
WASHINGTON (2)
HUNTINGDON
CUMBERLAND
ALLARM
MONTGOMERY
LANCASTER
SOMERSET
BEDFORD
CHESTER
PHILADELPHIA
FAYETTE
FULTON
FRANKLIN
ADAMS
YORK
DELAWARE
GREENE
MONONGALIA (WV)
N
Miles
0
25
50
100
Alliance for Aquatic Resource Monitoring
Environmental Studies Department
Dickinson College
P.O. Box 1773
Carlisle, PA 17013-2896
www.dickinson.edu/ALLARM
ALLARM@dickinson.edu
717.245.1565
Data Sources: ALLARM, NYS Office of Cyber Security, PA DOT, PSU, USGS, WVDEP
December 2011
Summer 2010
Summer 2011
Fall 2010
Fall 2011
Spring 2011
6 Major PA Watersheds

Building a Monitoring Constituency

- ALLARM – 700 volunteers
- Movement - 1500 volunteers trained since the start of 2010
- ALLARM, DRN, MWA, Mon River Quest, PACTU, PASA, Sierra Club & Waterdogs

Questions?

Alliance for Aquatic Resource Monitoring (ALLARM)
Dickinson College
P.O. Box 1773
Carlisle, PA 17013
717.245.1565
allarm@dickinson.edu
www.dickinson.edu/allarm
http://blogs.dickinson.edu/marcellusmonitoring/

Differences in Drilling

Traditional Hydrofracking	High Volume Hydrofracking (HVHF)
• In traditional hydrofracking, typically 20,000 to 80,000 gallons of fluid were used each time a well was hydrofractured.	• HVHF uses between 2 and 10 million gallons of fluid (on average 5.6 million), the exact amount depends upon the length of the well bore and the number of fractures created along the lateral extent.
• Traditional hydrofracking used 700 to 2,800 lbs. of chemical additives	• HVHF uses between 205,000 and 935,000 lbs. of chemical additives, per well many of which are toxic to humans and wildlife.
• 1940s	• Late 1990s

Quality Assurance/Quality Control

Considerations: What is feasible for volunteers?

Standard QA/QC Practices:

- Training requirements
- Care/calibration of equipment
- Replicates
- Documentation of procedures
- Split sample analysis