GOR is the Symptom:

What the Permian Basin is Telling Us

February 2026

REVIVAL PRODUCTION

Grant Morby - Biography

- **Revival Production LLC**
  - Chief Executive Officer (Feb 2025 – Present)
- **Permian Resources/Centennial Resource Development (8 Years)**
  - Vice President of Engineering (Sep 2022 – Aug 2024)
    - Accountable for development strategy, reserves, and capital allocation across all assets
  - Director of Asset Development (Sep 2020 – Sep 2022)
    - Led reservoir engineering and geoscience teams for development strategy and A&D
  - Reservoir Engineering Manager (Nov 2016 – Sep 2020)
- **EOG Resources (7 Years)**
  - Reservoir Engineer (Jan 2010 – Nov 2016)
    - Worked East Texas Basin (Haynesville) , Gulf Coast Basin (Eagle Ford) and Permian Basin
- **B.S. Petroleum Engineering – University of Texas at Austin (2009)**

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Revival Production LLC

Third-Party Capital for Deferred E&P Projects

- Capitalize projects deferred due to economics or budget
- Targeted Projects:
  - Below current internal economic thresholds
  - Pushed out by budgetary constraints
- Protects balance sheet, captures production and cash flow

Target Project Types

- Workovers
- Re-Fracs/Re-Completions
- Drilled Uncompleted Wells (DUCs)
- Infrastructure Projects

High-Level Structure

- Operator retains operational control
- Revival is repaid from project cash flow to a defined return
- Full economics revert to the operator post-payout

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Gas-Oil Ratio (GOR)

- **What is it?**
  - A ratio of associated gas (produced from the oil as fluid expands to surface) to oil

- **Why does it matter?**
  - It tells you about:

	Higher GOR:	**Lower GOR**:
1. **Reservoir Fluid**	Volatile Oil	Black Oil
2. **Reservoir Pressure**	Low Pressure	High Pressure
3. **Reservoir Quality**	Lower Quality	Higher Quality
4. **Well Connection to Reservoir**	Bad Connection	Good Connection

  - Increasing GOR can affect oil productivity

- **Why does pressure matter?**
  - Fluid is compressed in the subsurface
    - *Gas can be liquid under the right temperature and pressure (think LNG – liquified natural gas)*
  - Pressure differential drives hydrocarbons to the surface

- **When does the gas come out of the oil?**
  - For an oil reservoir this is called bubble point (for gas dew point)
    - Pressure at which gas begins to appear as pressure is reduced

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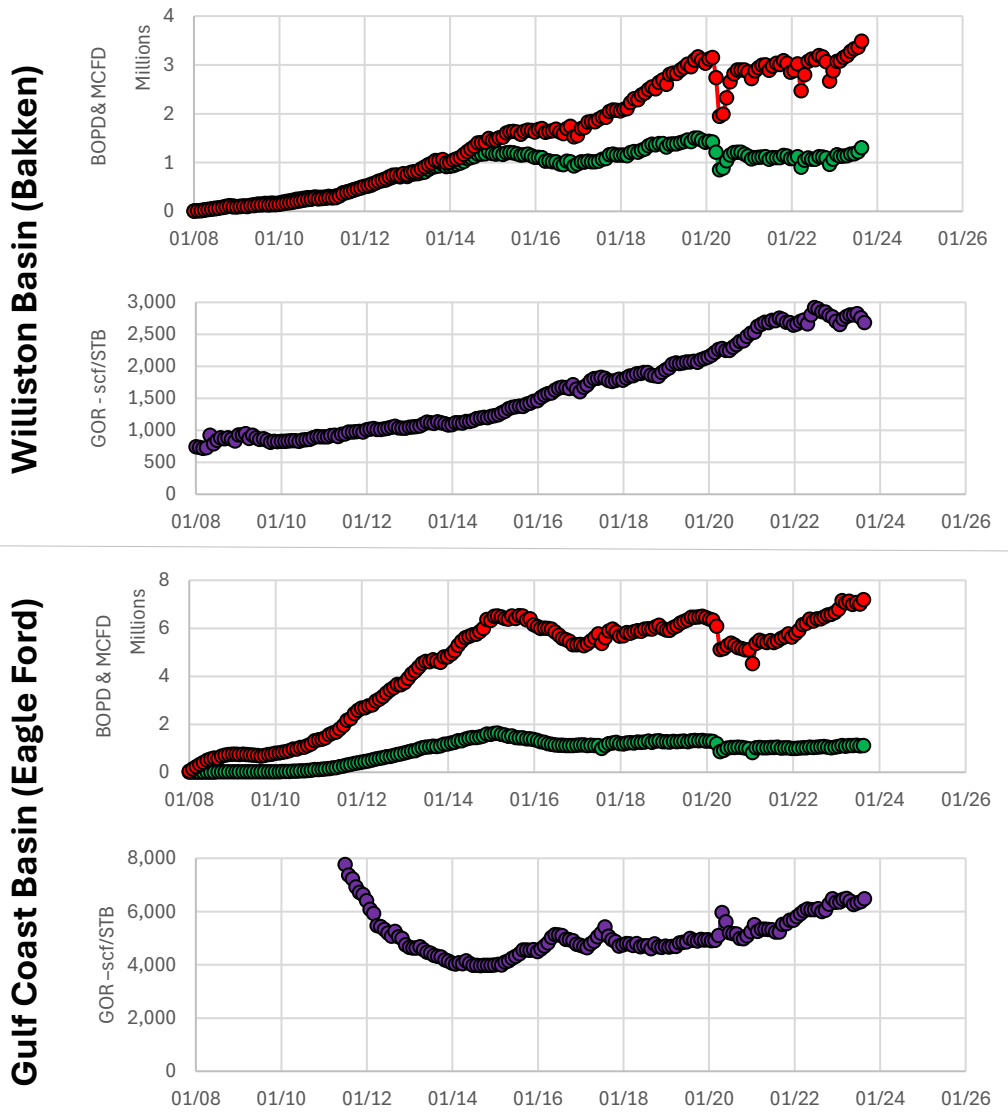
Maturing Oil Basins

- **Williston Basin (Bakken)**
  - Developed since 2008
  - First large-scale unconventional oil development
  - Changed the game for onshore L48 oil production
  - Testing ground for industry
  - Gas-Oil ratio has increased 200% since 2008

- **Gulf Coast Basin (Eagle Ford)**
  - Developed since 2010
  - Follow-up to Bakken
  - Implemented learnings from other unconventional plays
  - Frac design change ↑ well density
  - Gas-Oil ratio has increased 60% since 2014
    - Using 2014 for baseline GOR after initial testing/exploration



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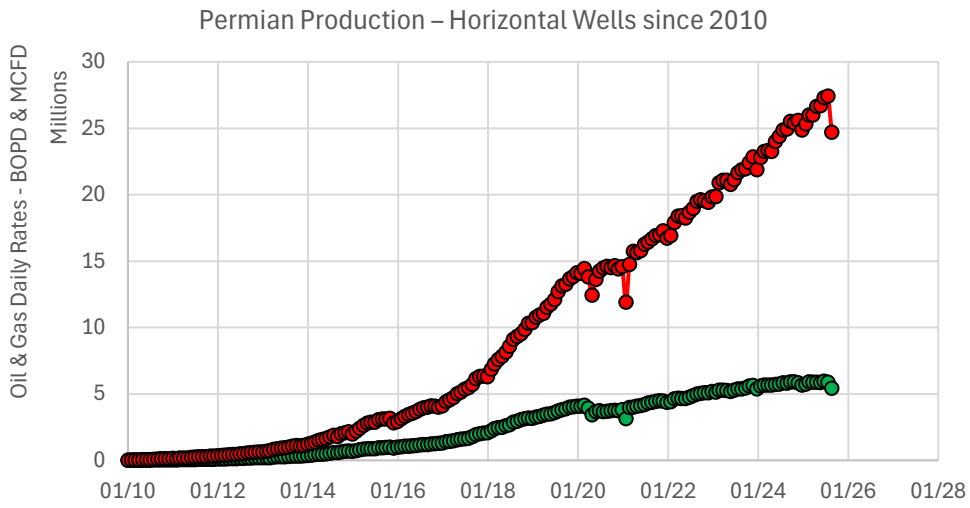
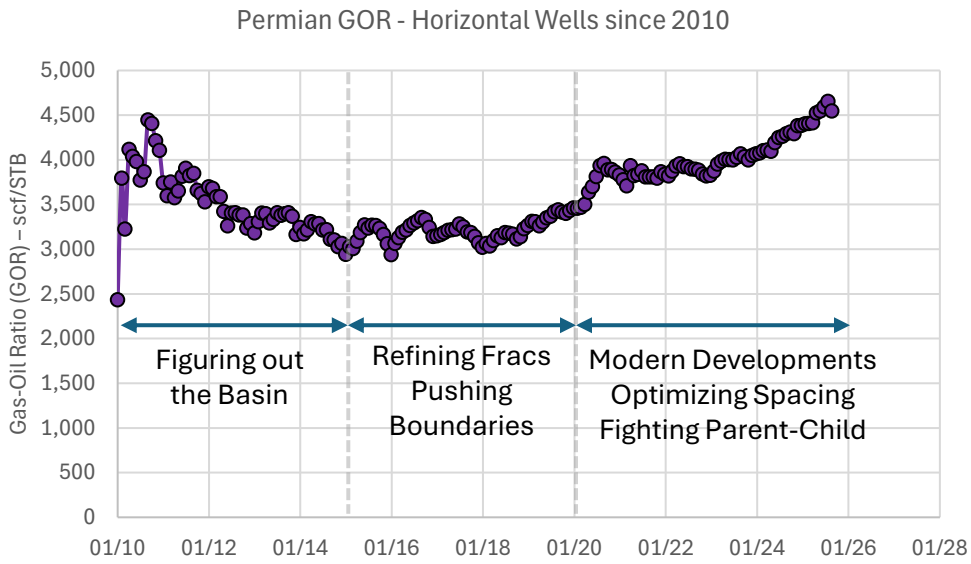
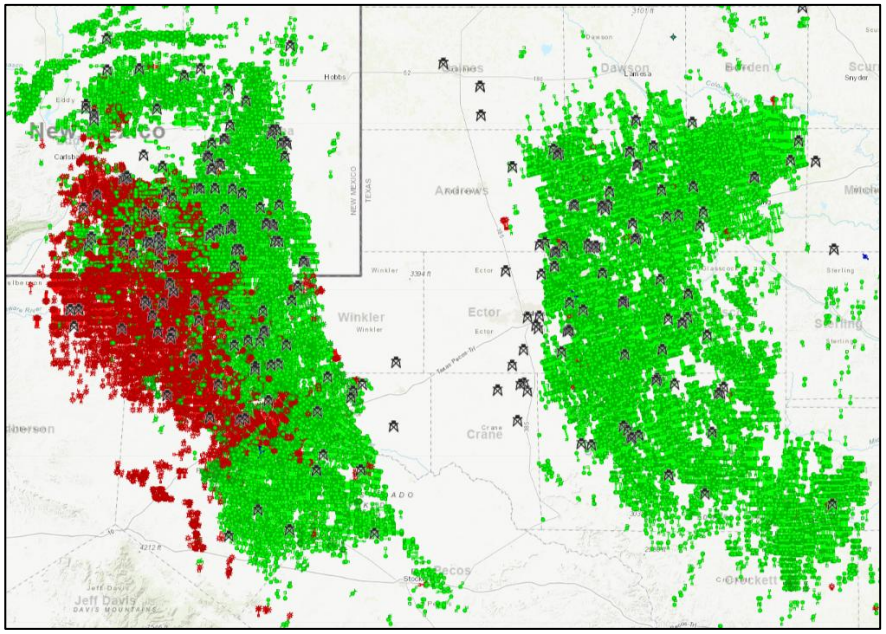
Permian Basin Production







- Development in Permian since 2010 has increased gas production through 3 drivers:
  - Parent-Child Impacts
  - Developing Fringes
  - Developing Uphole Targets
- Gas-Oil Ratio has increased 50% since 2015
  - Using 2015 as baseline for basin GOR

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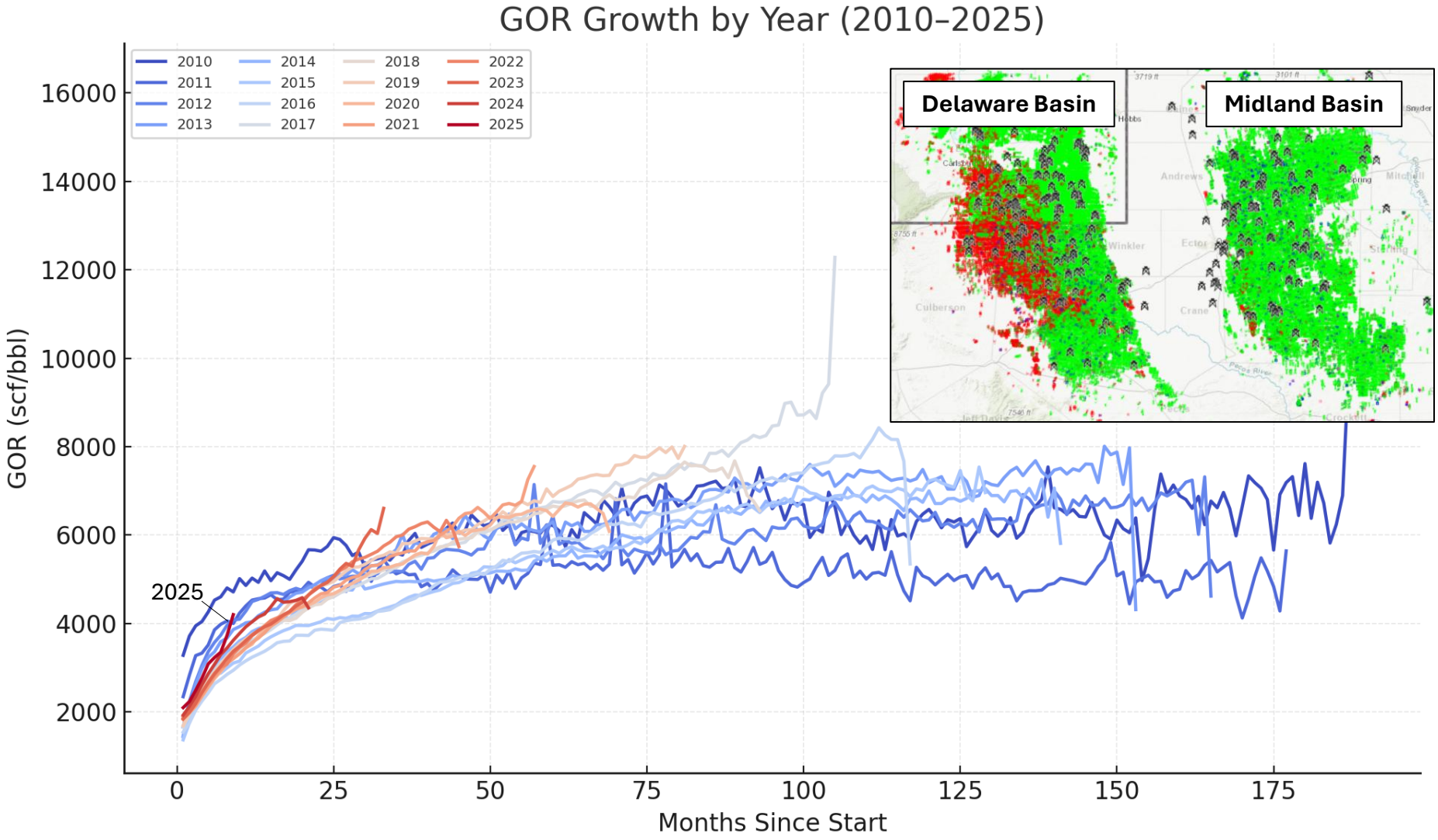
Permian Basin Gas-Oil Ratio (Well Level)



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Theory for Rising Gas-Oil Ratio

GOR variables:
Reservoir Fluid
Reservoir Pressure
Reservoir Quality
Connection

Parent-Child Wells

- Reduced reservoir pressure from offset wells impacts new wells
  - **Connection to Reservoir** – Stimulation (Frac) Effectiveness, surface area
  - **Reservoir Pressure** - Reduction in P_{res} means less ΔP to bubble point

Pushing the Basin Fringes

- Edges of the basin present reservoir quality and pressure challenges
  - **Reservoir Pressure** – depth is correlative to pressure, fringes are shallower
  - **Reservoir Quality** – quality improves near source of deposition, leads to migration of fluids from basin updip and traps against carbonates
  - **Reservoir Fluids** – migration of fluids updip at lower pressure = high GOR

Moving to Up-hole Targets

- Uphole targets typically possess lower pressure, quality varies
  - **Reservoir Pressure** – uphole targets have shallower depth/lower pressure

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Permian Basin has more Child Wells than…..

Philip Rivers' Family
9 Children

Philip Rivers

REVIVAL PRODUCTION

Permian Basin has more Child Wells than.....

Shane Smith's Family
4 Children

Shane Smith – My Cousin

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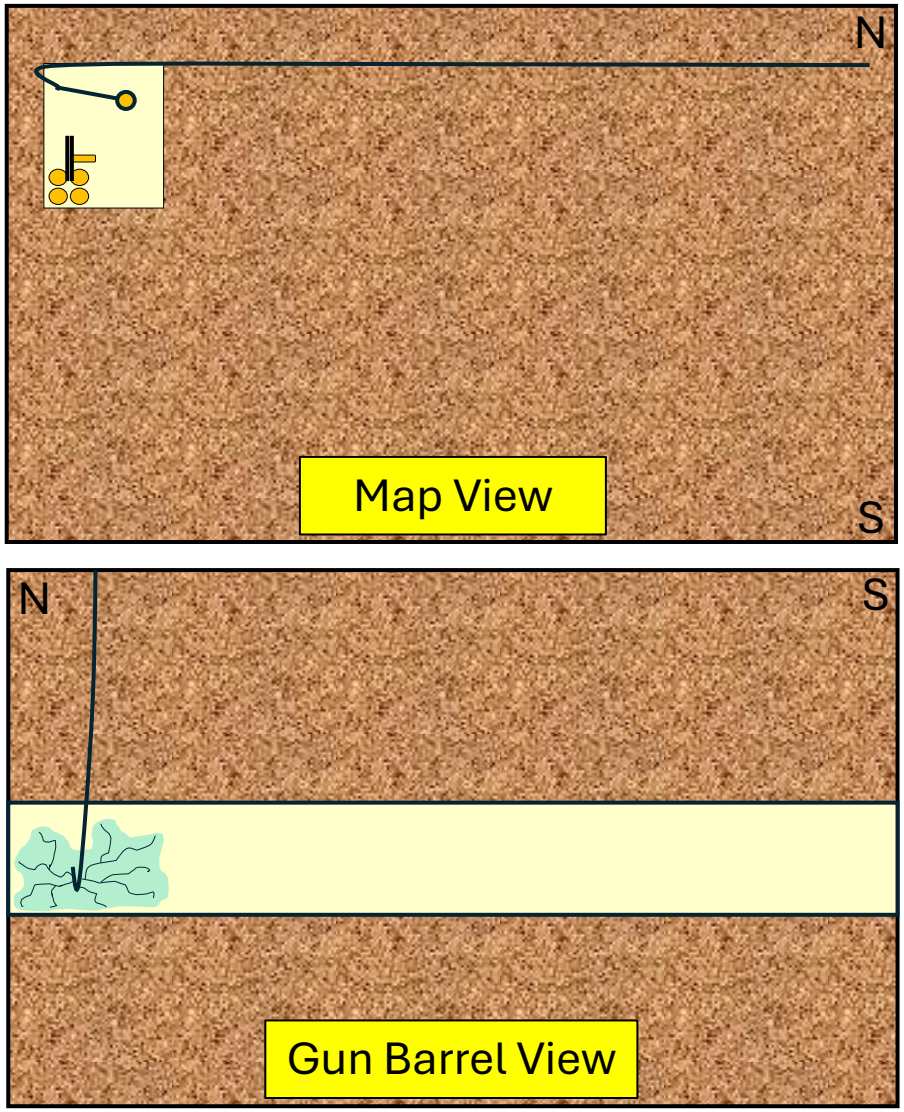
Parent Wells

- **Initial well drilled in section**
  - Initial Reservoir Pressure
  - Initial Fluid Properties
  - Generates initial fracture system via frac/stimulation
  - New surface area to drain
- **No competition for reserves**
- **Drainage width only limited by reservoir quality & frac**
- *"Great parent wells have bankrupted innumerable oil companies" – 1st Manager*



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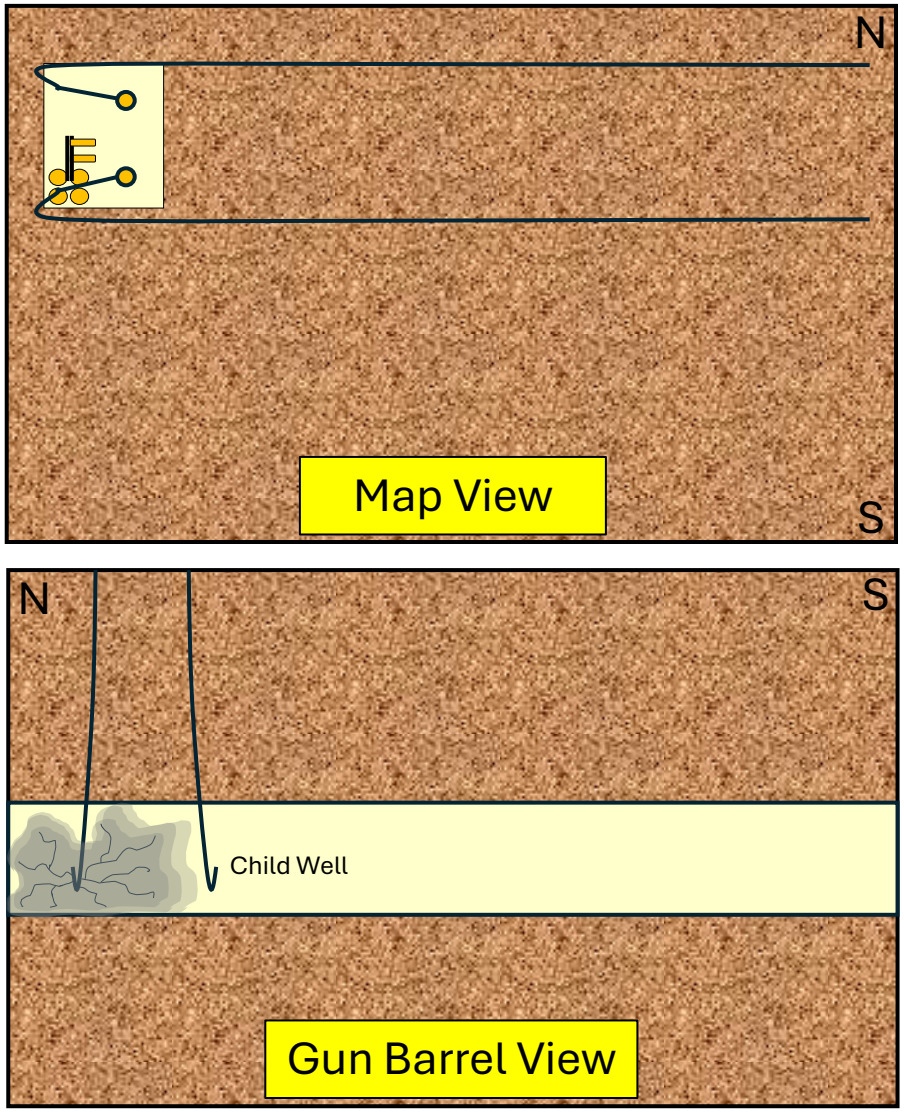
Child Wells

- **Well offsetting parent well**
  - Generally same formation
  - Offsets depletion from parent
    - Depletion created by parent
      - Well has produced fluids
    - Decreased reservoir pressure
    - Pre-existing fracture network
- **Offset competes for reserves**
  - Parent well has produced fluids
  - Child well is competition
- **Main concern is generating an effective frac next to depletion**
- **<u>Where do you think the frac fluid will go for the child well?</u>**



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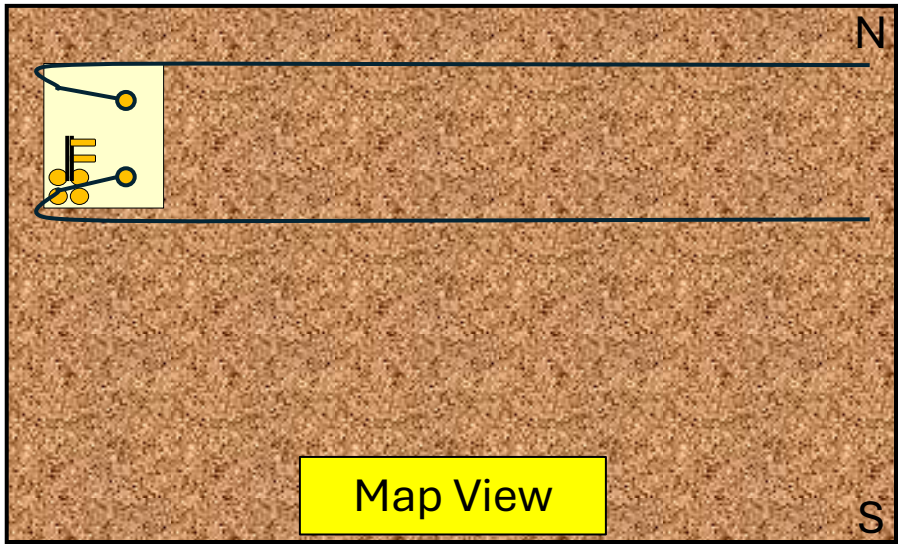
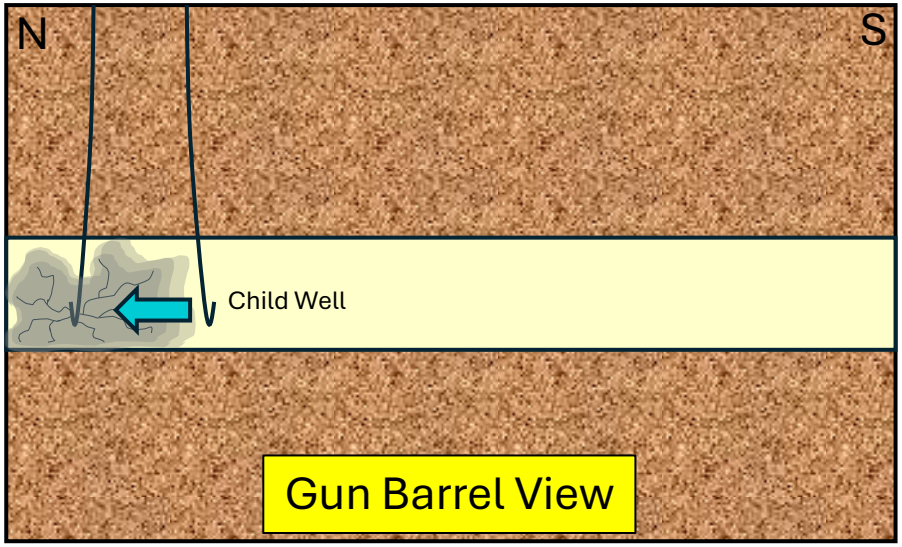
Child Wells

- **Frac fluid will <u>move towards existing depletion from parent</u>**
  - "Path of least resistance"
  - "High pressure to low pressure"
  - Why does this impact frac?
    - Net pressure creates fractures
    - Frac fluid fills void next door before generating new fractures
    - Less new surface area created
- **Permian more difficult with amount of water produced**
  - 4 bbls water for every bbl oil
  - More depletion than other basins
- **Child well productivity decreases with:**
  - Decreased reservoir pressure
  - Poor connection to reservoir





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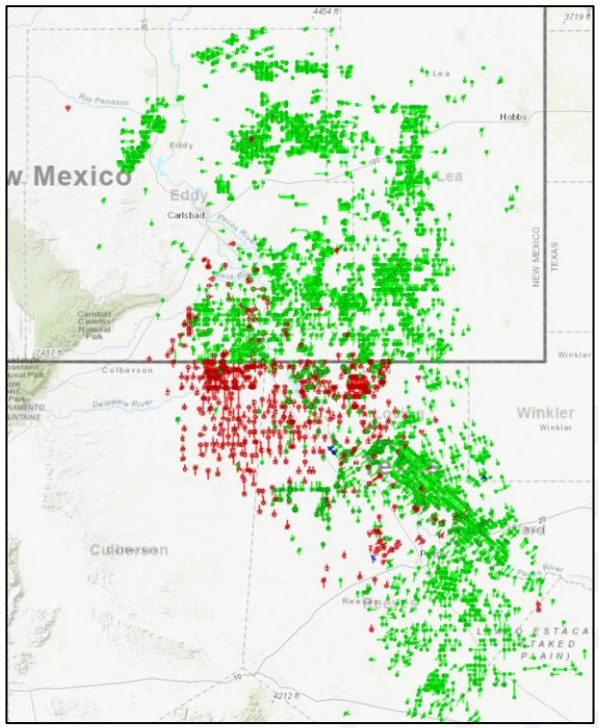
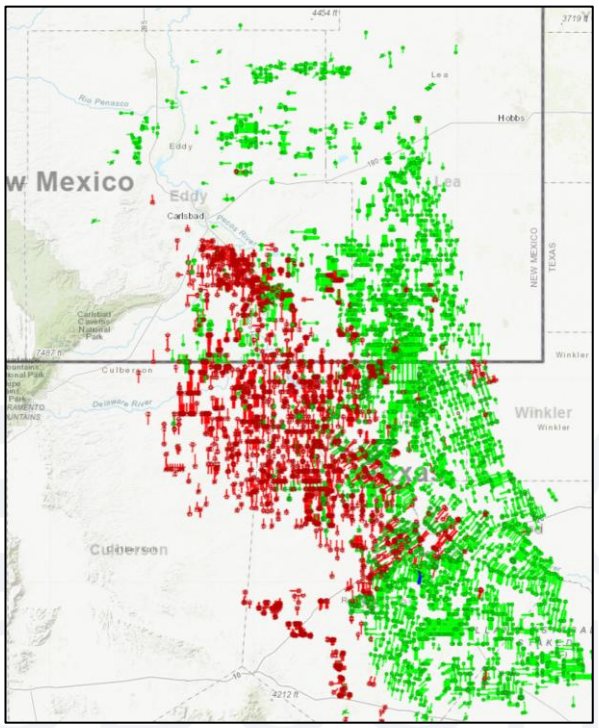
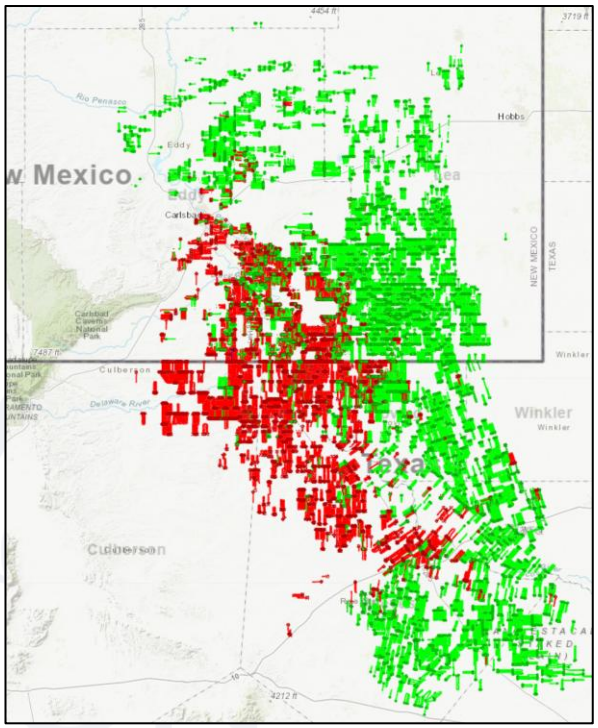
Delaware Basin - Pushing the Fringe



2010 – 2014



2015 – 2019



2020 – 2026

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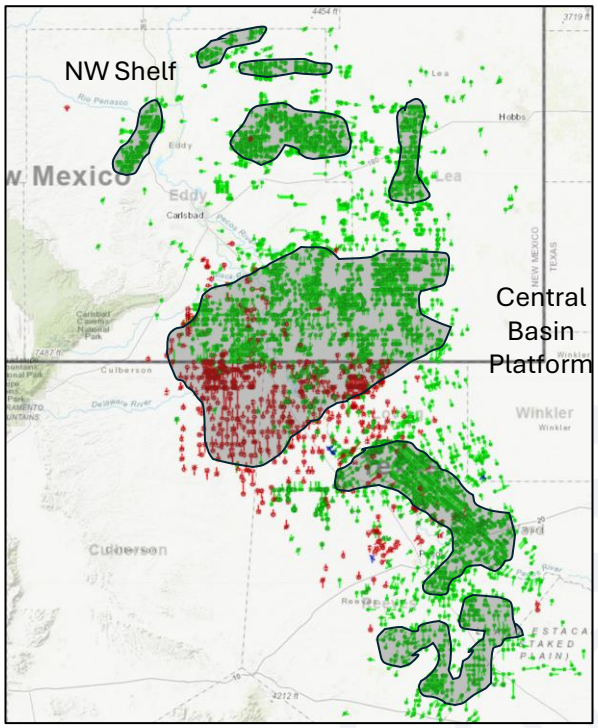
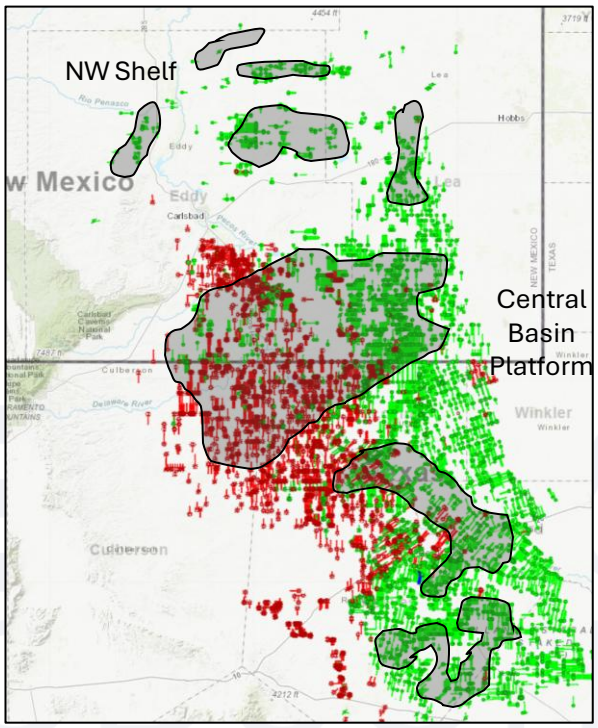
Delaware Basin - Pushing the Fringe



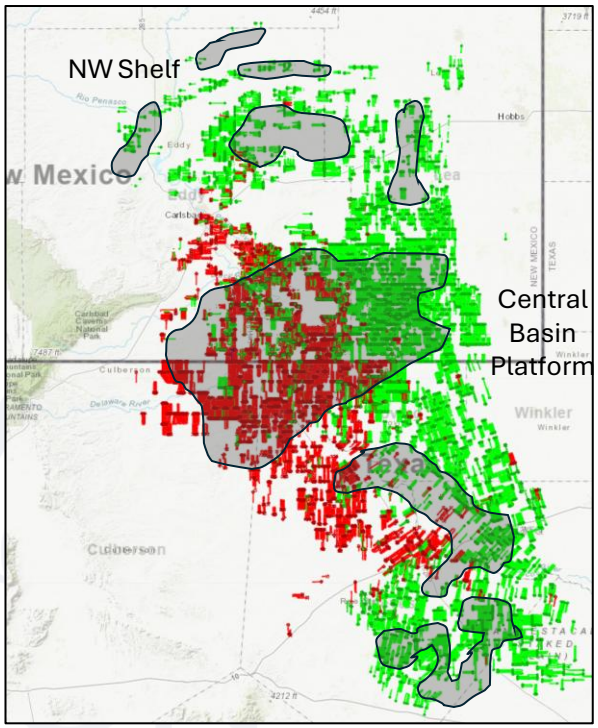
2010 – 2014

- Following success of oil shale basins, Operators returned to the Delaware
- Operators targeted Wolfcamp & Avalon shales as well as hybrid reservoirs like the Bone Spring Sands – **testing phase**
- Well density or wells per section were generally low, **smaller developments**



2015 – 2019

- Frac renaissance: increased proppant, reduced cluster spacing & slickwater fluid
- Frac changes improved recovery, reduced drainage area & increased density – new problem with **parent-child impacts**
- Operators **pushed basin boundaries** & targets, **new fracs opened new fairways**



2020 – 2026

- Operators continue pushing play boundaries in search of cheaper acreage
- Larger development patterns observed to compensate for parent-child impacts, avoid it by **larger-scale developments**
- Fringes of Delaware Basin at Central Basin Platform and NW Shelf pushed

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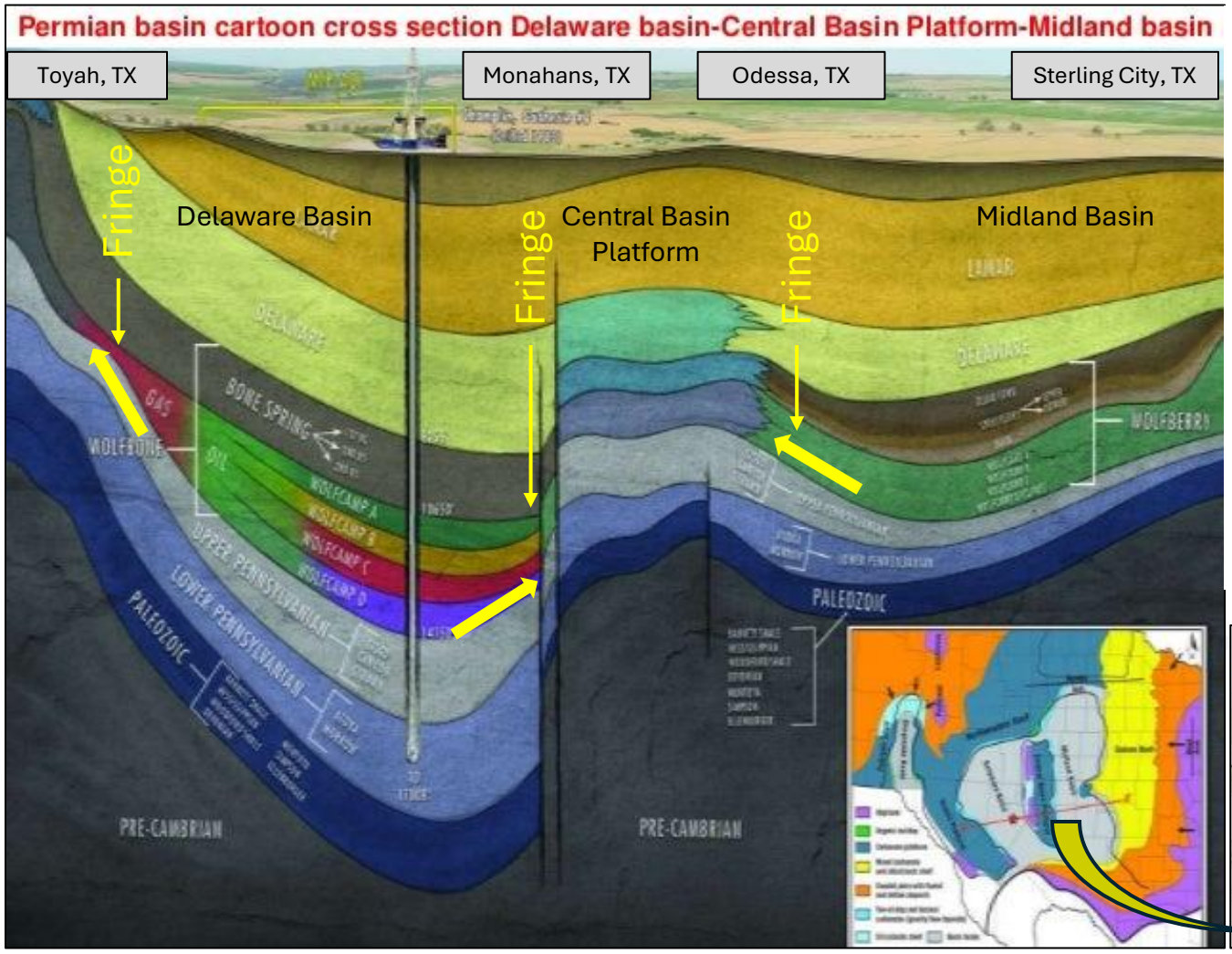
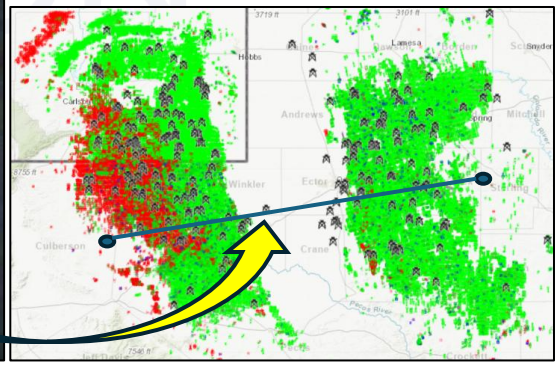
How does pushing the fringe impact GOR?





- Edge of the basin (fringe) shallows
- Less depth = ↓ Pressure
- Less pressure = ↑ GOR
- ↑ Reservoir quality allows fluid migration updip
  - More Gas
  - Less Pressure
  - Higher GOR

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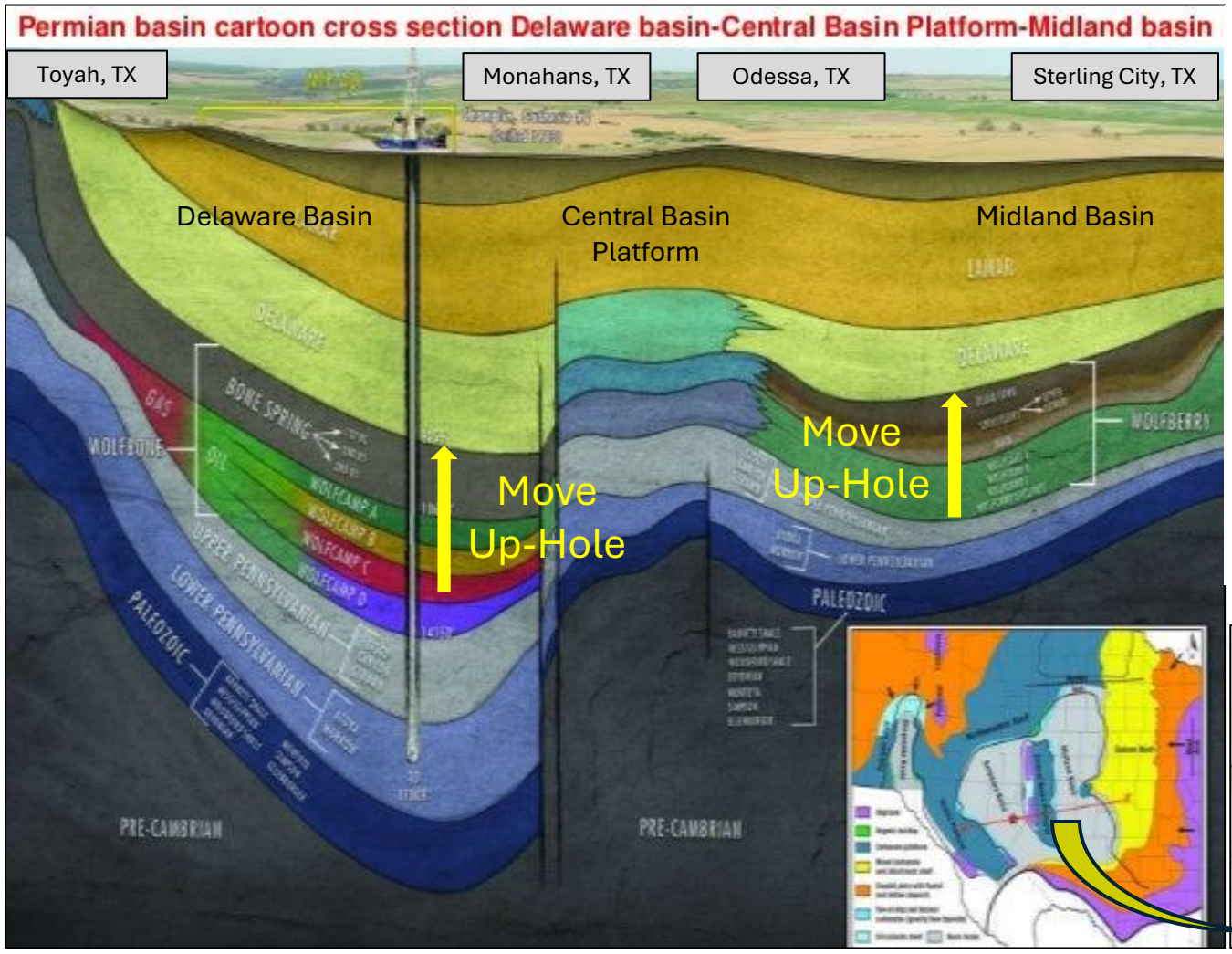
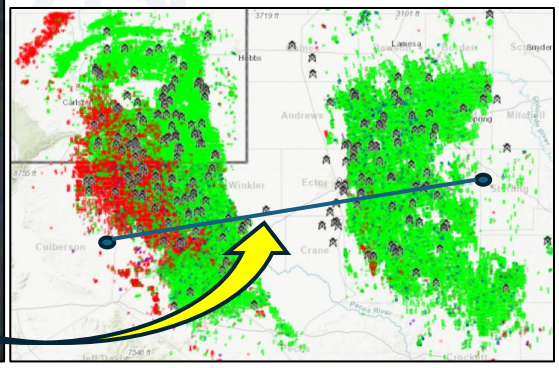
Up-Hole Targets



- Same principle as fringe
- Less depth = ↓ Pressure
- Less pressure = ↑ GOR
- Development Sequence:
  1. Wolfcamp
  2. Bone Spring/Sprayberry
  3. Avalon
  4. Delaware



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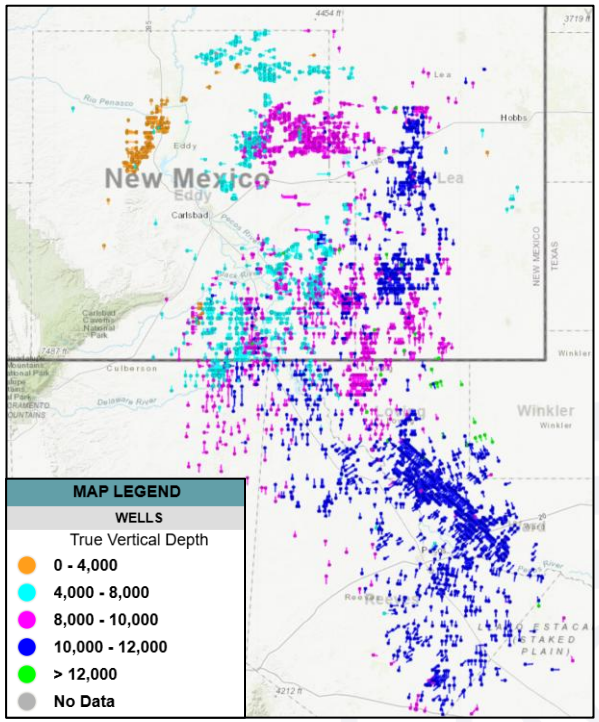
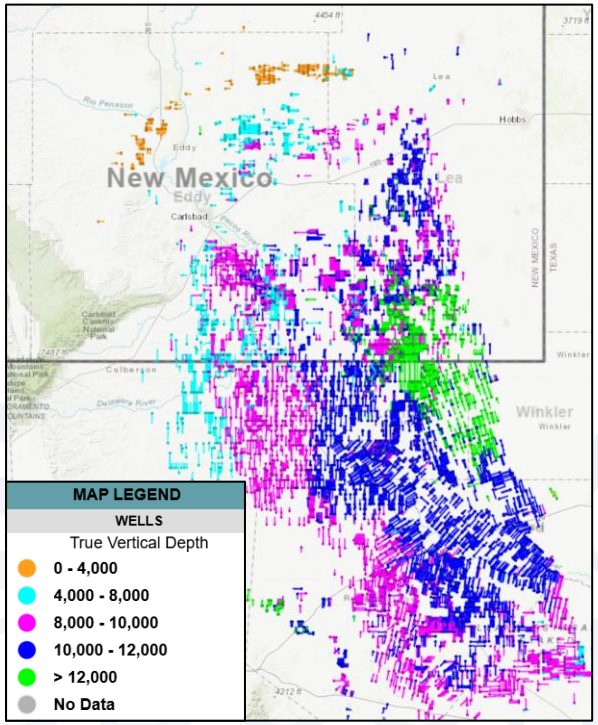
Up-Hole Targets – Maps by Depth Interval



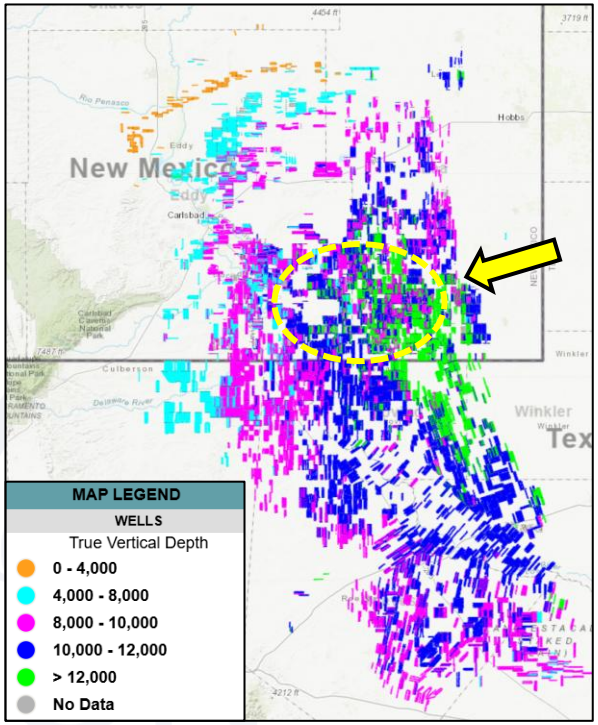
2010 – 2014

- **Exploratory window** for Delaware Basin, low density development in easy targets
- Operators **drilled parent wells**, **evaluated target productivity** and started contemplating **wells per section**



2015 – 2019

- **Frac renaissance**, infill/offset drilling, and **pushing boundaries of the basin**
- **Wolfcamp development dominates** this period, colors essentially showing depth of formation across Delaware



2020 – 2026

- Primary benches developed, **large scale development occurs** and **uphole drilling**
- **Shallower development** showing up in core of Delaware after deep development completed & producing

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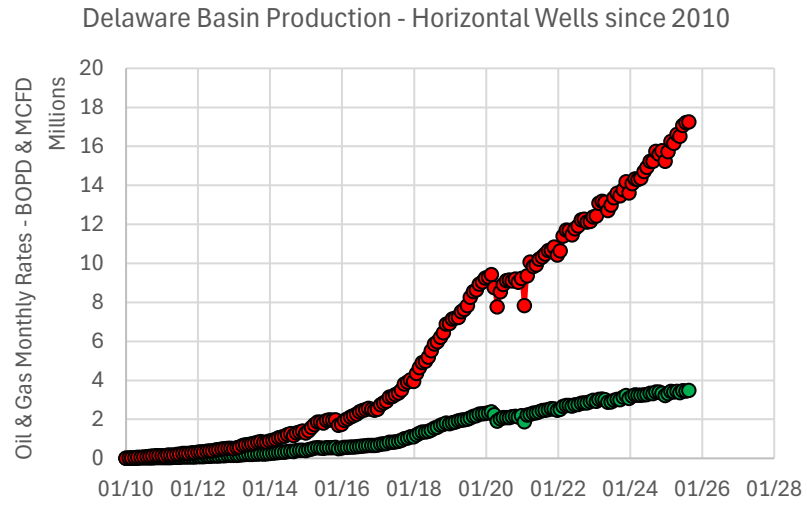
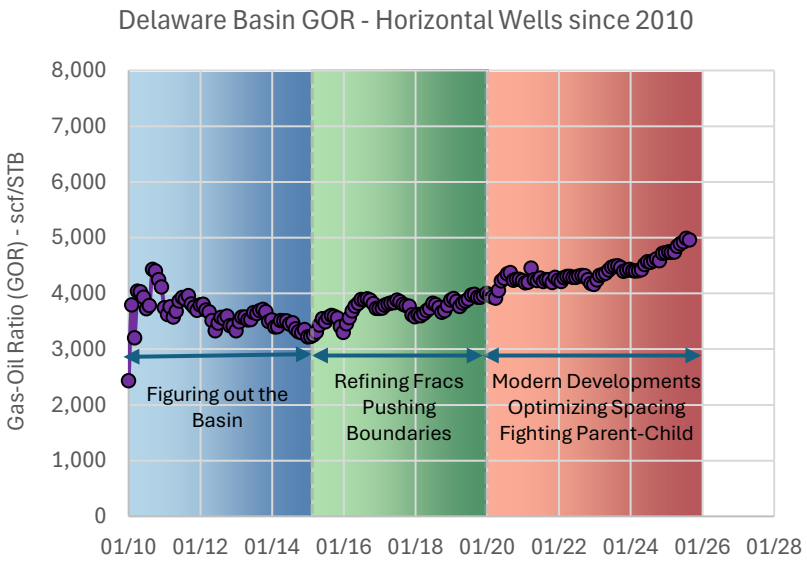
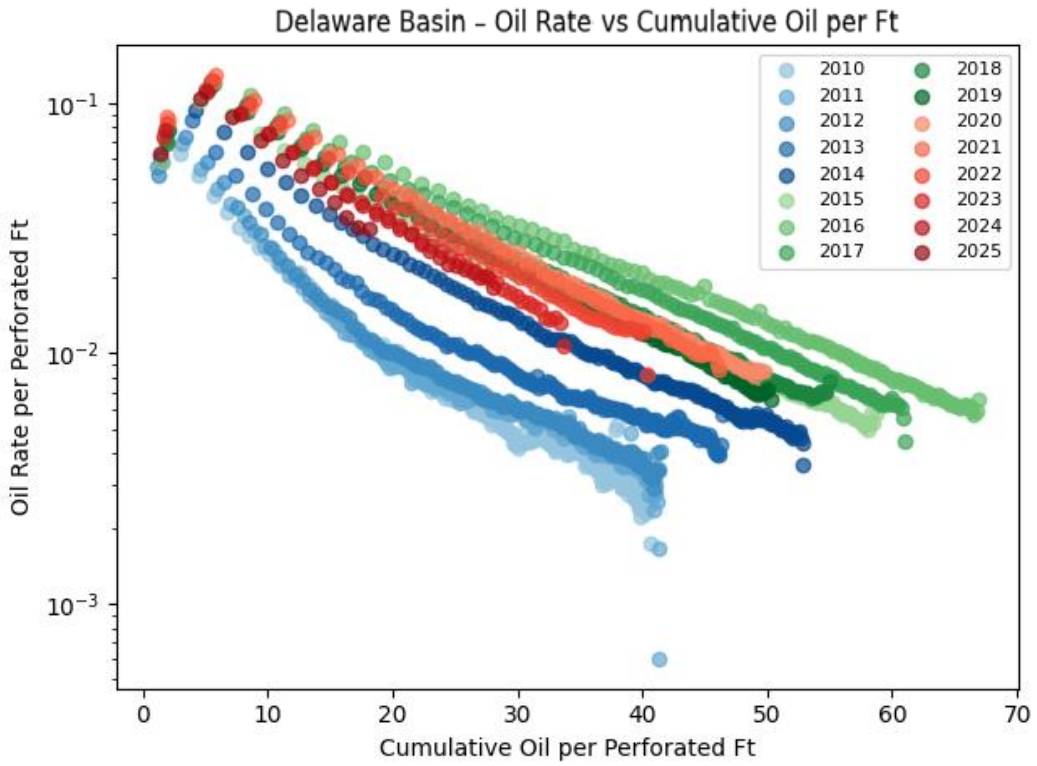
How this relates to Well Level Productivity?

Delaware Basin







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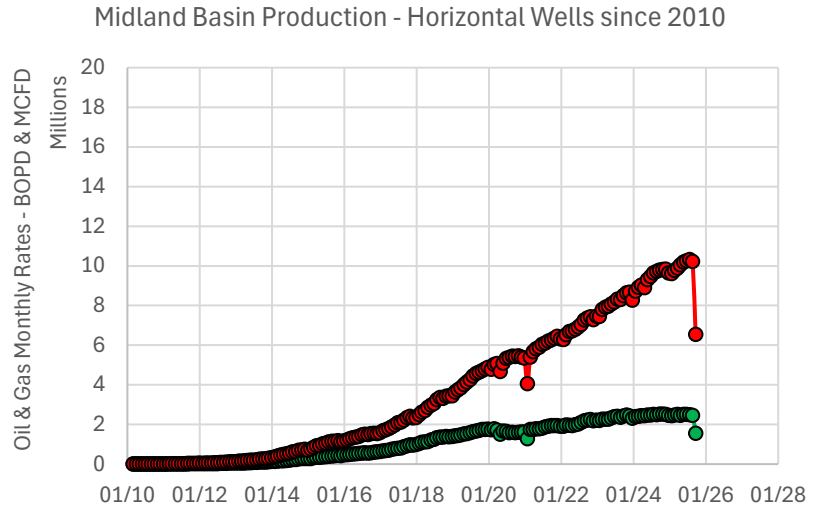
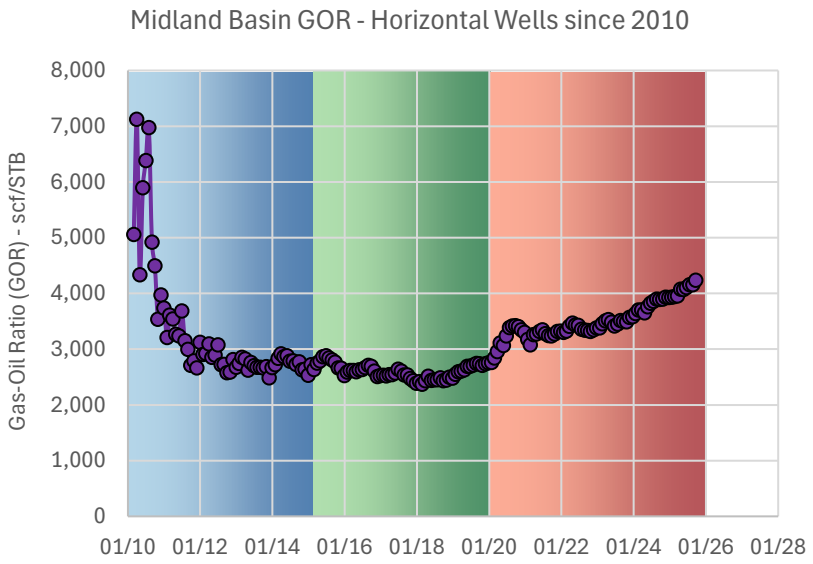
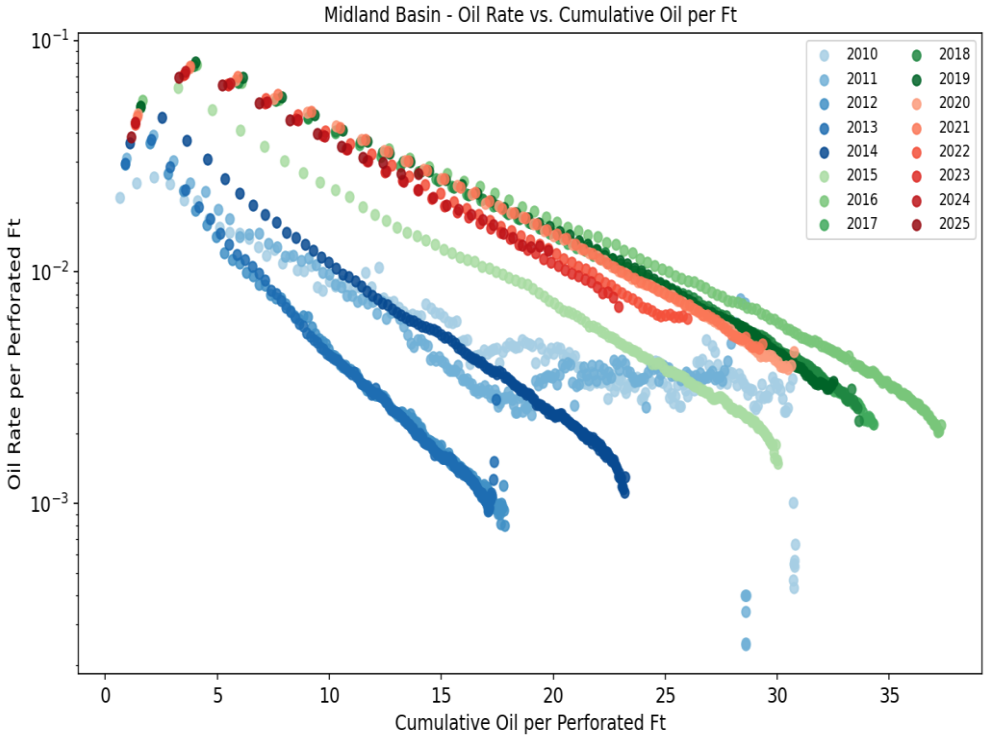
How this relates to Well Level Productivity?

Midland Basin







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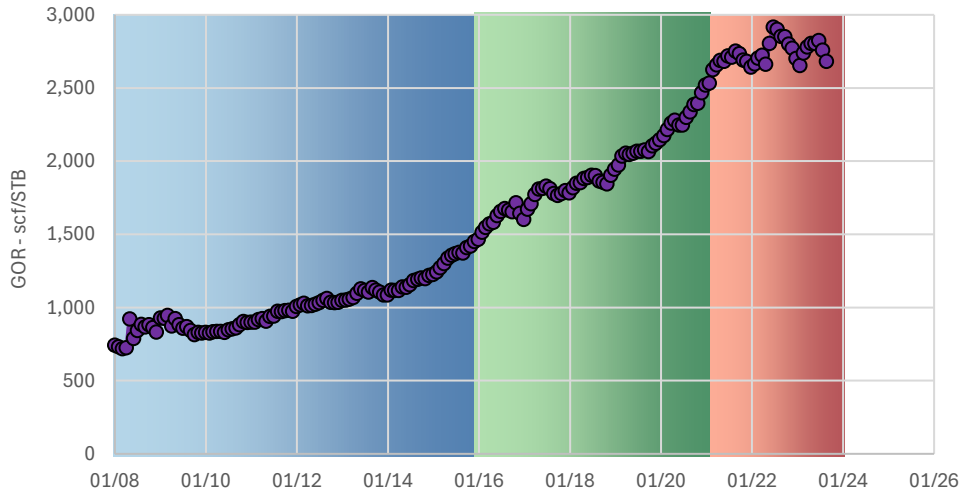
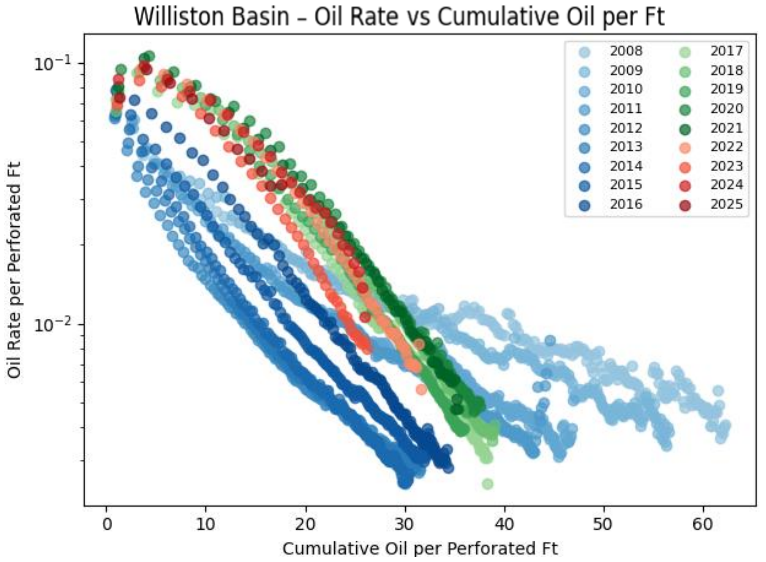
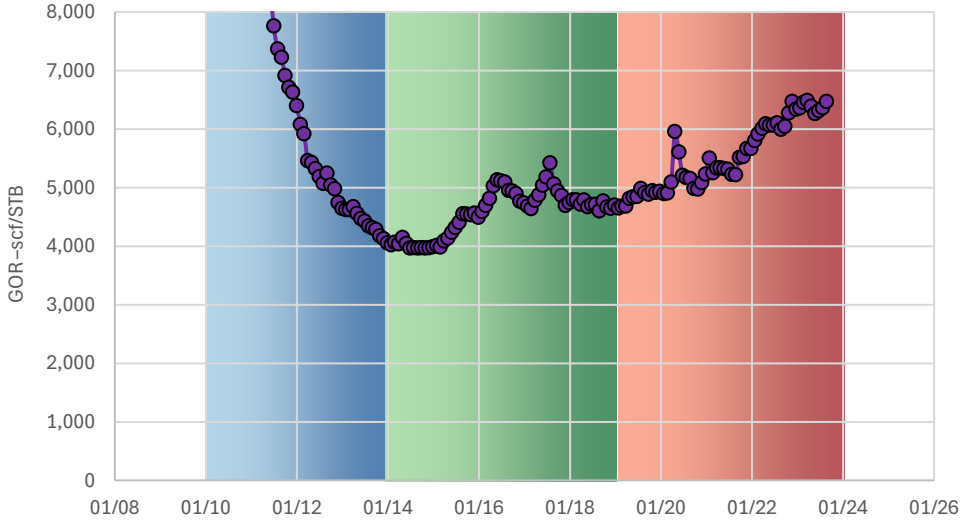
Did we see this in other Maturing Basins?

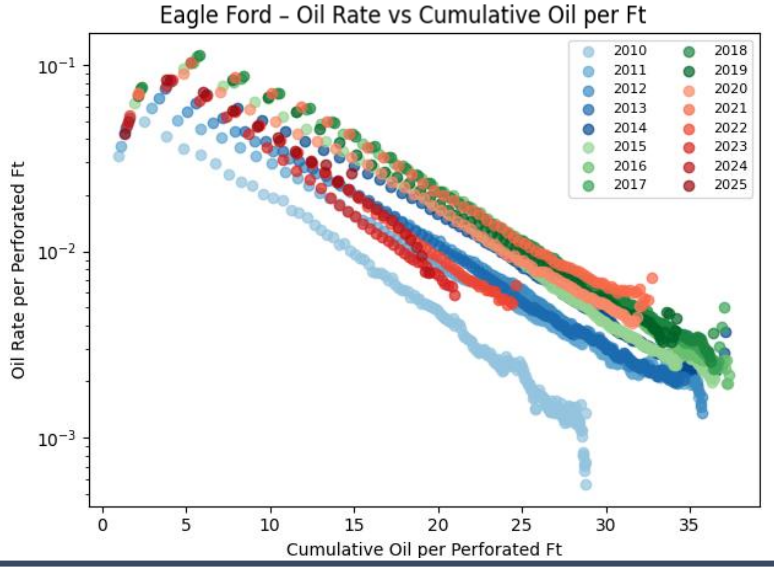
Williston Basin (Bakken)





Gulf Coast Basin (Eagle Ford)





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Summary

- **Rising GOR is a *symptom*, not the root cause**
  - Reflects less pressure, step-out developments (fringe & up-hole) and degraded well productivity
- **The Permian is maturing like other oil basins**
  - Like the Bakken and Eagle Ford, increased development intensity has driven GOR higher
- **Three structural drivers are increasing GOR in the Permian**
  - **Parent–Child well interference** → depletion, poorer frac efficiency
  - **Pushing the fringe** → shallower, lower-pressure reservoirs
  - **Up-Hole development** → inherently higher GOR targets
- **Implication:**
  - Rising GOR signals **diminishing oil productivity**, requiring:
    - smarter development sequencing
    - spacing optimization
    - capital discipline as basins mature
- **Takeaway:**
  - Peak Permian production will be here soon, my guess is the next few years

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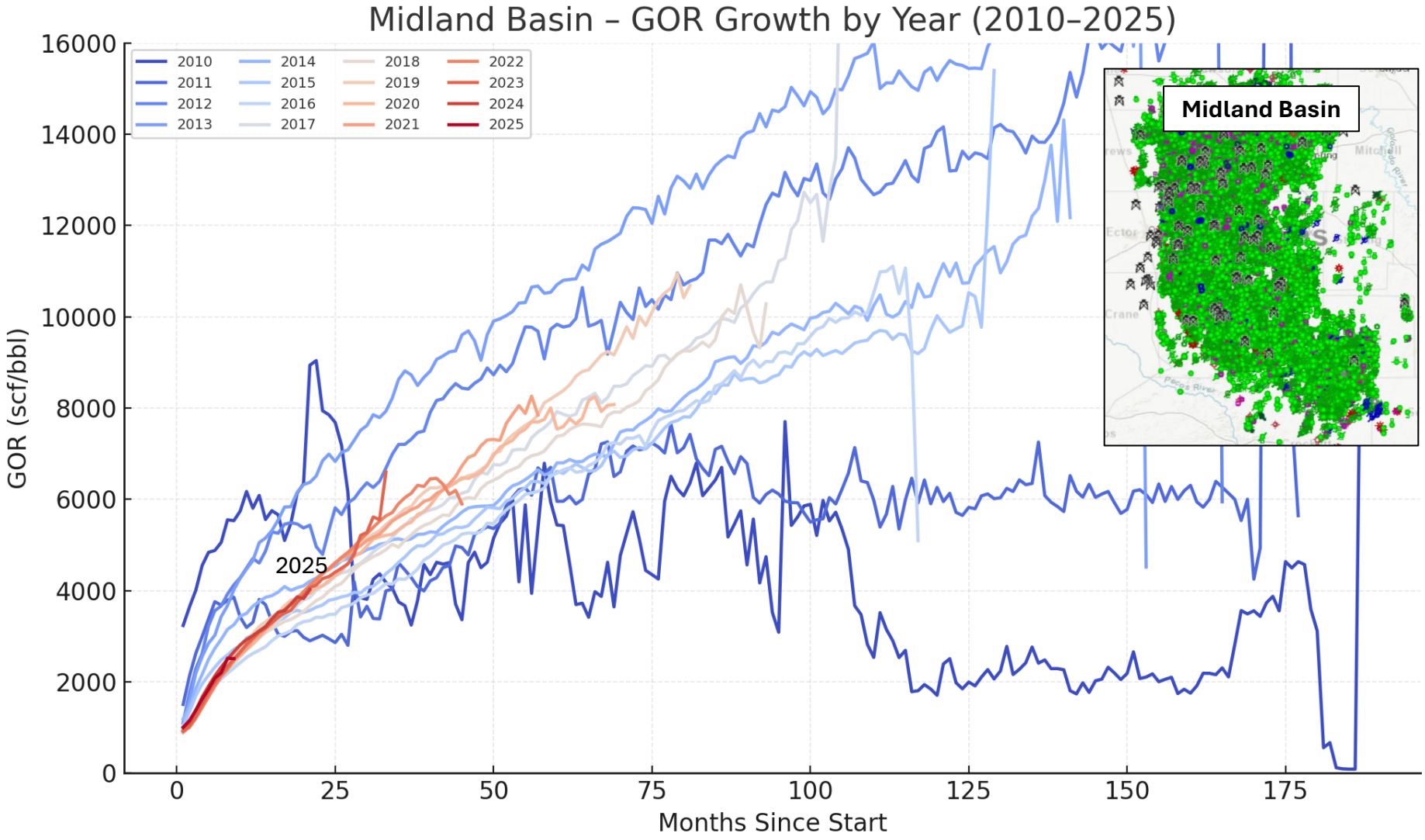
Midland Basin Gas-Oil Ratio (Well-Level)



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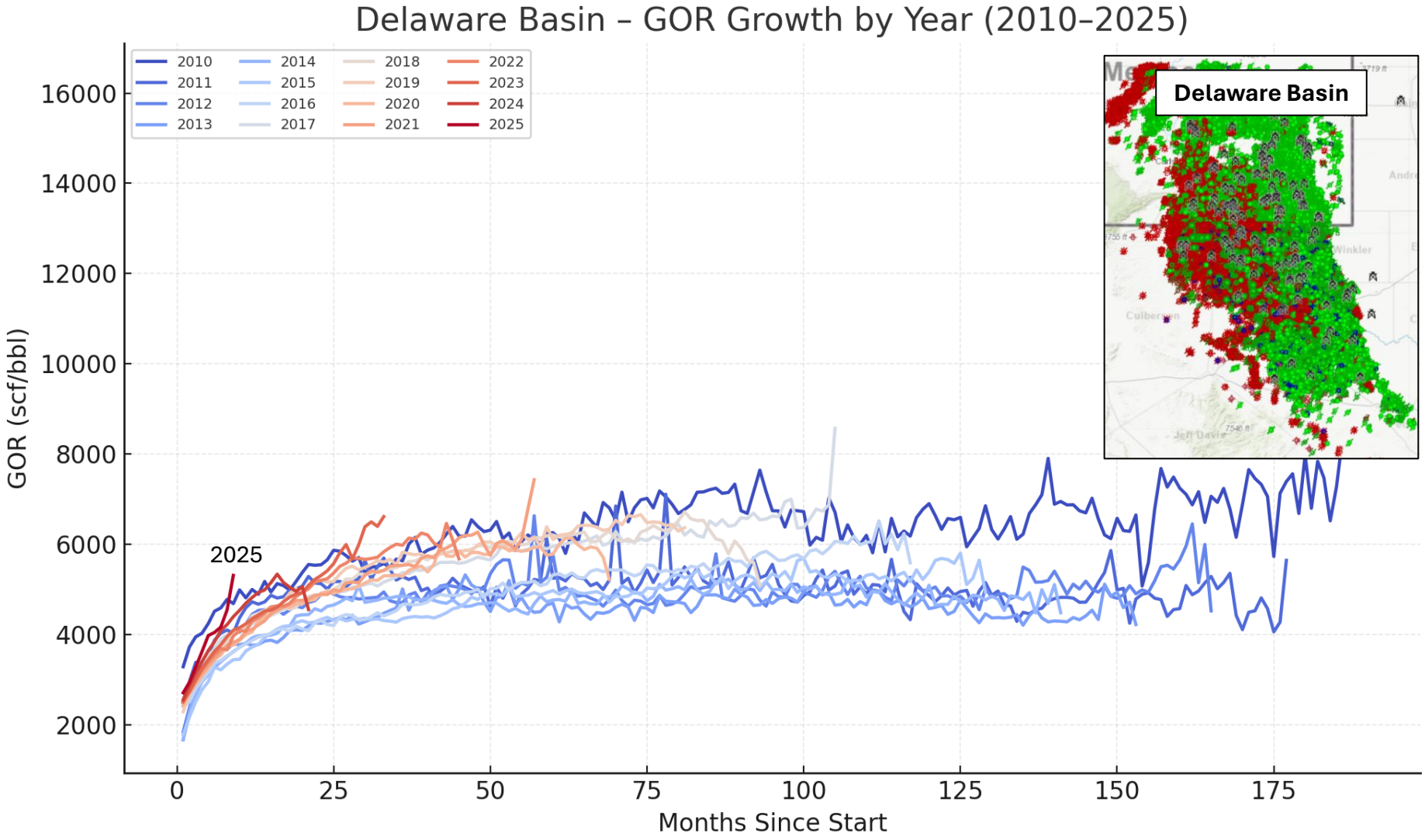
Delaware Basin Gas-Oil Ratio (Well-Level)



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