

## Assessing the Viability and Footprint of Six Underappreciated Secondary Intervals in the Permian Basin Category- International Case Studies and Exploration

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### Summary

Operators in the Permian Basin have focused on delineating the Wolfcamp XY, A and B, Bone Spring Sands and Lower Spraberry with nearly 90% of horizontal production coming from these intervals today. Relatively untapped resource potential exists beyond these targets with roughly 33% of the recoverable oil remaining in the 1st Bone Spring, 2nd Bone Spring and 3rd Bone Spring in the Delaware, and 45% of the recoverable oil in the Middle Spraberry, Jo Mill and Wolfcamp D in the Midland. To understand these intervals better we compared their geological characteristics, performance and economics to the well-proven Wolfcamp A, and introduced an economic and geological risk-tiering framework to highlight where these secondary intervals are most promising.

### Benchmarking

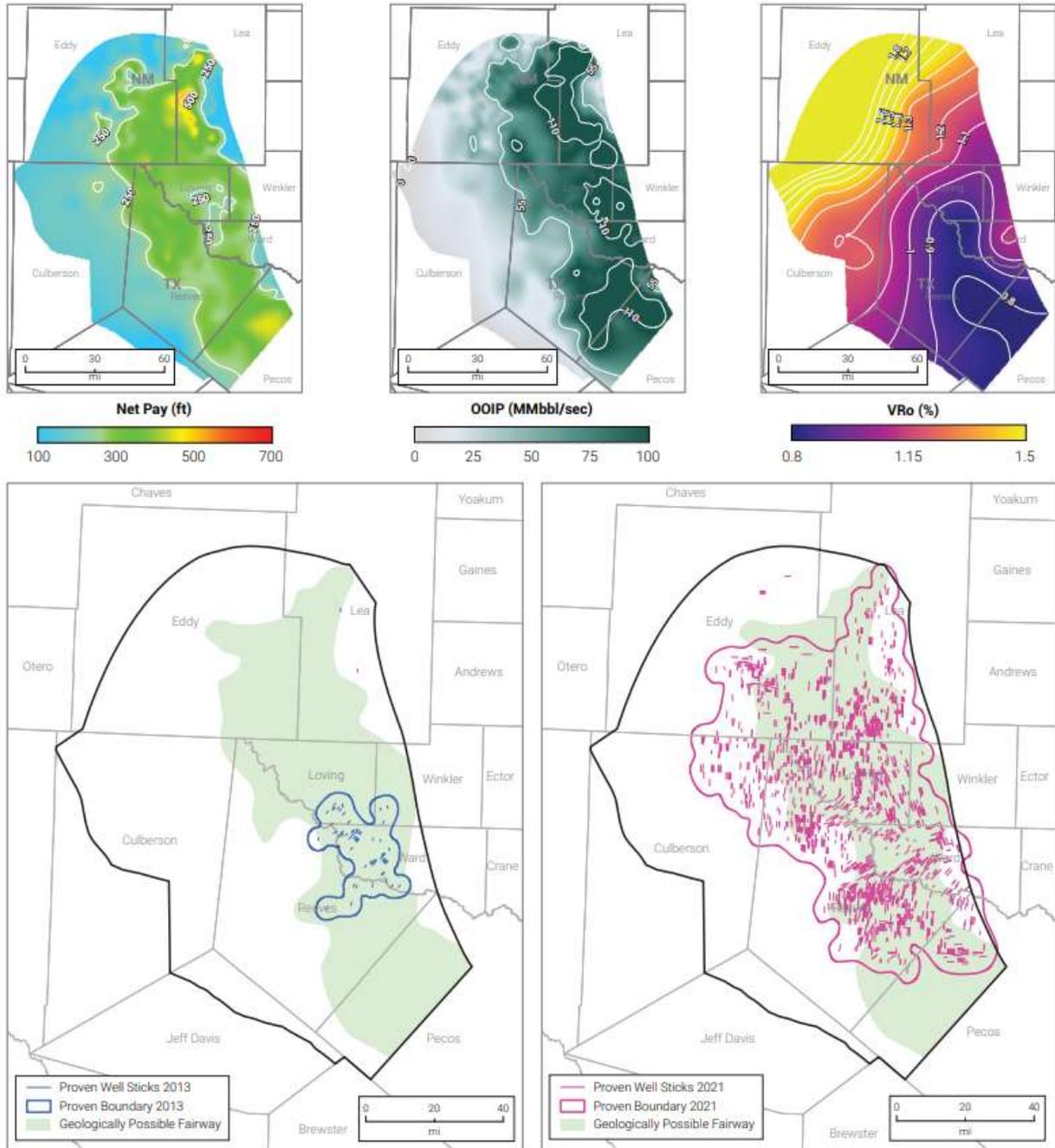
We compared the geology, economics and production of the secondary intervals to the Wolfcamp A, the most prolific interval in the basin, to get a sense of their viability. We found that on average these intervals are competitive with others in the Permian, with the highest breakeven underperforming the Wolfcamp A by only 13%. We also found that these intervals outperform most oil-weighted intervals in the U.S., with all six falling in the top 15.

### Risk-Tiering Methodology

To get an understanding of where in the Permian these secondary intervals are viable, we developed a risk-tiering framework with areas defined as proven (Tiers 1 and 2), proven with single wells (Tiers 3 and 4), geologically possible (Tier 5) and geologically unviable (Tier 6). The proven-extent or lowest-risk acreage was created by drawing a three-mile buffer around wells that break even below \$60/bbl excluding standalone wells. This is expanded into an area of higher risk when including standalone wells that break below \$60/bbl.

Due to the vertical heterogeneity in the Permian, it can be difficult to correlate interval average geological properties to production. By leveraging Enverus Transform to create a 3D model of original oil in place (OOIP), we were able to extract these values through a near wellbore rock tagging process to come out with a correlation to first-three-month oil recovery with an  $R^2$  of over 0.5. This correlation provided the confidence to use OOIP as a geological benchmarking parameter. To identify this fairway, we aligned contours of OOIP, net pay and vitrinite reflectance (VRo) to the proven extent. By testing this methodology on Wolfcamp A wells developed through 2013 we were able to predict expansion of its proven extent to date.

**FIGURE 1 |** Wolfcamp A Geologic Constraint Maps and Geologically Possible Fairway

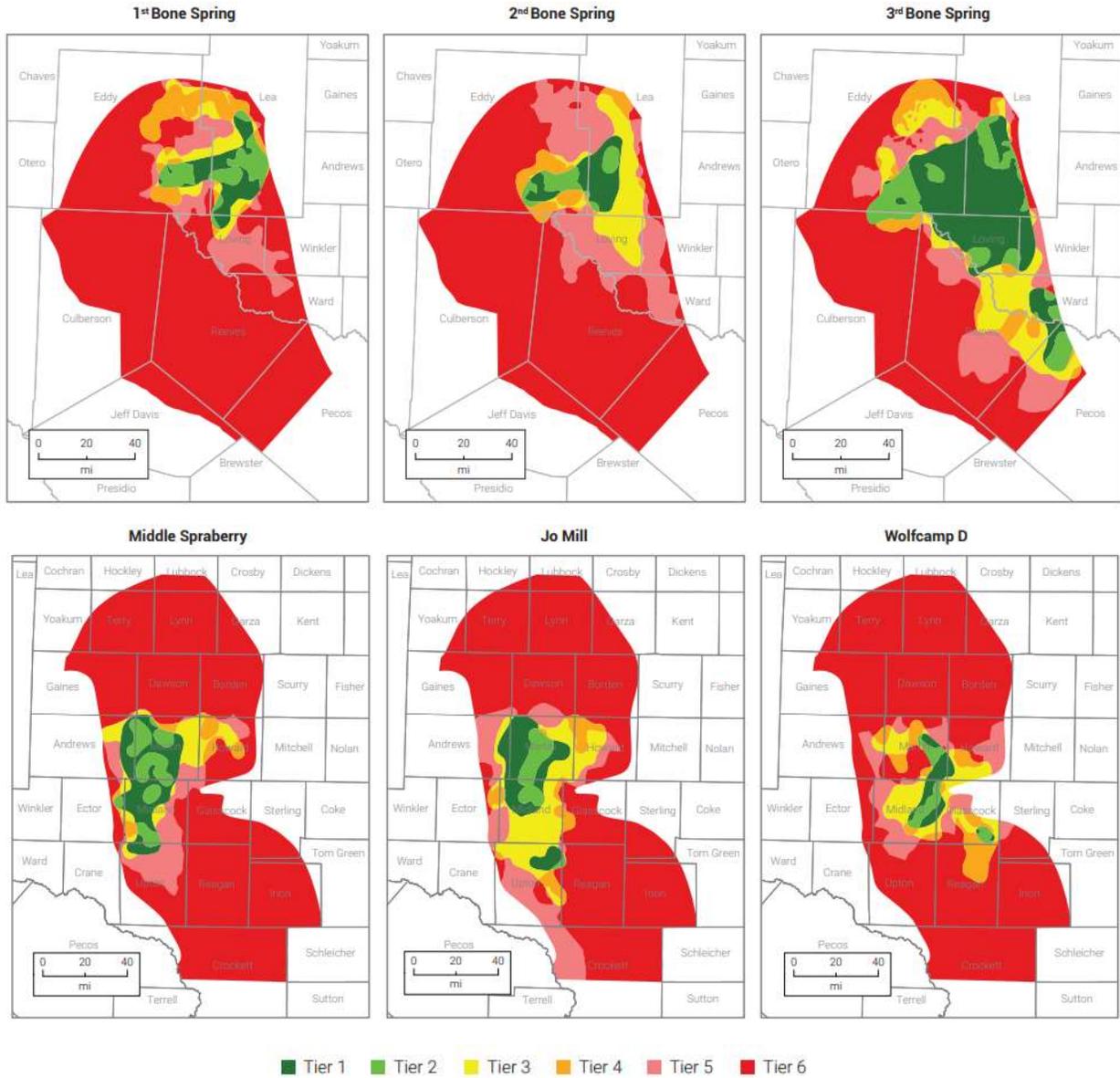


Note | Wolfcamp A geological constraints: OOIP > 55 MMbbl/sec, net pay > 250 feet, VRo > 0.6%  
 Source | Enverus

## Results

Combining both the economic risk tier polygons and geological risk tier polygons, we mapped the viability of all six secondary intervals across the Permian.

**FIGURE 2 | Secondary Interval Risk Tiering**



Source | Enverus