

Concurrent Development of Multiple Horizons*

Daniel Silber¹

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Abstract

As more shale resources are found to be economically productive, there are opportunities to develop multiple strata in the same vertical column. In addition, conventional development of shallow strata continues within many of these same columns. This presentation will explore the emerging issues operators face when acquiring leases in these environments. For background, we will look at geographic areas where there is both conventional and unconventional development, as well as areas where there is unconventional development of multiple strata. This will include a look at stratigraphic maps for these areas. Next, we will discuss the difference in rental and bonus values when leasing all or part of the column, and the impact on rights of the associated surface area. Then specific lease clauses will be reviewed, with a focus on clauses that affect the operators, but also clauses that affect the owners of the surface, oil and/or gas rights. In some cases, there may be a separate owner for each of these three rights. Lastly, a practical approach to landowners will be discussed, with some tips on what to include and what to avoid.

Reference Cited

Hill, D.G., and T.E. Lombardi, 2002, Fractured Gas Shale Potential in New York: New York State Energy Research and Development Authority, NY, 114 p. Web accessed October 11, 2014.

http://esogis.nysm.nysed.gov/NYSERDA/NYSERDA_Project_5012_Fractured_Gas_Shale_Potential_in_New_York_004Mb.pdf.



Concurrent Development of Multiple Horizons

▲ Daniel Silbert

▲ AAPG 43rd Eastern Section Meeting, London, ON, Canada



Leasing in a Stacked Play

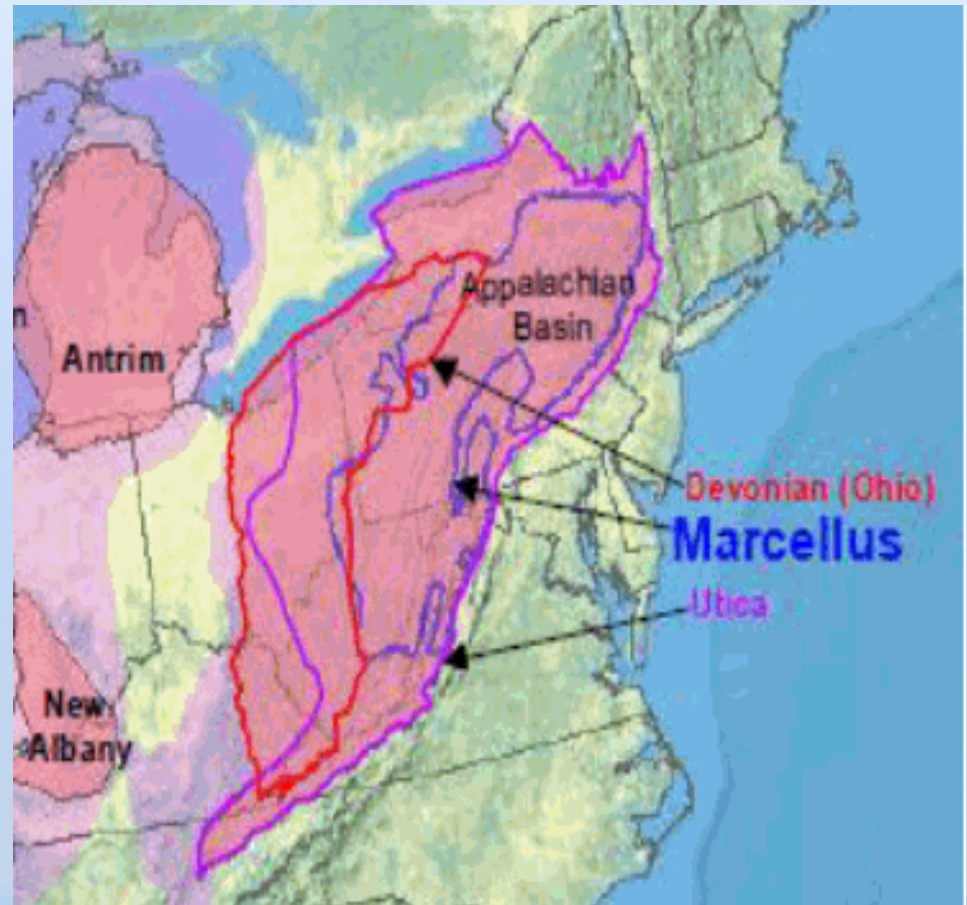
- ▶ New York development
- ▶ Ontario development
- ▶ Bonus Rentals
- ▶ Lease Clauses
- ▶ Compare Ontario and Appalachian Basin

What is a Stacked Play?




What is a Stacked Play?

- Shale Gas Plays
 - Shale Oil Plays
 - Shale Gas and Shale Oil Plays
 - Basins
- Stacked Plays
- Shallowest/ Youngest
 - Deepest/ Oldest




PERIOD		GROUP	UNIT	LITHOLOGY	THICKNESS (feet)	PRODUCTION
PENNSYLVANIAN		Pottsville	Olean	Ss, cgl	75 – 100	
MISSISSIPPIAN		Pocono	Knapp	Ss, cgl	5 – 100	
DEVONIAN	UPPER	Conewango	Riceville	Sh, ss, cgl	70	
		Conneuat	Chadakoin	Sh, ss	700	
		Canadaway	Undiff	Sh, ss	1100 – 1400	Oil, Gas
			Perrysburg-Dunkirk	Sh, ss		Oil, Gas
				Sh		
		West Falls	Java	Sh, ss	365 – 125	Oil, Gas
			Nunda	Sh, ss		
			Rhinestreet	Sh		
	Sonyea	Middlesex	Sh	0 – 400	Gas	
	Genesee	Geneseo	Sh	0 – 450	Gas	
	?		Tully	Ls	0 – 50	Gas
	MIDDLE	Hamilton	Moscow	Sh	200 – 600	
			Ludlowville	Sh		
			Skaneateles	Sh		
			Marcellus	Sh		Gas
	LOWER	Tristates	Onondaga	Ls	30 – 235	Gas, Oil
Oriskany			Ss	0 – 40	Gas	
Manlius			Ls	0 – 10		
Rondout			Dol			
SILURIAN	UPPER	Salina	Akron	Dol	0 – 15	Gas
			Camillus	Sh, gyp	450 – 1850	
			Syracuse	Dol, sh, slt		
			Vernon	Sh		
	LOWER	Lockport	Lockport	Dol	150 – 250	Gas
			Rochester	Sh	125	Gas
			Irondequoit	Ls		
			Clinton	Sodus	Sh	75
		Reynales		Ls		
		Thorold		Ss		
		Medina		Grimsby	Sh, ss	
			Whirlpool	Ss	0 – 25	Gas
UPPER			Queenston	Sh	1100 – 1500	Gas
			Oswego	Ss		
		Lorraine	Sh			
		Utica	Sh	900 – 1000		
MIDDLE	Trenton-Black River	Trenton	Ls	425 – 625	Gas	
		Black River	Ls	225 – 550		
LOWER	Beekmantown	Tribes Hill-Chuctanunda	Ls	0 – 550		
		Little Falls	Dol	0 – 350		
CAMB.	UPPER		Galway	Dol, ss	575 – 1350	Gas
			Potsdam	Ss, dol	75 – 500	Gas
PRECAMBRIAN				Gneiss, marble, quartzite		
(Modified from NYSERDA 1985).						

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			Perrysburg-Dunkirk	Sh, ss		Oil, Gas
				Sh		
		West Falls	Java	Sh, ss	365 – 125	
			Nunda	Sh, ss		Oil, Gas
			Rhinestreet	Sh		
		Sonyea	Middlesex	Sh	0 – 400	Gas
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	MIDDLE	Hamilton	Moscow	Sh	200 – 600	
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		Onondaga	Ls	30 – 235	Gas, Oil	
	LOWER	Tristates	Oriskany	Ss	0 – 40	Gas
		Heldergerg	Manlius	Ls	0 – 10	
			Rondout	Dol		
SILURIAN	UPPER		Akron	Dol	0 – 15	Gas
		Salina	Camillus	Sh, gyp	450 – 1850	
			Syracuse	Dol, sh, slt		
			Vernon	Sh		
		Lockport	Lockport	Dol	150 – 250	Gas
	LOWER	Clinton	Rochester	Sh	125	Gas
			Irondequoit	Ls		
			Sodus	Sh	75	Gas
			Reynales	Ls		
		Thorold	Ss			
		Medina	Grimsby	Sh, ss	75 – 150	Gas
			Whirlpool	Ss	0 – 25	Gas
ORDOVICIAN	UPPER		Queenston	Sh	1100 – 1500	Gas
			Oswego	Ss		
			Lorraine	Sh		
			Utica	Sh	900 – 1000	
	MIDDLE	Trenton-Black River	Trenton	Ls	425 – 625	Gas
			Black River	Ls	225 – 550	
	LOWER	Beekmantown	Tribes Hill-Chuctanunda	Ls	0 – 550	
CAMB.	UPPER		Little Falls	Dol	0 – 350	
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				Vernon	Sh		
		Lockport		Lockport	Dol	150 – 250	Gas
				Rochester	Sh	125	Gas
	LOWER	Clinton		Irondequoit	Ls	75	
				Sodus	Sh		Gas
				Reynales	Ls		
				Thorold	Ss		
		Medina		Grimsby	Sh, ss	75 – 150	Gas
				Whirlpool	Ss	0 – 25	Gas
				Queenston	Sh	1100 – 1500	Gas
UPPER		Oswego	Ss				
		Lorraine	Sh				
		Utica	Sh	900 – 1000			
ORDOVICIAN	MIDDLE	Trenton-Black River		Trenton	Ls	425 – 625	Gas
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	Irondequoit		Ls			
	Medina		Sodus	Sh	75	Gas
			Reynales	Ls		
			Thorold	Ss		
			Grimsby	Sh, ss		75 – 150
	ORDOVICIAN	UPPER		Whirlpool	Ss	0 – 25
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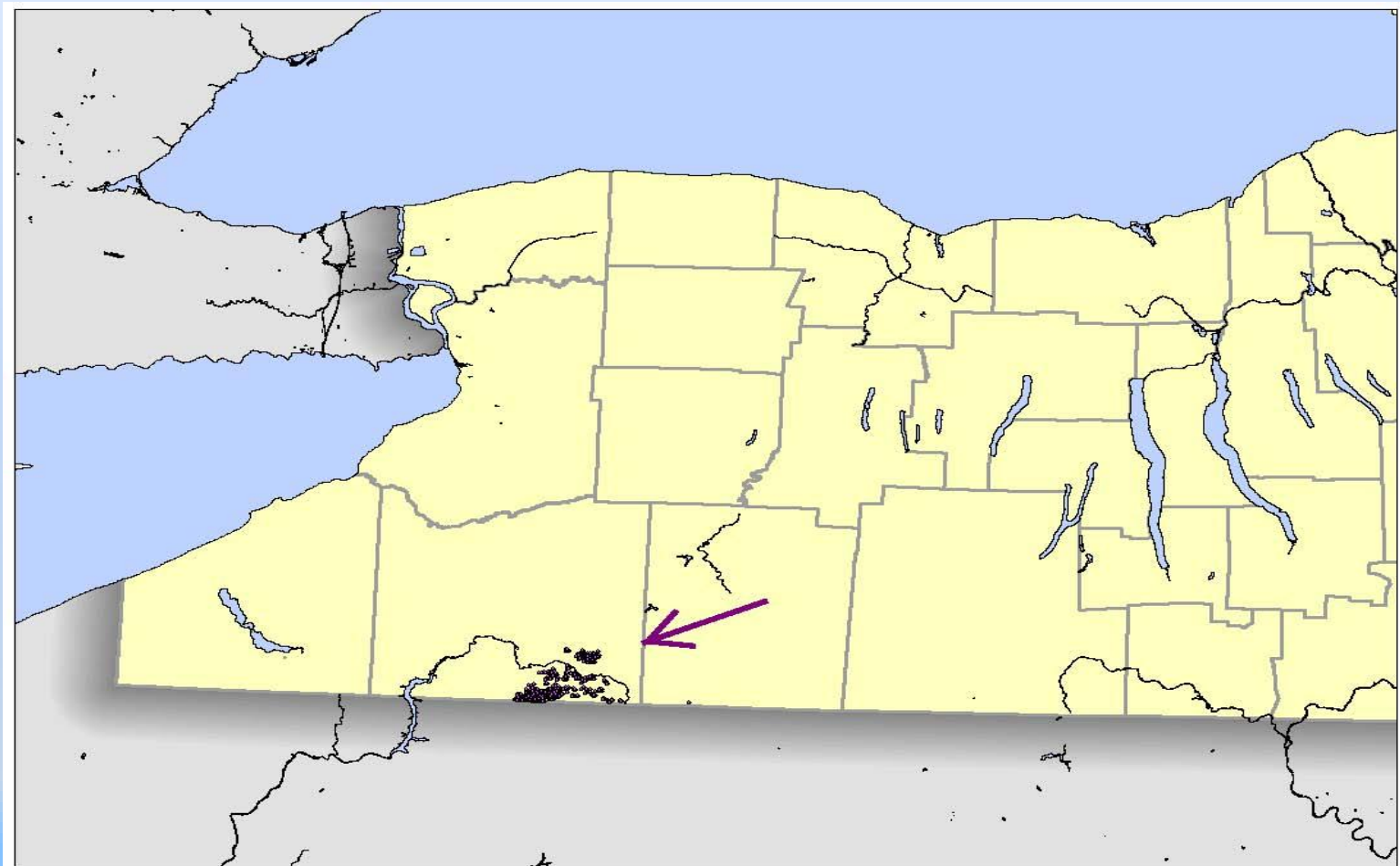
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	Thorold		Ss			
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		Conneuat			700	
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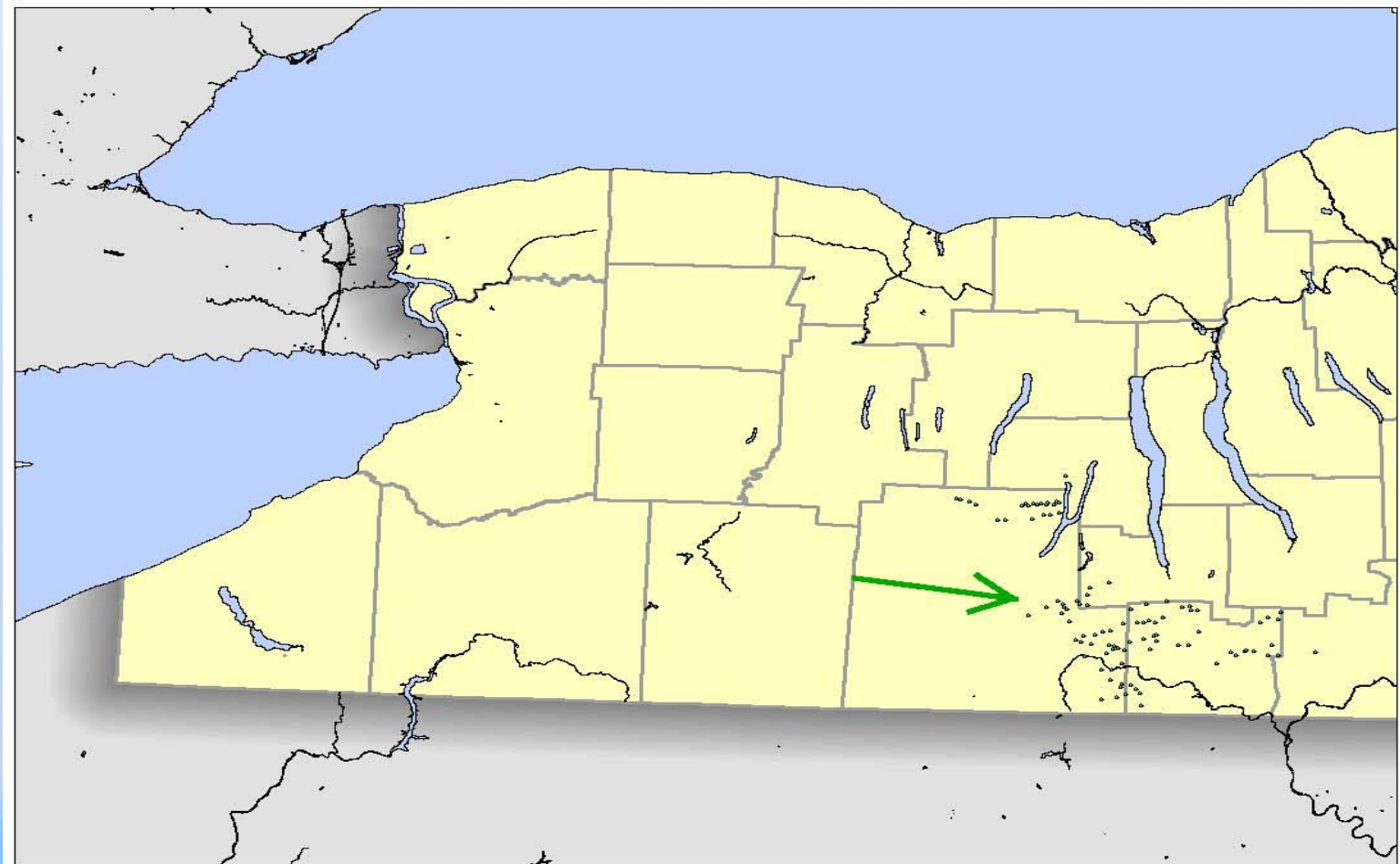
Location

Bradford Sands



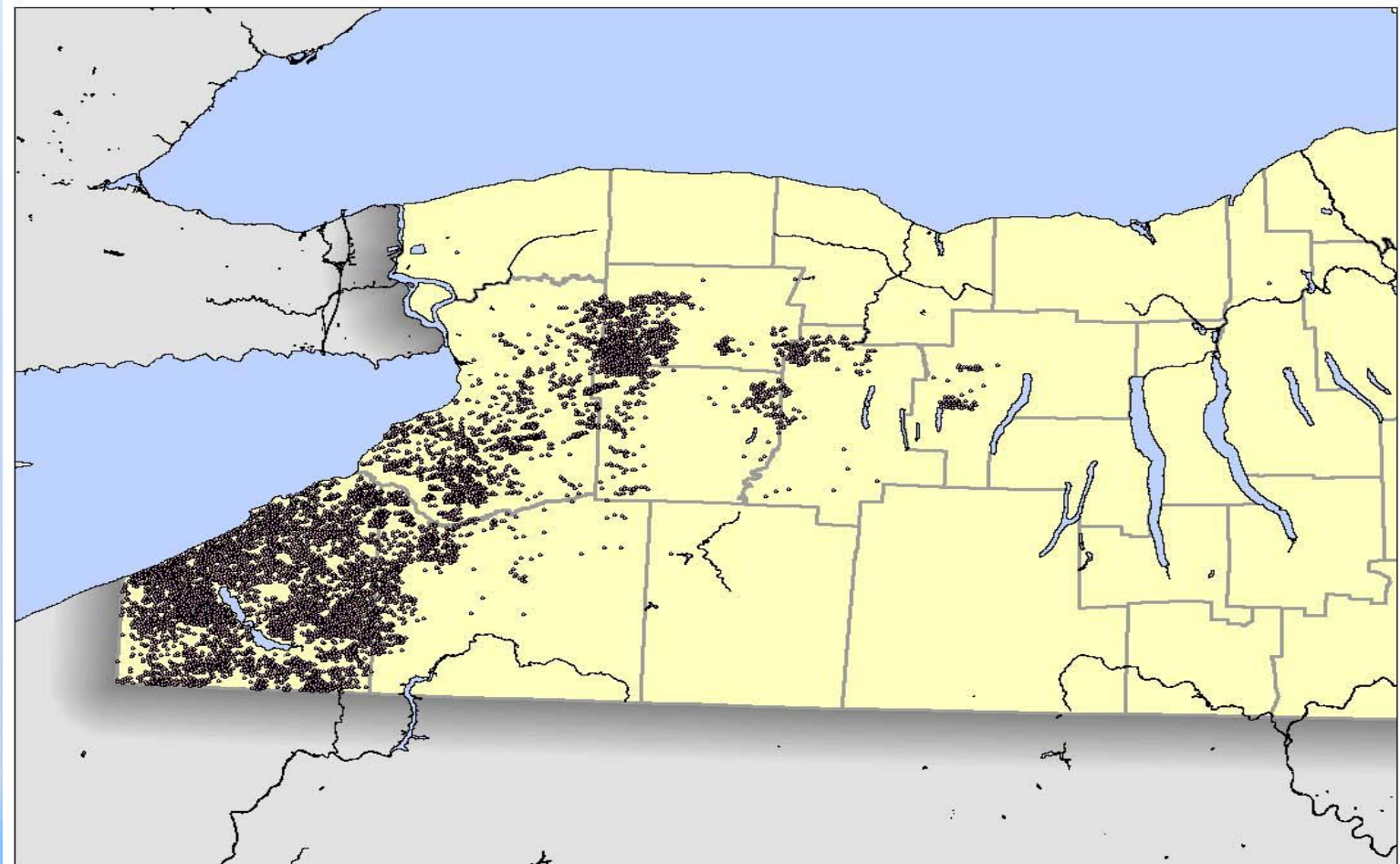
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Trenton-Black River



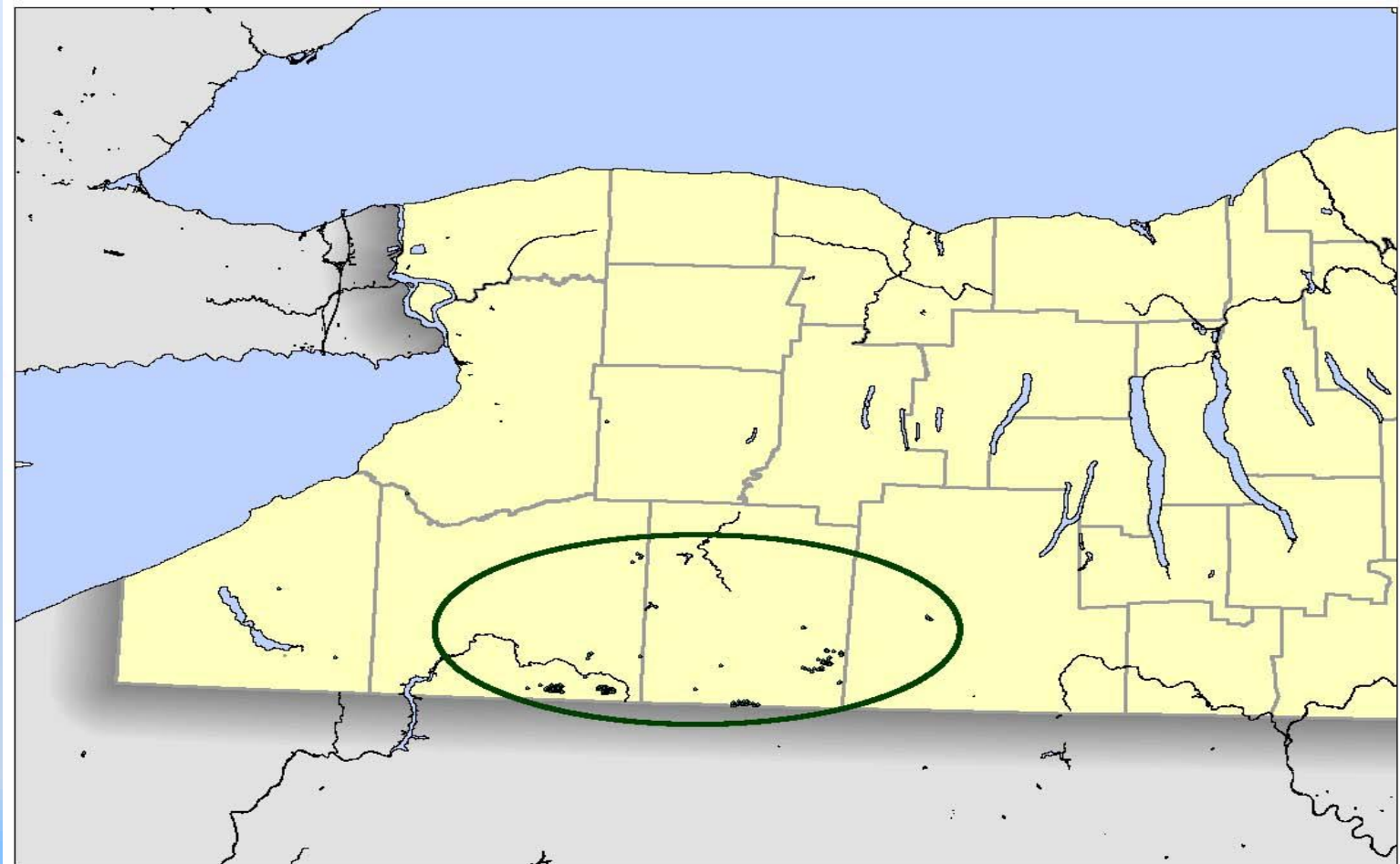
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Medina

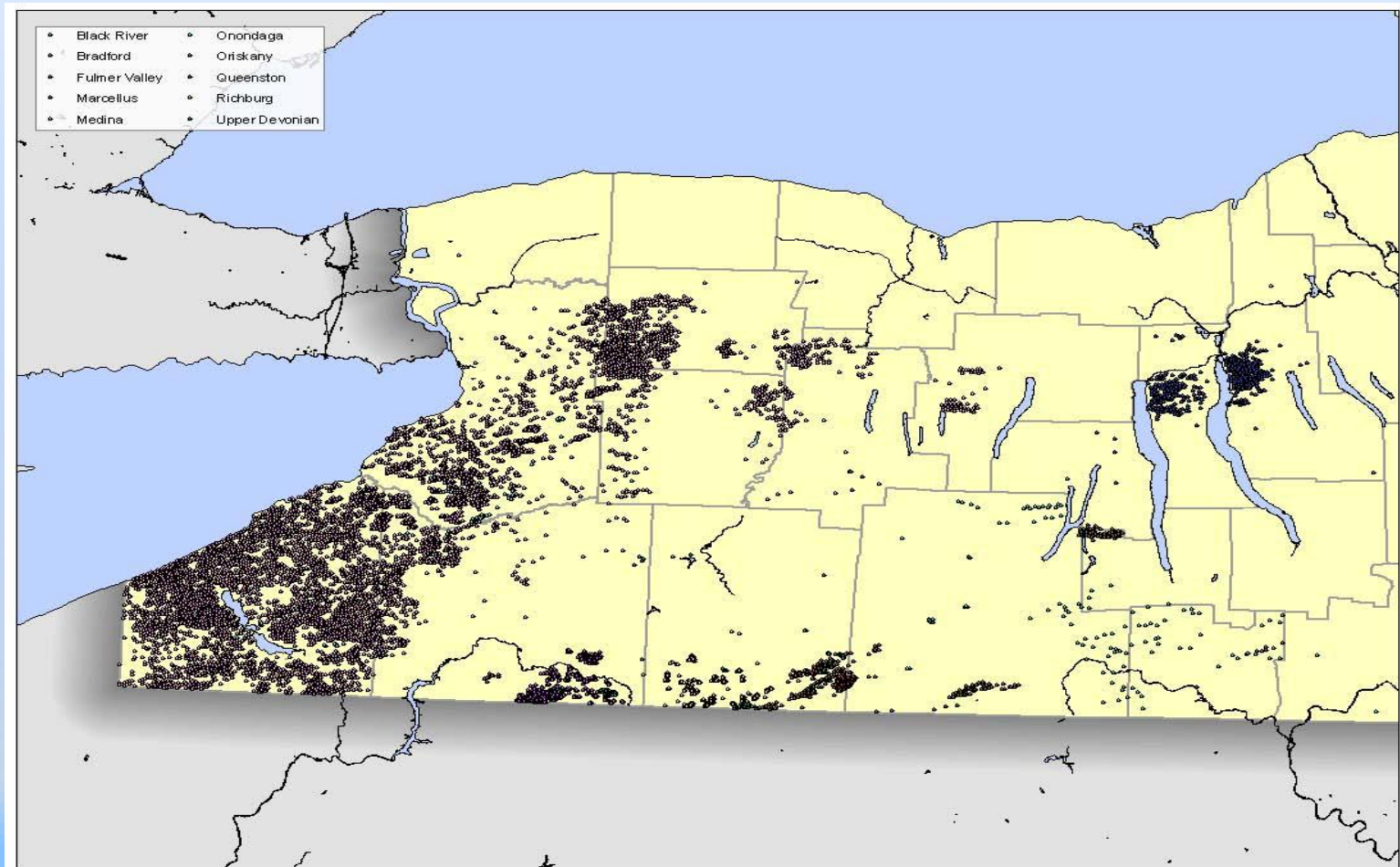


Location

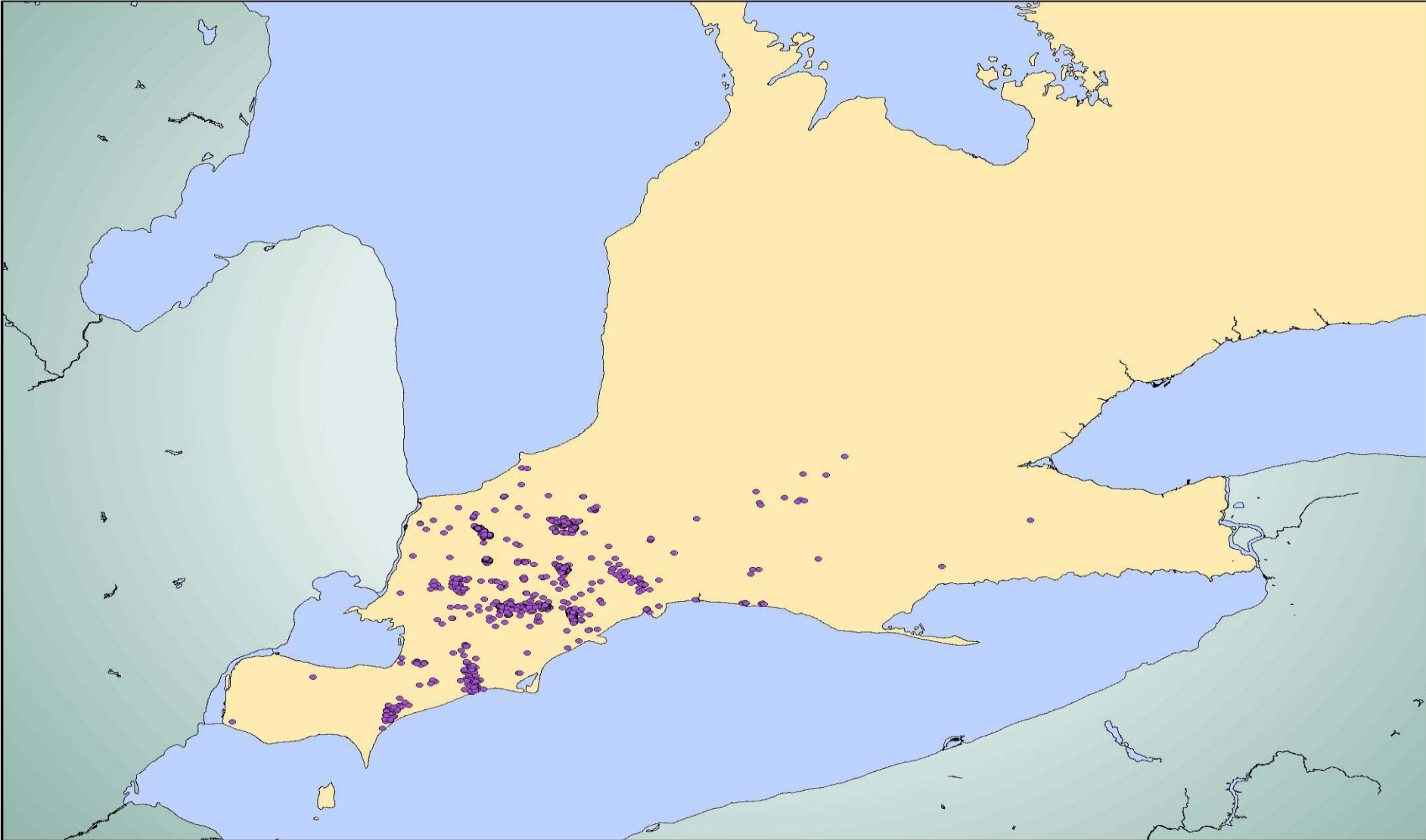
“Upper Devonian”



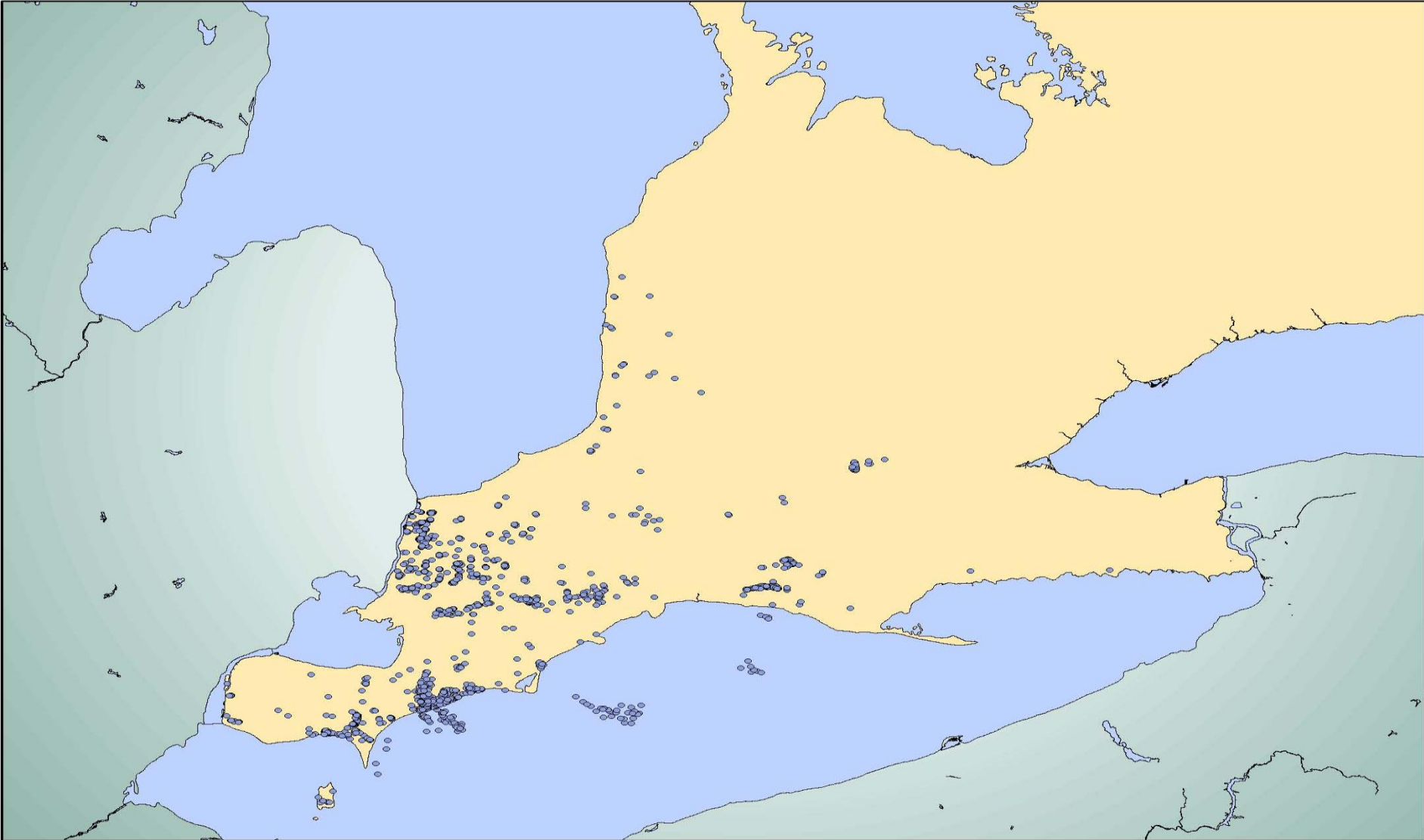
Location Compilation



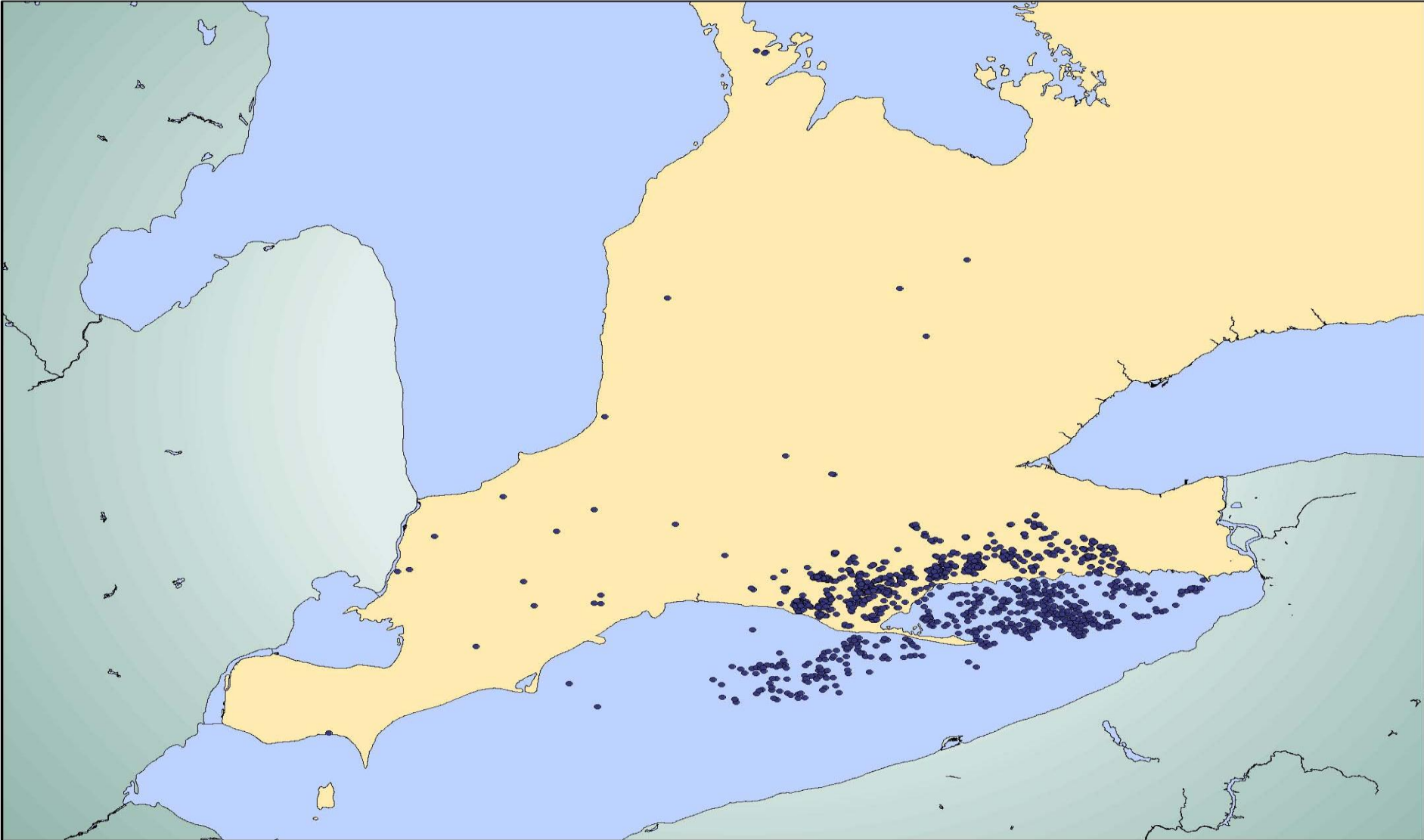
Devonian



Silurian - Salina

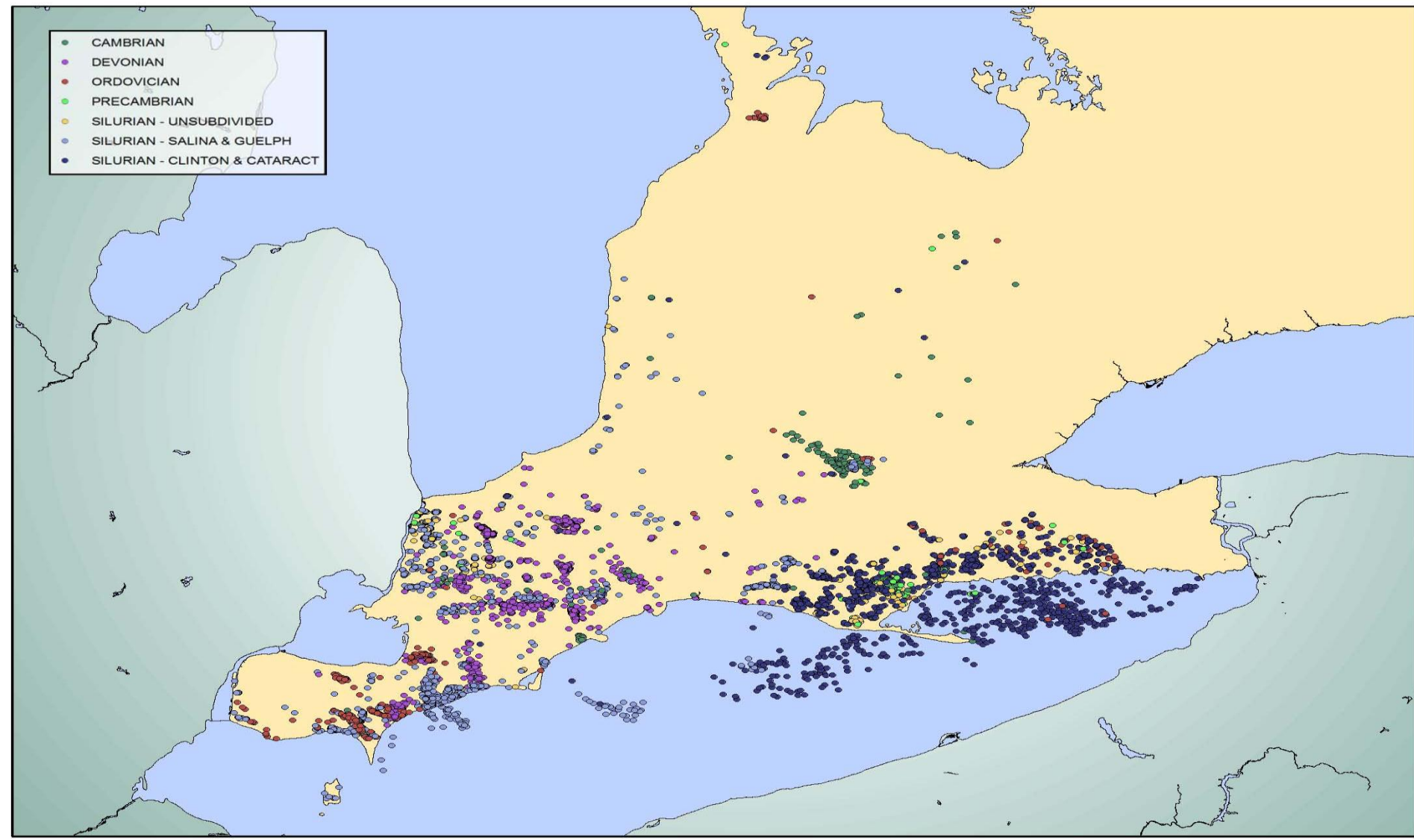


Silurian - Clinton



Composite

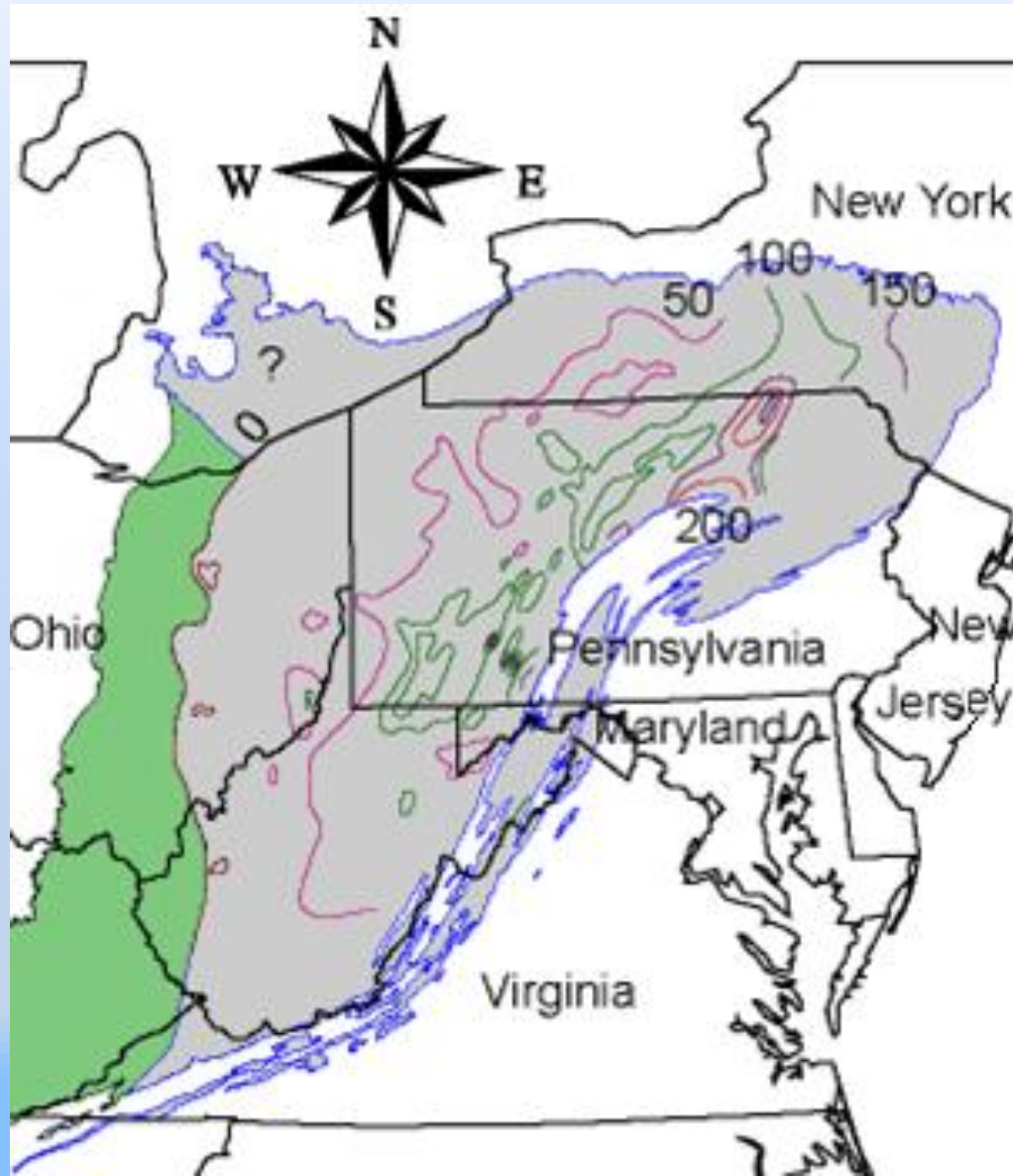
- CAMBRIAN
- DEVONIAN
- ORDOVICIAN
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- SILURIAN - UNSUBDIVIDED
- SILURIAN - SALINA & GUELPH
- SILURIAN - CLINTON & CATARACT



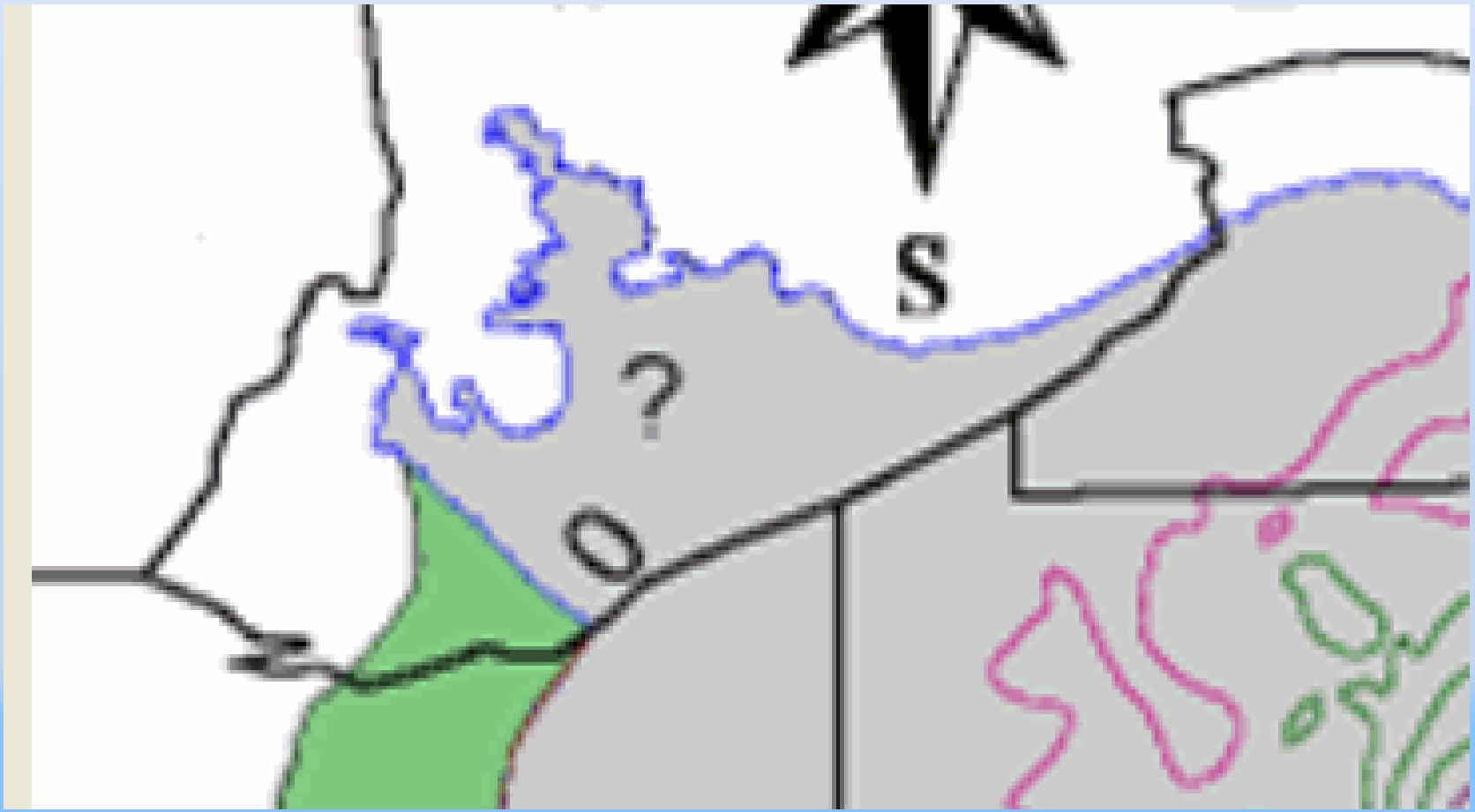
Marcellus in Ontario?



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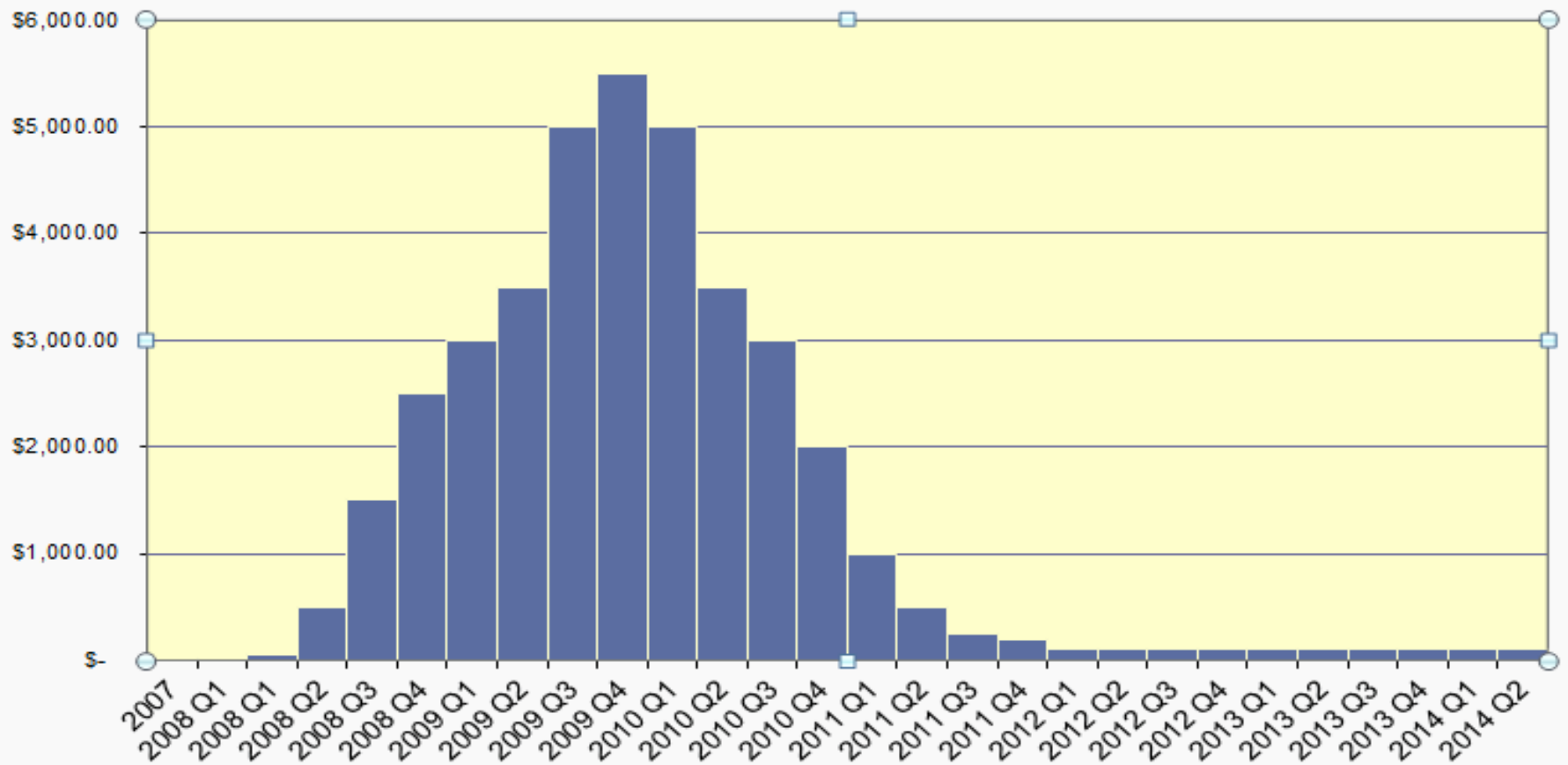


Marcellus in Ontario?



Rentals

Bonus Rental





Rentals

- ❑ Conventional vs. Unconventional
- ❑ Delay Rentals
 - ❑ Often not utilized → Paid-up Lease
- ❑ Shut-In Rentals

Lease Clauses

OIL AND GAS LEASE

This Lease Agreement (this "**Lease**"), made the __ day of _____, 20__ (the "**Effective Date**") between _____ whose address is _____ ("**Lessor**"), and _____, whose address is _____ ("**Lessee**").

WITNESSETH: In consideration of \$1.00 paid by Lessee, and other good and valuable consideration, receipt of which is acknowledged, Lessor leases and lets exclusively to Lessee, all of the Leased Premises (defined below) and oil and gas therein, for the purpose, and with the exclusive rights to explore for, operate for, drill for, transport, produce and market, using all current and future methods, oil and gas; "gas" as used herein includes, but is not limited to, all gaseous (including coalbed methane) and liquid hydrocarbons and non-hydrocarbons contained in or associated with any formation or strata (including gob areas, mined-out areas, coal seams, and communicating zones), and their liquid or gaseous constituents, whether hydrocarbon or non-hydrocarbon, and all products related thereto or derived therefrom. Lessee shall also have exclusive rights (1) to inject, store, protect, and withdraw stored gas on the Leased Premises and lands in the vicinity thereof; (2) to drill and operate water, disposal, or injection wells; (3) to conduct geological/geophysical/seismic activities; (4) to stimulate or fracture all coals or other strata or formations; (5) of ingress and egress on and across the Leased Premises for any purpose to and from any other land; (6) of perpetual easements over the Leased Premises and the existing roads thereon, which shall survive the expiration of this Agreement, and ingress and egress thereto,

Lease Clauses

- Lease limited to certain depths – must clearly distinguish:
 - Depth in feet
 - Reference to certain formations
 - Combination of references

lying 600 feet below the base of the Fifth Sandstone formation, such base of the Fifth Sandstone formation being depicted at a depth of 2,275 feet on the Pennzoil Company log for the Robert Knox #15 well, API 37-125-21422, located in the Taylorstown Field in Washington County, Pennsylvania (such depths and formations, the “Deep Rights”), (b) all rights granted under such Leases to the extent



Lease Clauses

- Different levels of surface approval for different activities?
- Does development of one strata only hold that strata by production?
- Environmental clauses – different strata will have different techniques, and therefore different concerns.
- Pipelines – limitations for number of oil/gas lines?
- Shut-in time limits vs. implied duty to produce from other strata.
- Pooling clauses.
 - Only certain strata.
 - Patchwork of pooling shapes/sizes in column.



Ontario vs. Appalachia

- Royalty
- Title
- Un-registered / Un-mapped wells



Thank You.

