

# Strategic Saltwater Disposal Performance Assessments Are Improved with Quality Assurance of Regulatory Data

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## Sourcewater's Mission

To show where all oilfield water comes from and goes to, both on the surface and under it.

To predict where that water *can and will* move in the future.

And to help our clients decide where they *should* move their water for profitability, reliability, and sustainability.

# Chaves County, New Mexico



	Actual Performance	Maximum Capacity
Target	Devonian (25 ft)	
Capacity	40%	100%
Injection Rate (barrels per day)	2k	5k
Revenue (per ft per day)	\$40	\$100
Annual Revenue	\$380k	\$1M

\* Assumed revenue of \$95 per barrel of disposed water

# Chaves County, New Mexico



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Target	Devonian (25 ft)	
Capacity	40%	100%
Injection Rate (barrels per day)	2k	5k
Revenue (per ft per day)	\$40	\$100
Annual Revenue	\$380k	\$1M

\* Assumed revenue of \$0.85 per barrel of disposed water

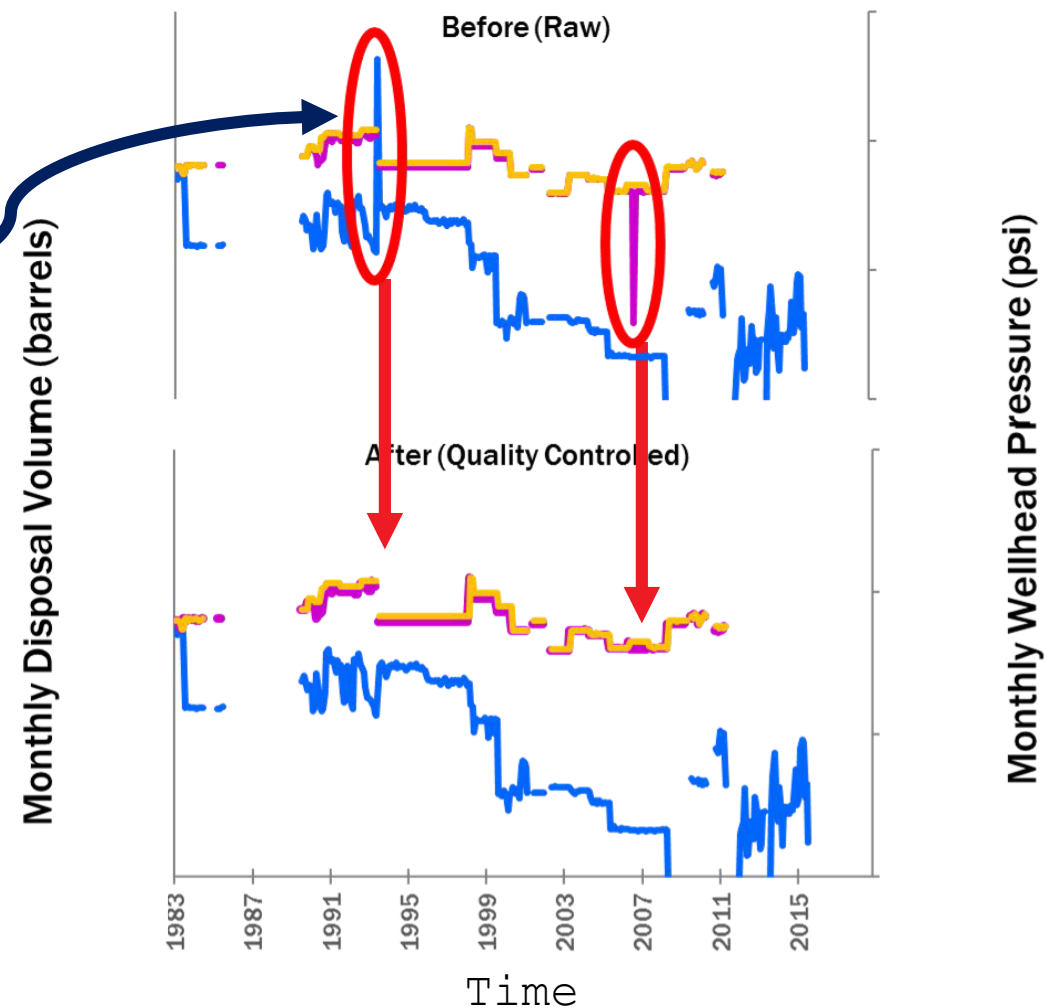
**Solution: Intelligence Tools**

Tool 1: Quality assure and  
supplement injection  
volumes and pressures

# Culberson County, Texas

- Injection Volume
- Average Injection Pressure
- Maximum Injection Pressure

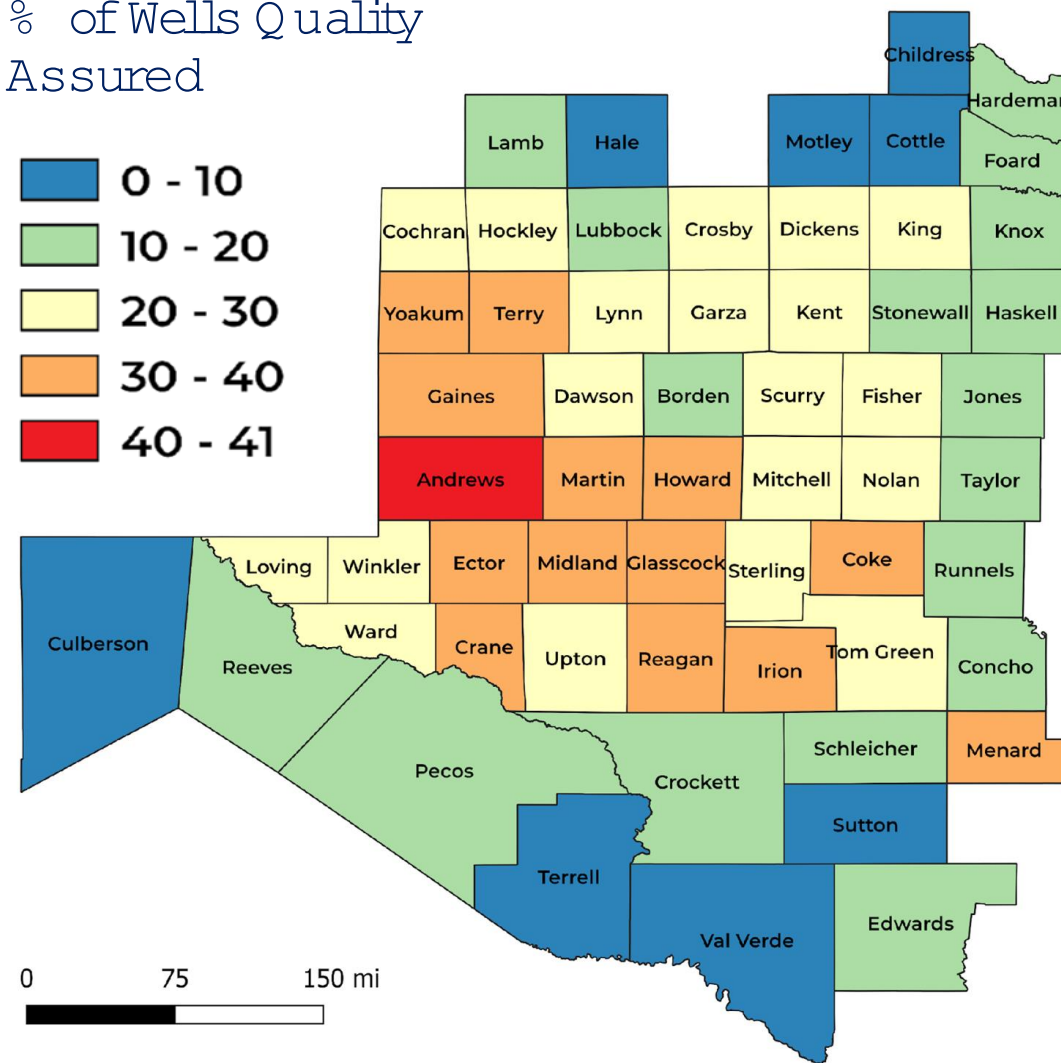
One erroneous raw value (7,000 times greater than the well average) resulted in a false 22% higher total well performance.



# Permian Basin, Texas

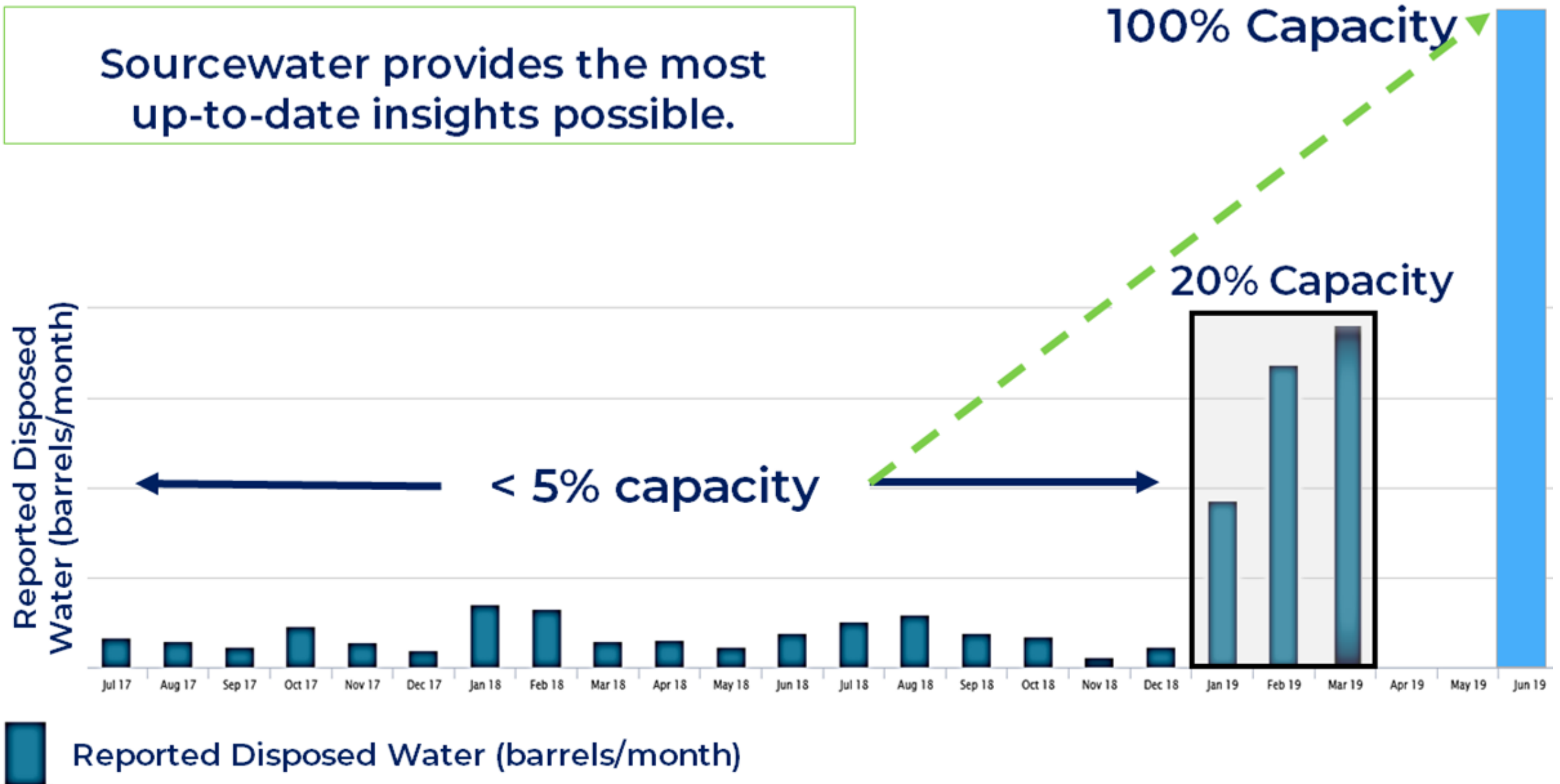
Quality Assurance  
Improves Reported  
Volumes and  
Pressures

% of Wells Quality Assured



# Optimizing the Water Market

Sourcewater provides the most up-to-date insights possible.

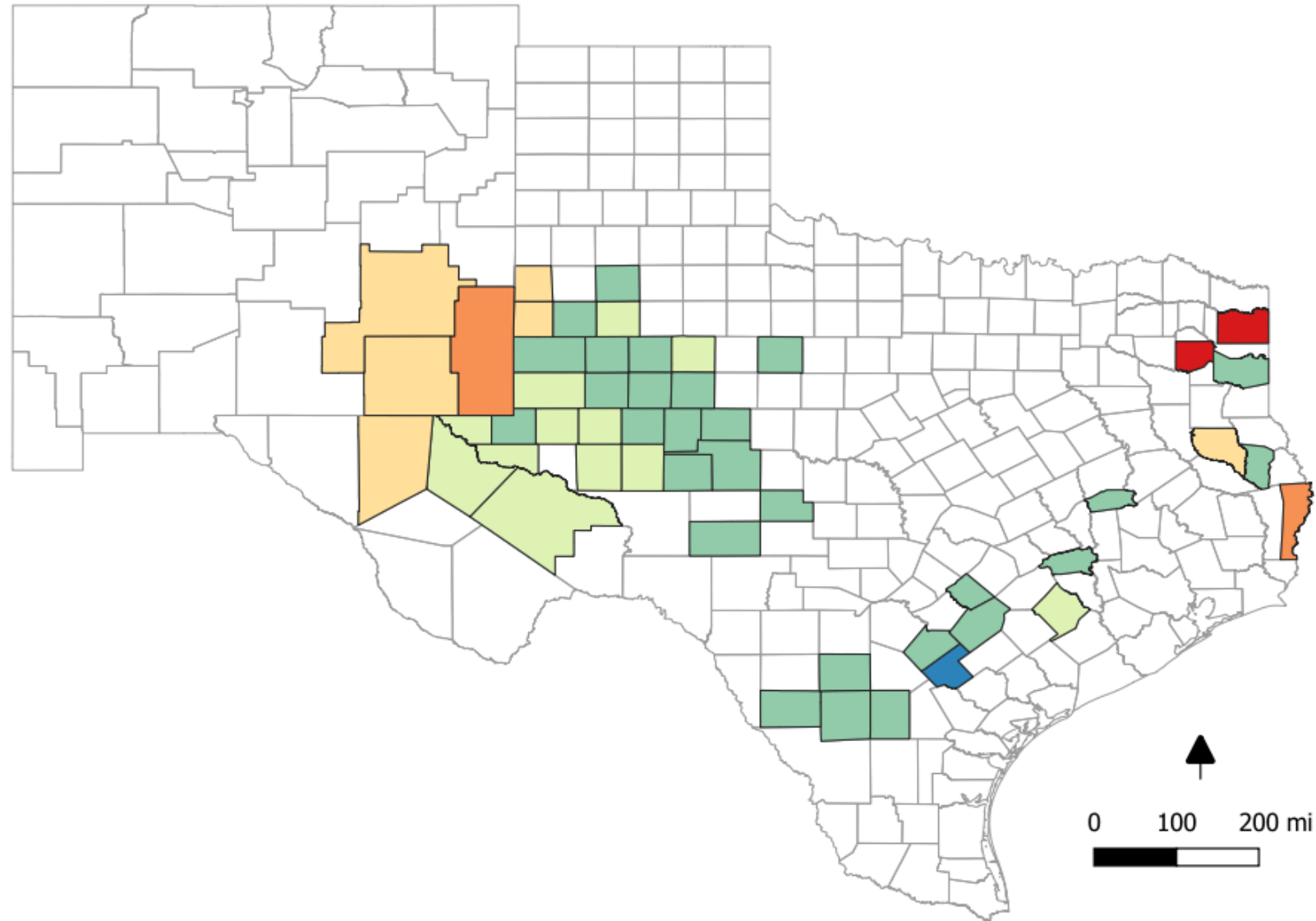
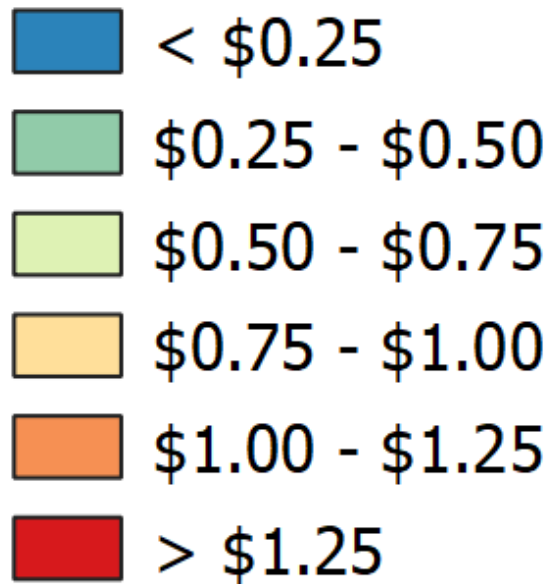




Tool 2: Use well  
activity, not permits, to  
calculate potential  
revenue

# Average Freshwater Market Costs

Average  
Freshwater  
Market Costs  
(US\$/barrel)



# Reeves County, Texas



Permitted Interval



Active Disposal Interval

Active Perforations



# Reeves County, Texas

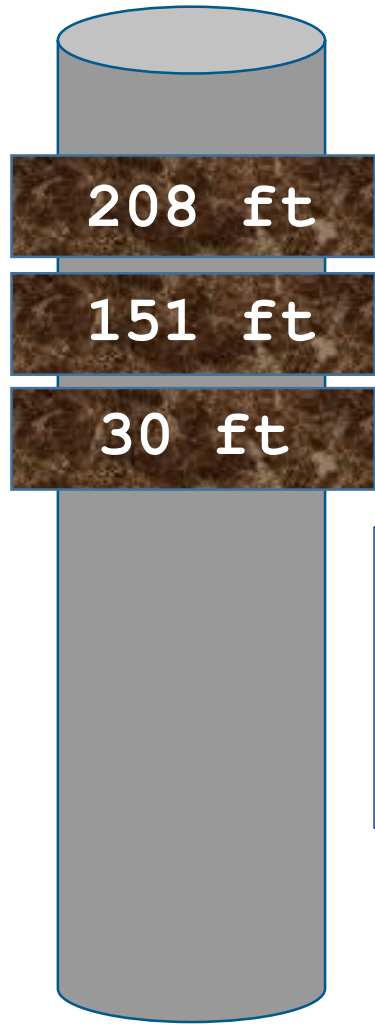


Permit

$$\begin{array}{l} \text{Revenue} \\ \$0.54 \\ \hline \text{barrel} \\ 1 \end{array} \times \begin{array}{l} \text{Injection Rate} \\ 25\text{k barrels} \\ \hline \text{day} \end{array} = \$15\text{k per day}$$

\$5M per year

# Reeves County, Texas



$$\frac{\text{Revenue}}{\text{barrel}} \times \frac{\text{Injection Rate}}{\text{day}} = \$5\text{k per day}$$

$\frac{\$0.54}{\text{barrel}} \times \frac{9\text{k barrels}}{\text{day}} = \$5\text{k per day}$

Lower injection pressure

\$2M per year

-\$3M per year overestimated revenue

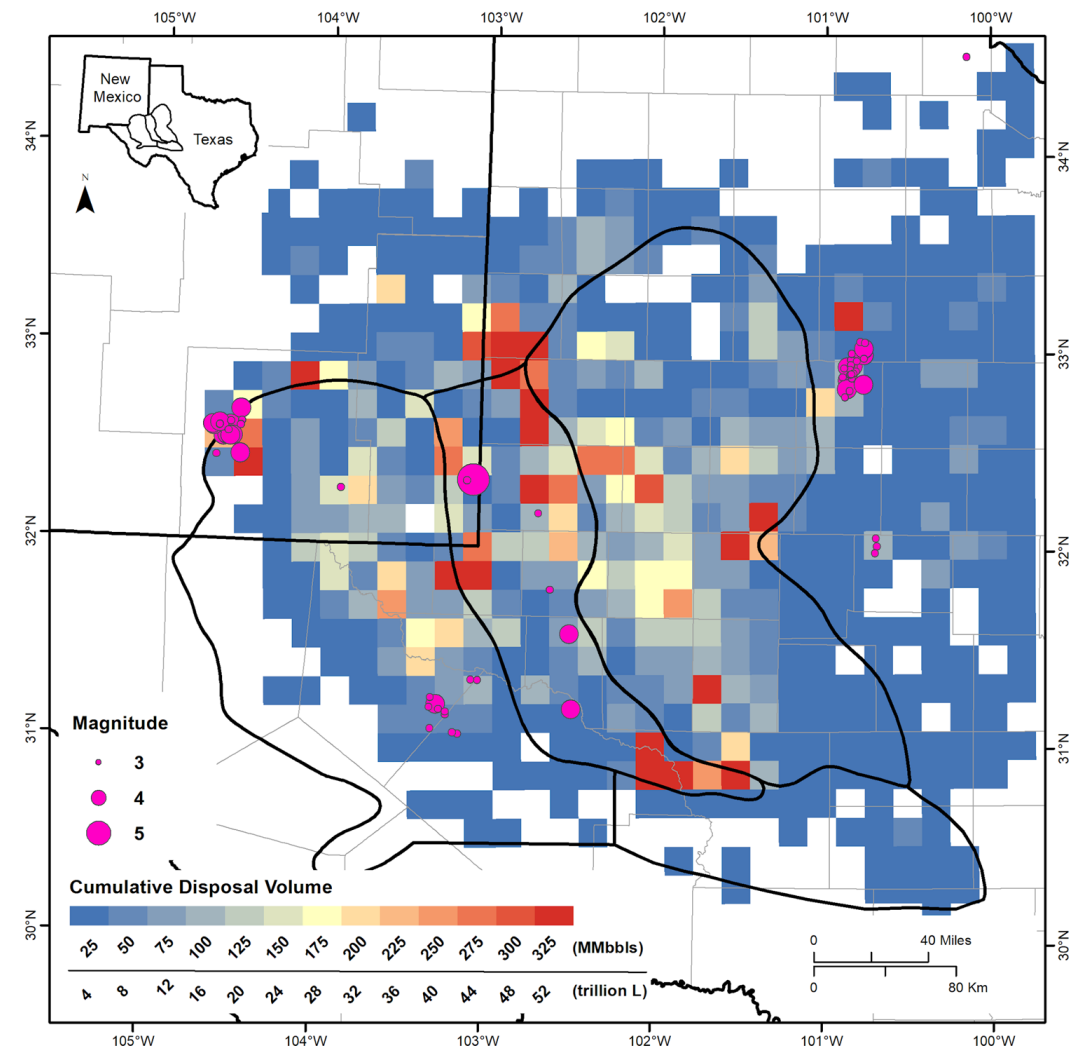
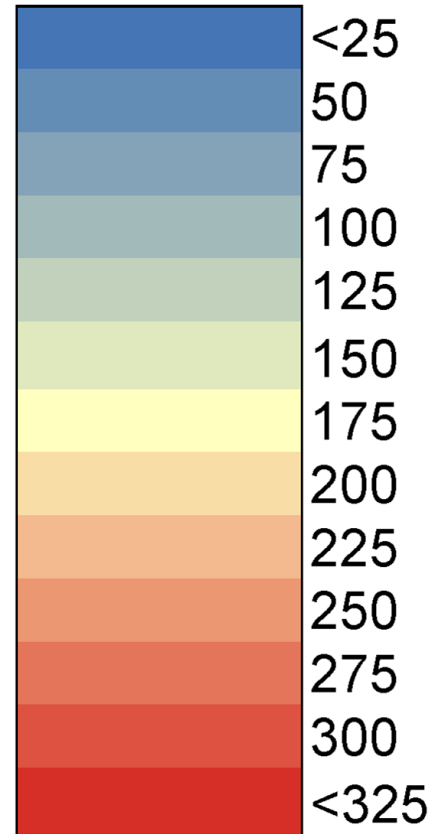


Tool 3: Stratigraphic  
Landing of the Active  
Disposal Interval

# Understand Subsurface Activity

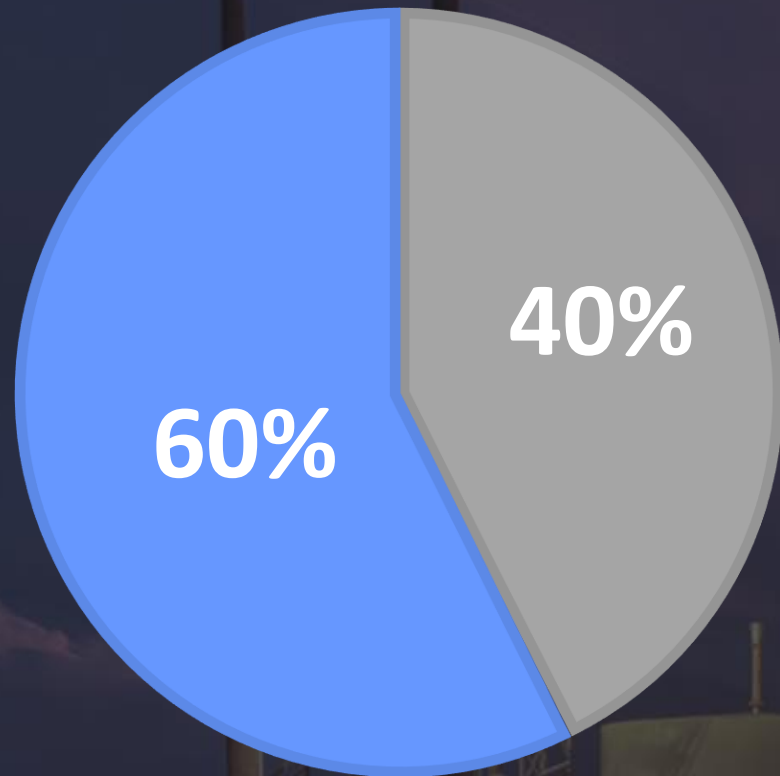
Chronostratigraphic Units		Correlation Chart, Permian Region				
CRETACEOUS	EARLY	Toborg				
TRIASSIC	LATE	Dockum	Chinle		Capitan	
			Santa Rosa			
			Tecovas			
PERMIAN	LOPINGIAN	Dewey Lake				
		Rustler				
		Salado				
	GUADALUPIAN	Tansill	Bell Canyon	Capitan		
		Yates				
		Seven Rivers				
		Queen	Cherry Canyon			
		Grayburg	Brushy Canyon			
		San Andres				
		Glorieta				
	CISURALIAN	Paddock	Clear Fork	Bone Spring / Leonard		
		Tubb				
		Yeso				
		Drinkard				
		Abo / Wichita-Albany				
Wolfcamp						
Bough						
PENNSYLVANIAN	LATE	Upper Penn	Cisco Canyon			
		Strawn				
	MIDDLE	Bend				
	EARLY	Morrow				
MISSISSIPPIAN	MIDDLE	Mississippian Lime				
	EARLY	Woodford				
DEVONIAN		Devonian / Thirtyone				
SILURIAN	LLANDOVERY	Silurian / Fusselman				
ORDOVICIAN	LATE	Montoya				
	MIDDLE	Simpson				
	EARLY	Ellenburger				
CAMBRIAN	LATE	Cambrian				

## Cumulative Saltwater Disposal Volume (MMbbbls)





# San Andres and Delaware Mountain Group

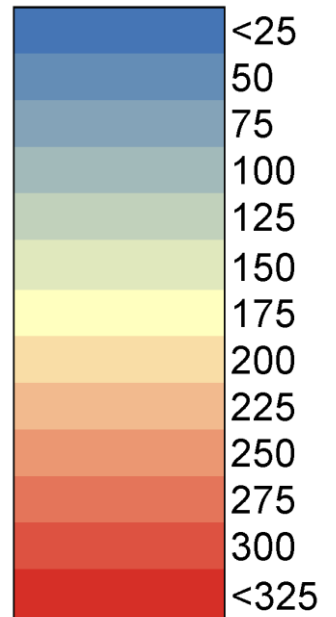


■ Other

■ Guadalupian

Chronostratigraphic Units		Correlation Chart, Permian Region		
CRETACEOUS	EARLY	Toborg		
TRIASSIC	LATE	Dockum	Chinle	
			Santa Rosa	
			Tecovas	
	LOPINGIAN	Dewey Lake		
		Rustler		
		Salado		
PERMIAN	GUADALUPIAN	Tansill	Bell	
		Yates	Canyon	
		Seven Rivers	Capitan	
		Queen		
		Grayburg	Cherry	
		San Andres	Canyon	
		Glorieta	Brushy Canyon	
	CISURALIAN	Paddock	Yeso	
		Tubb	Clear Fork	
		Drinkard		
		Abo / Wichita-Albany		Bone Spring
		Wolfcamp		Leonard
PENNSYLVANIAN	LATE	Upper Penn	Cisco Canyon	
	MIDDLE	Strawn		
	EARLY	Bend		
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**Cumulative Saltwater Disposal Volume (MMbbls)**

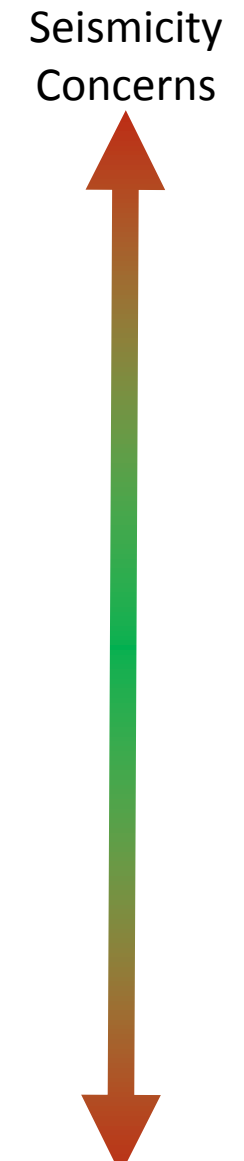
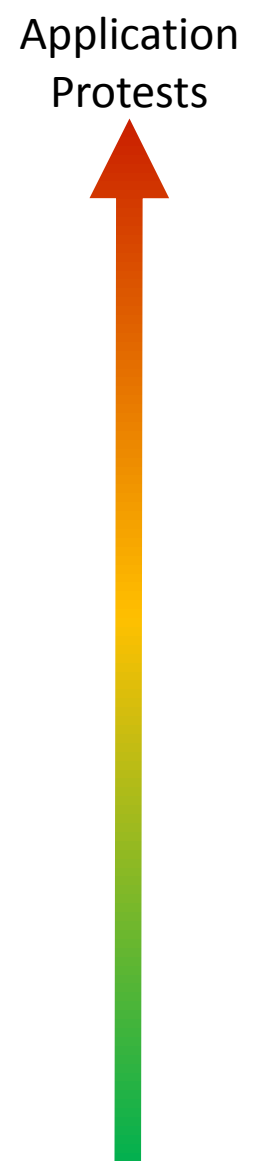
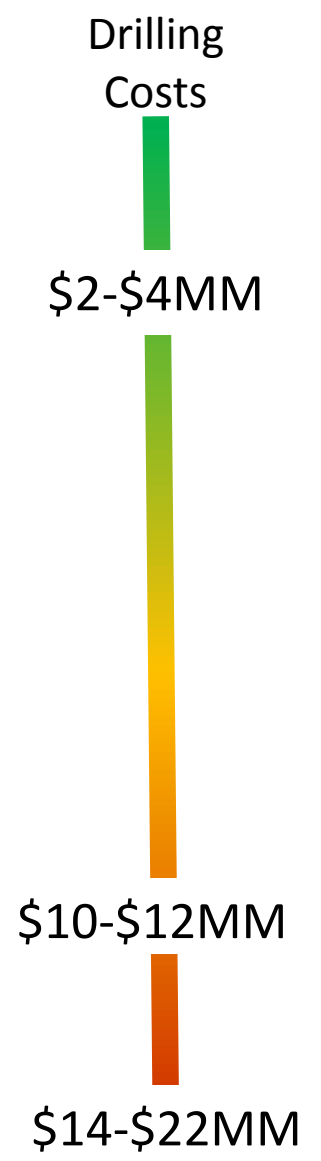
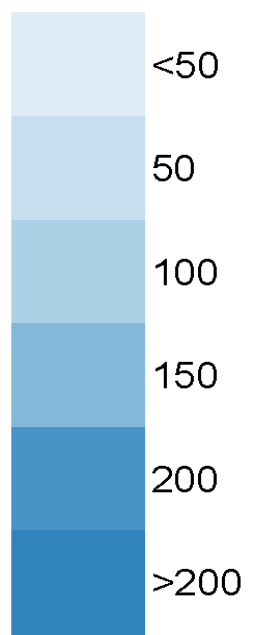


# Permian SWD Permitting, Cost, and Risk

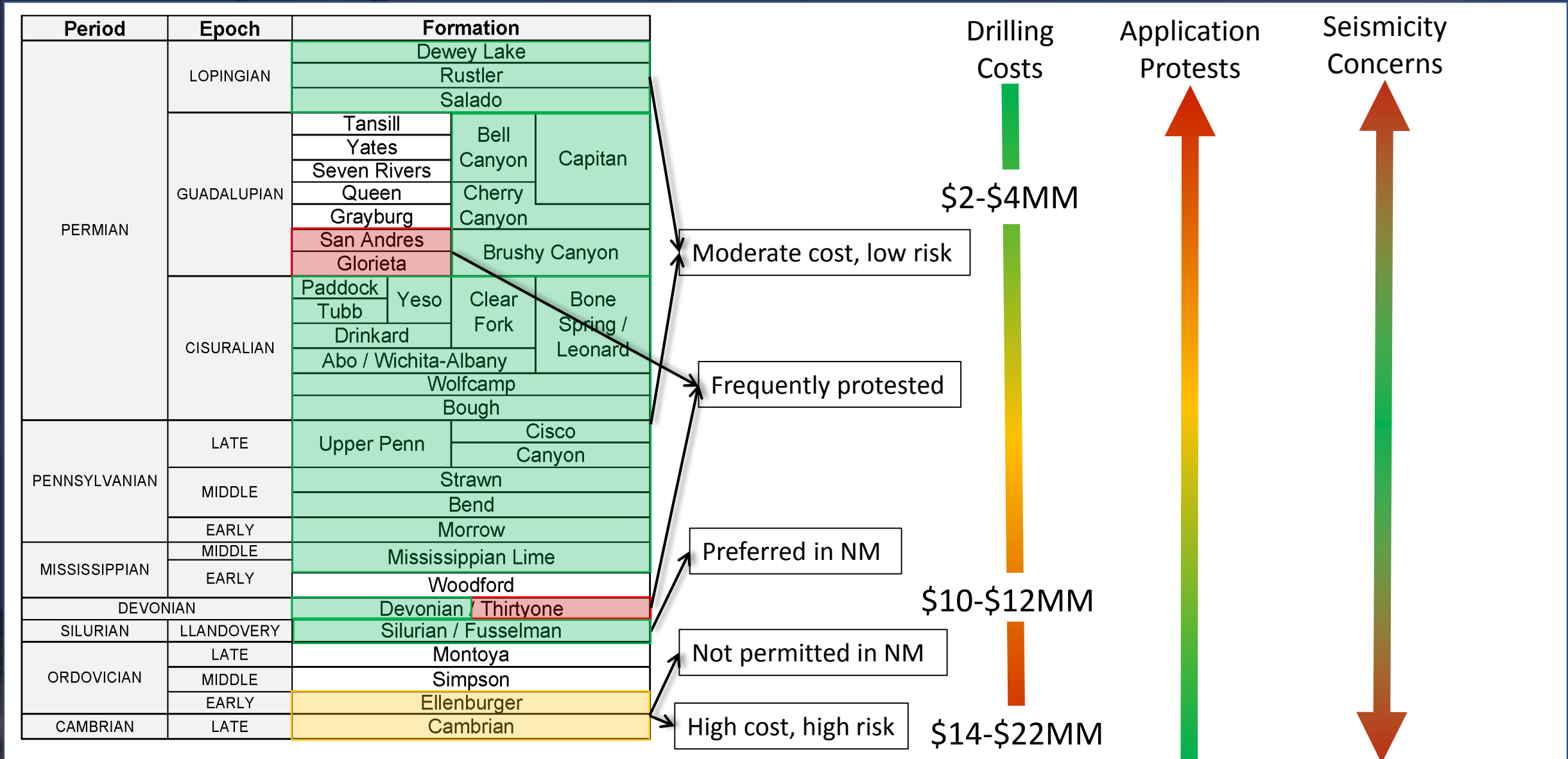
Period	Epoch	Formation		
PERMIAN	LOPINGIAN	Dewey Lake		
		Rustler		
		Salado		
	GUADALUPIAN	Tansill	Bell Canyon	Capitan
		Yates		
		Seven Rivers		
		Queen	Cherry Canyon	
		Grayburg		
		San Andres	Brushy Canyon	
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ORDOVICIAN	LATE	Montoya		
	MIDDLE	Simpson		
	EARLY	Ellenburger		
CAMBRIAN	LATE	Cambrian		

2014-2018

New SWD Permits



# Permian SWD Permitting, Cost, and Risk





## Tool 1: QA of rates

- + Assess Performance
- + Selling opportunities

## Tool 2: Well Activity

- + Potential revenue

## Tool 3: Stratigraphic landing

- + Zone performance
- + Risk

Would you like to learn more?  sourcewater

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[www.sourcewater.com](http://www.sourcewater.com)