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Farm Foundation Forum

Natural Gas Extraction: Impacts on Rural America

NYS Water Resources Institute

04/03/13

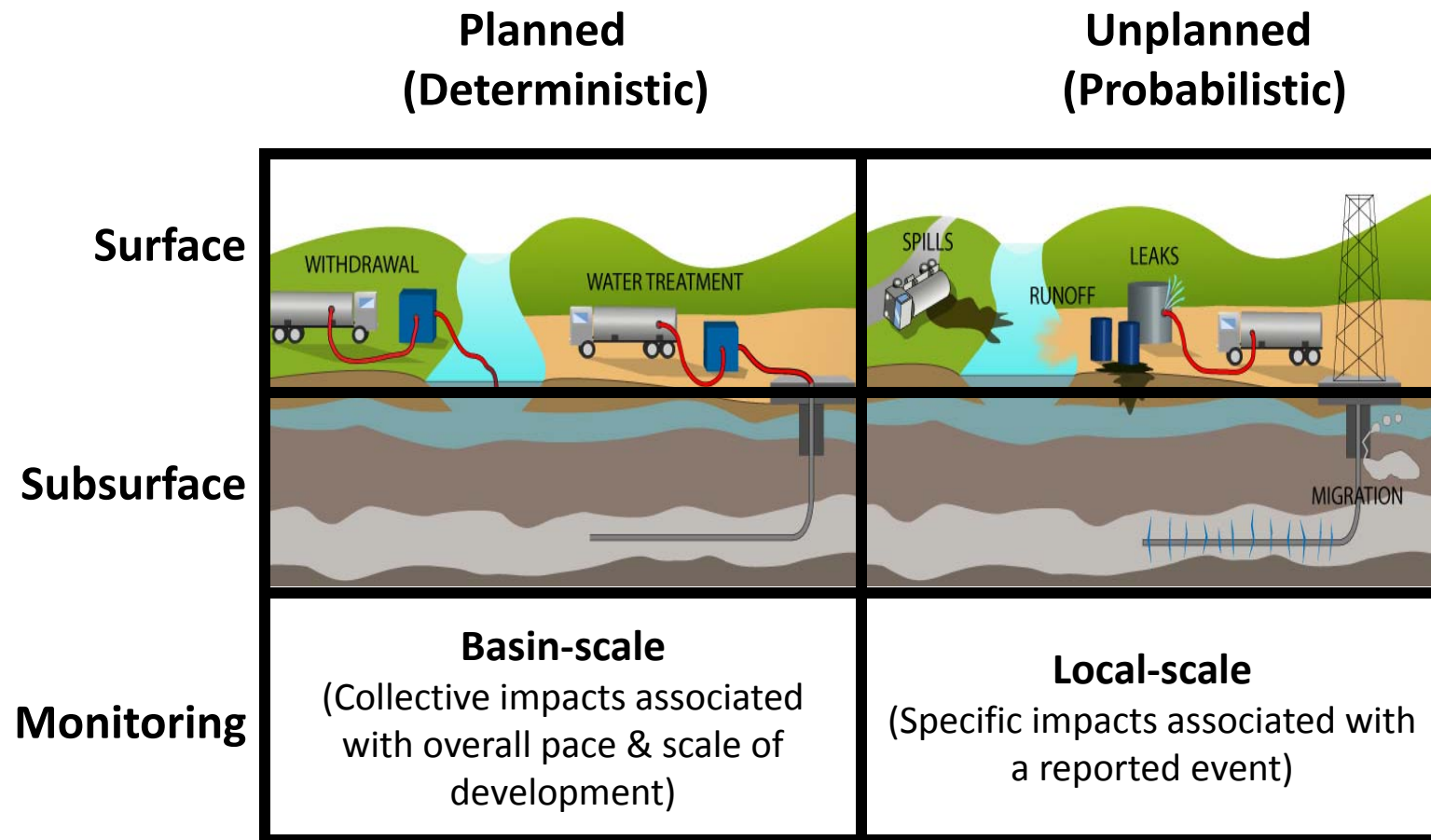


Conclusions... from a different talk

- Scientists/engineers need to explain complexity, not present a “side”
- Energy literacy required for smooth(er) shifts toward more sustainable practices & energy sources
- Everything is a “trade-off” and no, it is not simple
- Understanding of science, policy, economics can help in planning for and mitigating impacts
- Positive outcomes require multi-level regulation, industry best practice, regional awareness & municipal preparedness



Water Resource Events Framework





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Water Withdrawal Policy



Ecosystem Flow Recommendations for the Susquehanna River Basin

Report to the Susquehanna River Basin Commission and U.S. Army Corps of Engineers

ENVIRONMENTAL SCIENCE & POLICY 17 (2012) 12–23



Available online at www.sciencedirect.com

SciVerse ScienceDirect

journal homepage: www.elsevier.com/locate/envsci



Toward strategic management of shale gas development: Regional, collective impacts on water resources

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SUSQUEHANNA RIVER BASIN COMMISSION

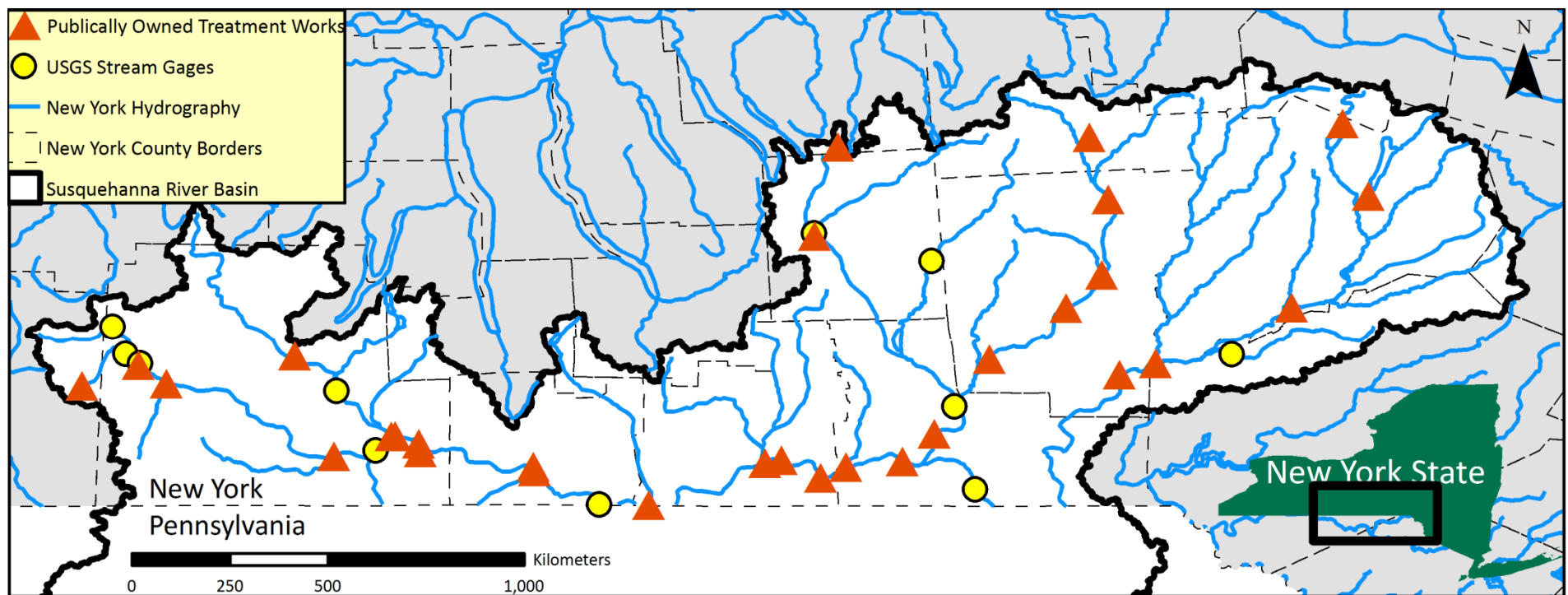
REGULATION OF PROJECTS



18 CFR PARTS 801, 806, 807 AND 808

This document contains excerpts from Title 18 of the Code of Federal Regulations and, as such, does not constitute the official published regulations of the Commission. Those interested in the official regulations are directed to the Code of Federal Regulations. This document reflects final rulemaking actions of the Commission taken through December 15, 2011, effective April 1, 2012.

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website: <http://www.srbcm.net>



Rahm, et al., 2012. Toward strategic management of shale gas development: Regional, collective impacts on water resources: *Environmental Science & Policy*



Water Withdrawal Policy



Cornell Daily Sun

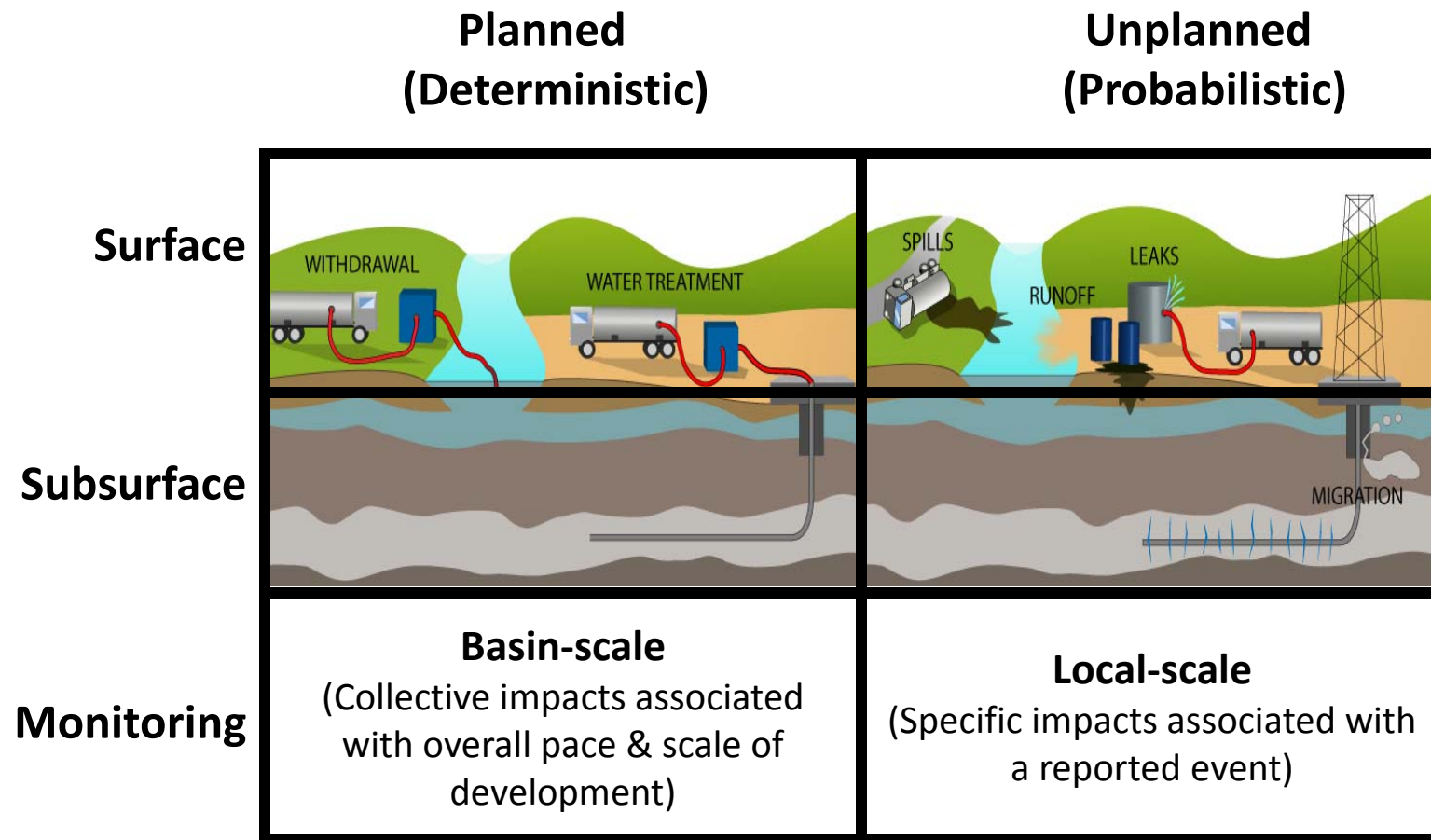


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- Large rivers not significantly impacted
- Small streams more sensitive (seasonal flow variation); require close oversight
- Large rivers well gaged; Small streams no
- **Prohibition of withdrawals based on stream size could be environmentally protective while minimizing cost of oversight and utilizing existing monitoring networks**

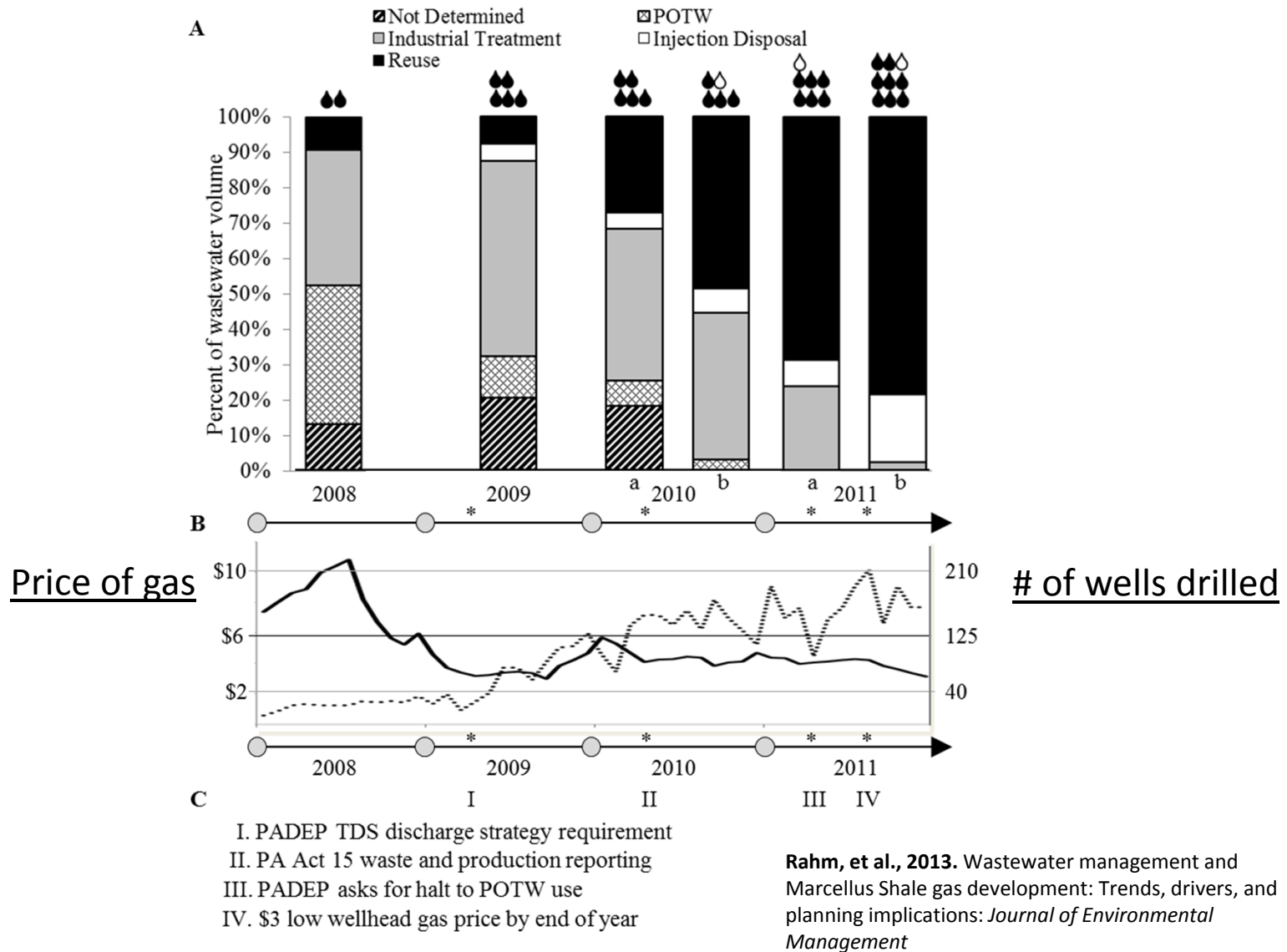


Water Resource Events Framework





Waste Disposal Methods 2008-2011: Trends & Drivers





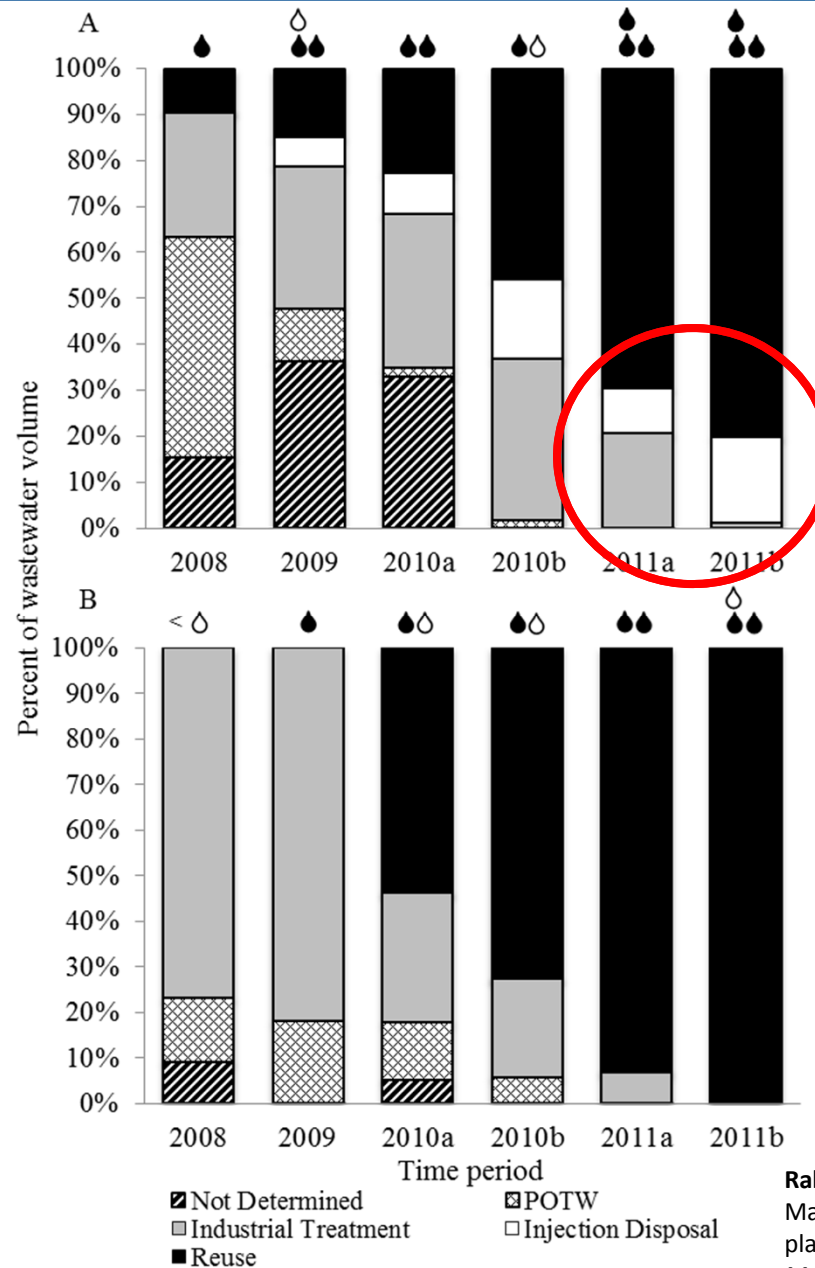
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SOUTHWEST

(Greene, Washington, Fayette)



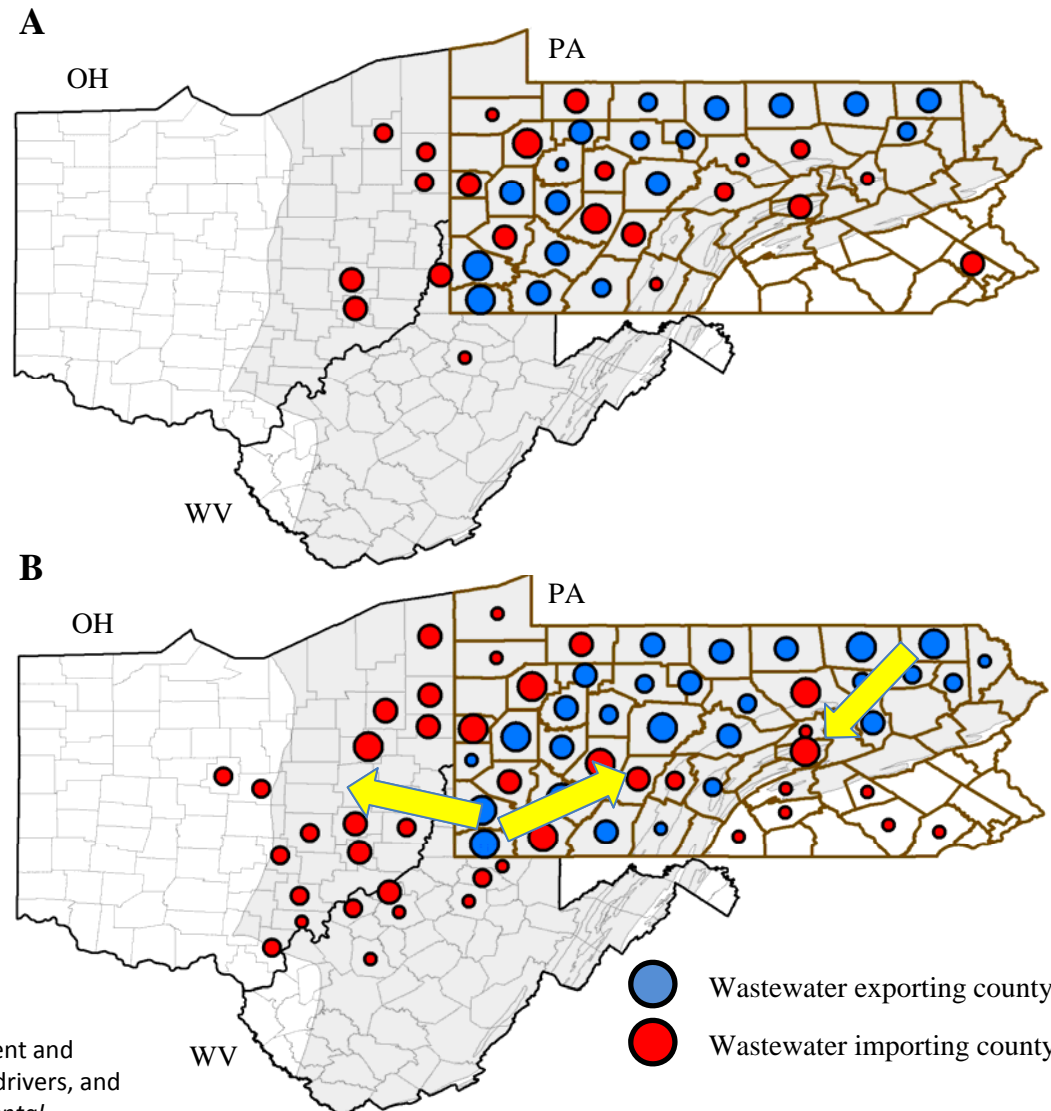
NORTHEAST

(Tioga, Bradford, Susquehanna)

Rahm, et al., 2013. Wastewater management and Marcellus Shale gas development: Trends, drivers, and planning implications: *Journal of Environmental Management*



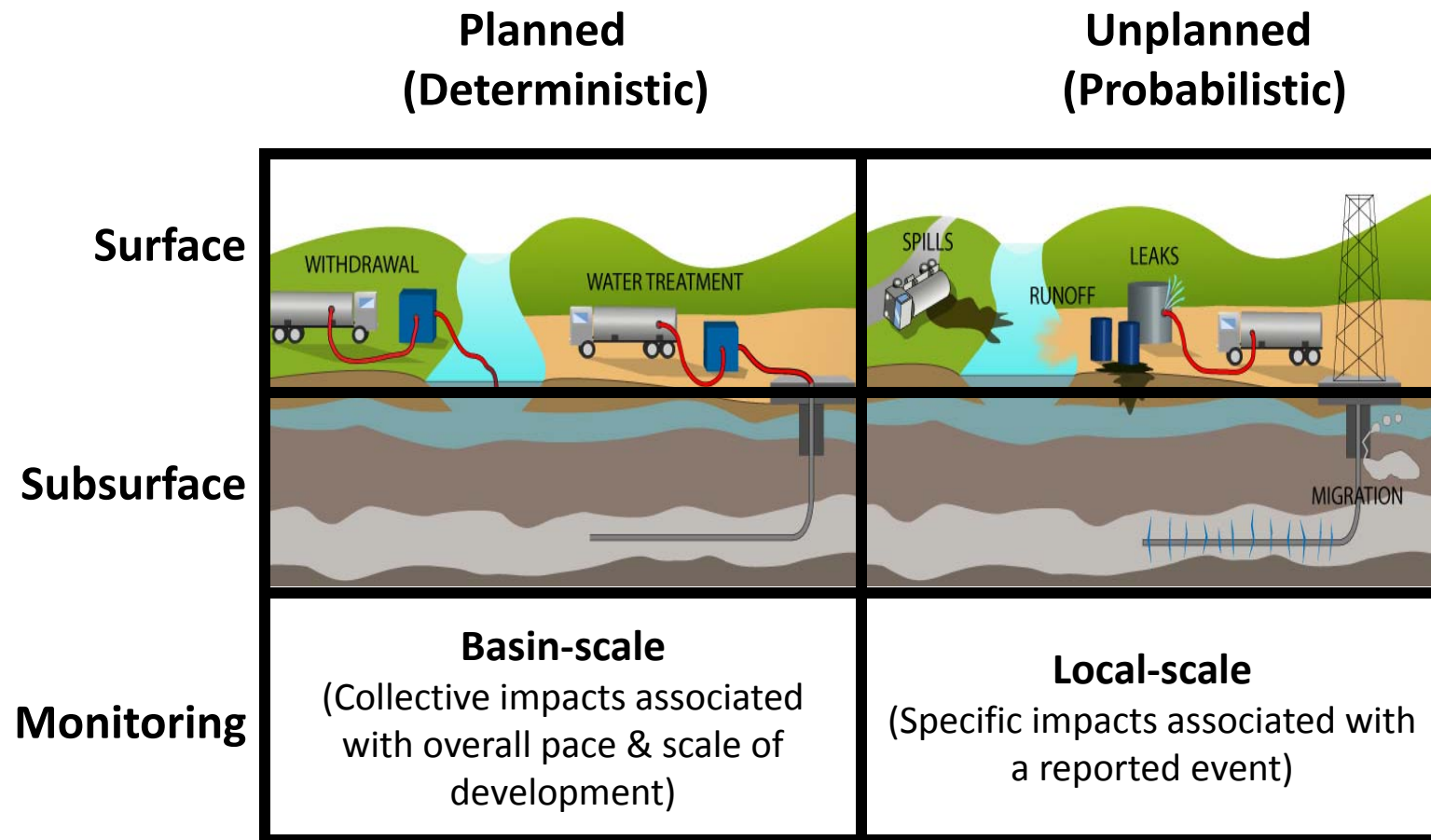
Marcellus Waste Transport



Rahm, et al., 2013. Wastewater management and Marcellus Shale gas development: Trends, drivers, and planning implications: *Journal of Environmental Management*



Water Resource Events Framework



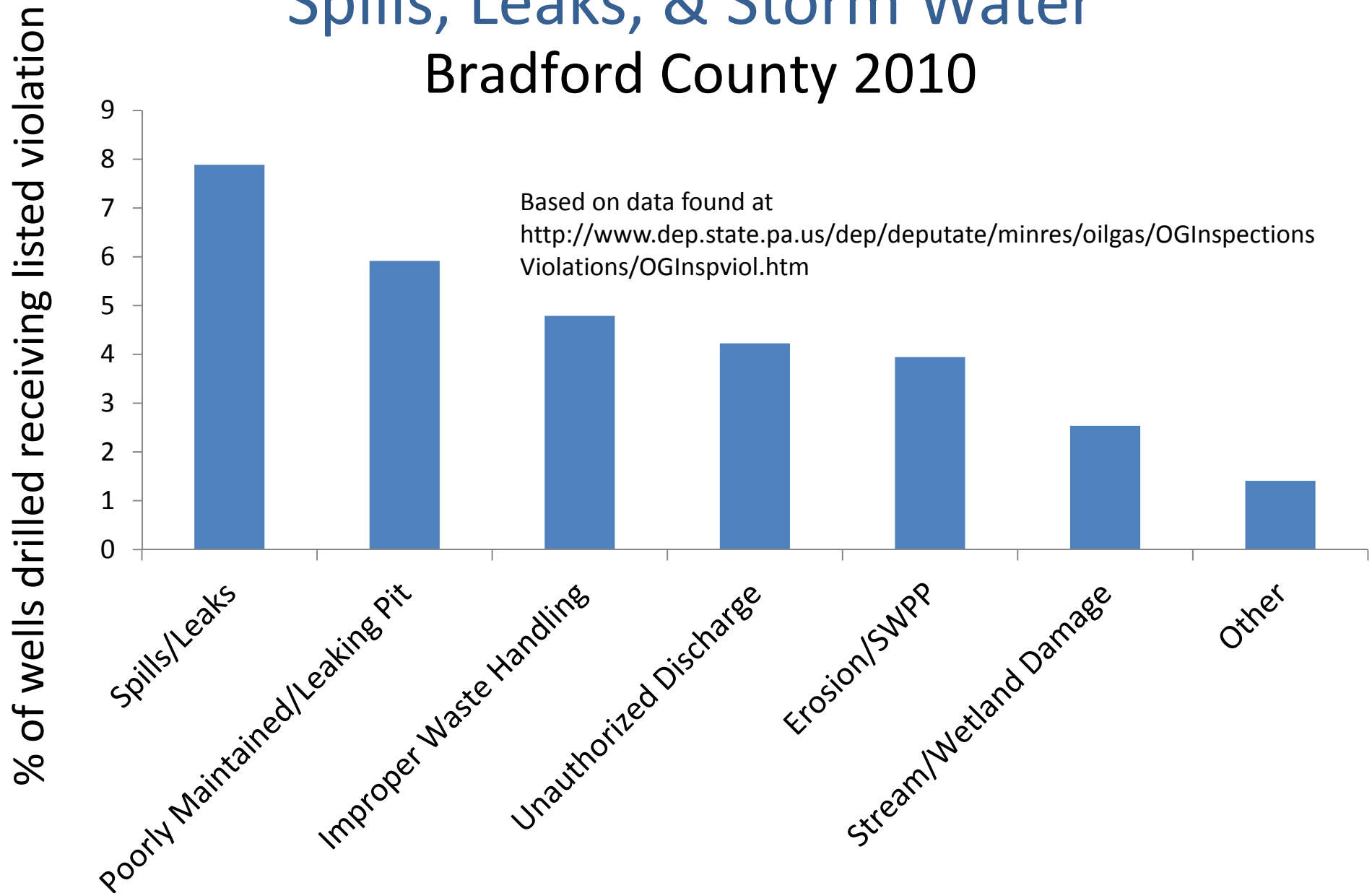


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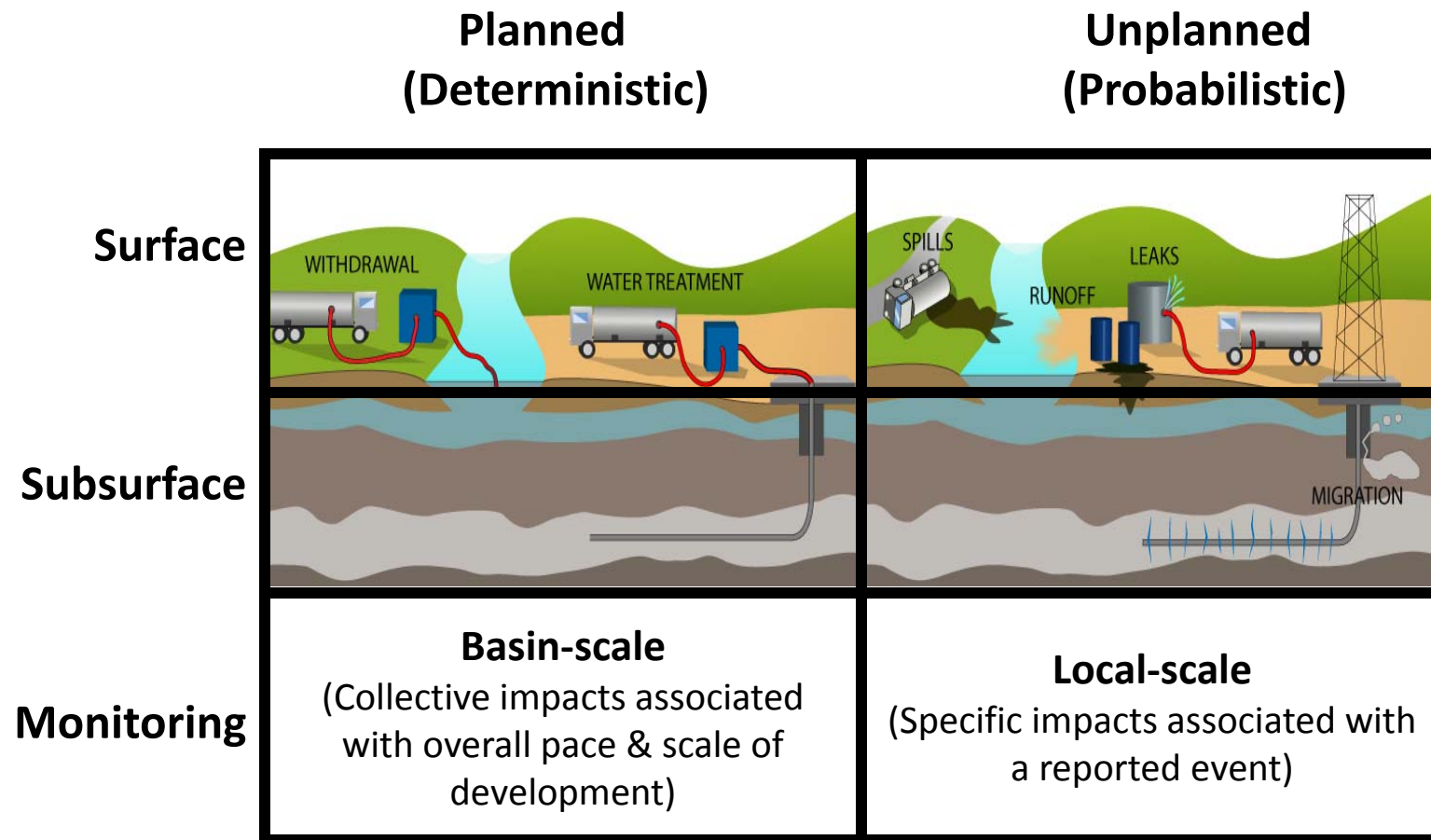


Spills, Leaks, & Storm Water Bradford County 2010





Water Resource Events Framework





Monitoring: unplanned surface or subsurface events using private water well testing - What do you test for?

- Measure
 - Range of parameters
 - Test before (baseline), during, and after drilling activity
- State certified lab
- WRI has posted recommendations on its website



Parameter	Resource			
	WRI	NY DEC	PSU	CSI
Total Dissolved Solids (TDS)	1	1	1	1
pH	1	1	1	1
Barium	1	1	1	2
Methane	2	3	1	2
Hardness	2	2	2	1
Surfactants	2	2	2	2
Total Suspended Solids (TSS)	2	2	2	2
Strontium	2	2	2	
Alkalinity	2	3 *	2	2
Gross alpha	2	3 **	3	2

Partial table taken from the WRI website <http://wri.eas.cornell.edu/>



Recent studies of interest... just a few examples:

THE IMPACT OF MARCELLUS GAS DRILLING ON RURAL DRINKING WATER SUPPLIES

- Pre-existing water quality issues are common
- Our limited study found no statistically significant changes from hydraulic fracturing – additional analyses ongoing
- 12 to 17% of water supply owners perceived changes
- Voluntary landowner actions to protect water resources are recommended including water testing and leasing stipulations



Final report available at: <http://www.rural.palegislature.us>



Recent studies of interest... just a few examples:

- USGS – Baseline groundwater quality in national park units within the Marcellus and Utica (*USGS Open-File Report*)
- RFF – Shale gas development impacts on surface water quality in PA (*PNAS*)
- McBroom et al. – Soil erosion & surface water quality impacts of natural gas development in East Texas (*Water*)
- USGS – Shallow groundwater quality and geochemistry in the Fayetteville (*USGS Investigation*)
- Lutz et al. – Generation, transport and disposal of wastewater associated with Marcellus Shale gas development (*WRR*)
- **WRI maintains an annotated bibliography, as do many others...**



Some resources for govts.

- SRBC (Water withdrawal and source regs) - <http://www.srbrc.net/>
- NY SGEIS (Comprehensive impact and policy statement) - <http://www.dec.ny.gov/energy/75370.html>
- PaDEP (Production and wastewater reporting) - http://www.portal.state.pa.us/portal/server.pt/community/marcellus_shale/20296
- Oil & gas BMP project - <http://www.oilandgasbmps.org/>
- EFD (research) - <http://www.efdsystems.org/>
- Cornell Coop Ext (info on leases, etc) - <http://cce.cornell.edu/EnergyClimateChange/NaturalGasDev/Pages/default.aspx>
- PSU MCOR - <http://www.marcellus.psu.edu/>
- Best practices in energy transitions conf agenda - <http://thesciencebeneaththesurface.wordpress.com/2013/02/22/best-practices-in-marcellus-shale-education-conference/>
- RFF - http://www.rff.org/centers/energy_economics_and_policy/Pages/Shale_Gas.aspx
- Many, many more



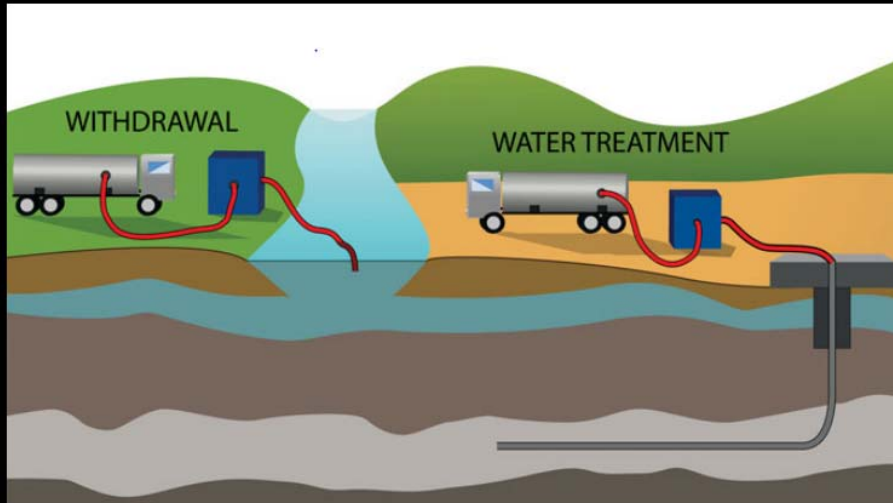
What it means for rural America

- Find some help/source of good information
- Plan ahead
- There will be both positive and negative impacts, and this varies by person, region, shale play, over time, etc...
- There are many good policies out there, but it is a matter of execution, enforcement, adaptive management over time

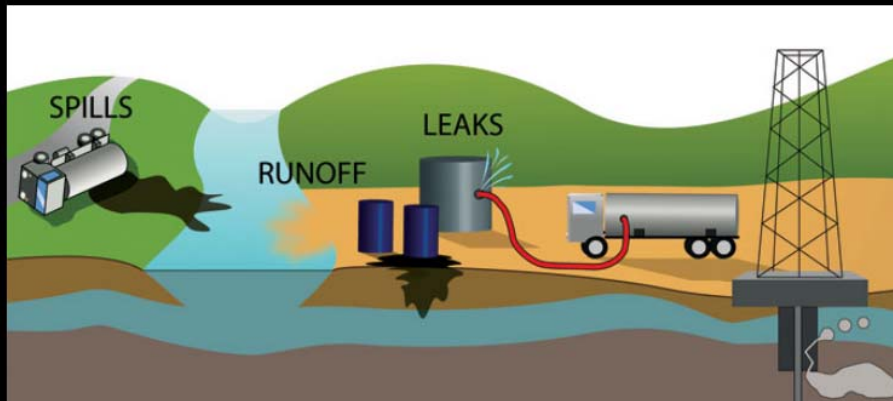
GAS WELLS

A Framework for Assessing Water Resource Impacts from Marcellus Shale Gas Drilling

Planned



Unplanned



Learn More

[Introduction to Marcellus Shale](#)
[Water Withdrawals](#)
[Waste Management](#)
[Runoff From Wellpads](#)
[Impacts on Water During Drilling](#)
[Spills & Leaks at the Surface](#)

Recent Publications

Lessons for NY from EPA
Pavillion Study ([link](#))

Regional, collective impacts on
water resources ([link](#))

Testing Drinking Water ([link](#))

Understanding Isotopes ([link](#))

Framework for Assessing Water
Resource Impacts ([link](#))

Maps

Marcellus thickness, depth ([link](#))

Marcellus extent in NY ([link](#))

Marcellus in Susquehanna Basin
([link](#))

Marcellus in Delaware Basin
([link](#))

NY and Chesapeake Bay ([link](#))

Bibliography

References for understanding
shale gas impacts ([link](#))

wri.eas.cornell.edu

