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National and Global Petroleum Assessment

Assessment of Undiscovered Oil and Gas Resources in the Bossier Formation Within the Onshore United States and State Waters of the Gulf Coast Region, 2025

Using a geology-based assessment methodology, the U.S. Geological Survey estimated undiscovered, technically recoverable mean resources of 3 million barrels of oil and 343.5 trillion cubic feet of gas in reservoirs of the Bossier Formation within the onshore United States and State waters of the Gulf Coast region.

Introduction

The U.S. Geological Survey (USGS) assessed the Jurassic Bossier Formation and its age-equivalent strata for undiscovered, technically recoverable petroleum resources within the onshore United States and State waters of the Gulf Coast region (fig. 1). Approximately 2,000 wells have targeted the Bossier Formation in the onshore Gulf Coast region (S&P Global Commodity Insights, 2025). Since the last USGS assessment of oil and gas resources in the Bossier Formation by Paxton and others (2017), exploration drilling on the western flank of the East Texas Basin has revealed deep, highly overpressured productive shales (Morenne, 2025), warranting a reevaluation of the resources of the Bossier Formation.

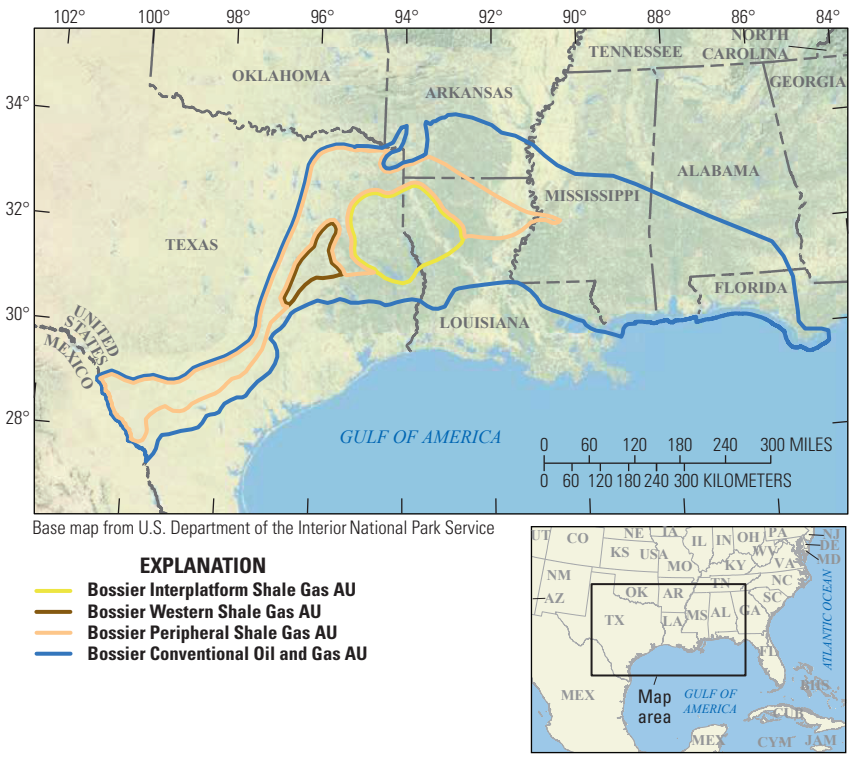

Figure 1. Map showing the location of three continuous and one conventional assessment units (AUs) in the Bossier Formation.

Total Petroleum System and Assessment Units

The USGS defined an Upper Jurassic–Cretaceous–Tertiary Composite Total Petroleum System (TPS) encompassing oil and gas throughout the Gulf Coast region. Gas in shales of the Bossier Formation may be mainly self-sourced but may also be augmented by gas from the underlying Smackover and Haynesville Formations. The Bossier Formation is widespread in the subsurface of Texas, Arkansas, Louisiana, Mississippi, Alabama, and Florida. The spatial extent of three continuous and one conventional assessment units (AUs) in the Bossier Formation was defined within the Upper Jurassic–Cretaceous–Tertiary Composite TPS based on differing aspects of geology, petroleum system elements, and technical drilling limits related to pressure and temperature (Whidden and others, 2023).

The Bossier Interplatform Shale Gas AU, which is the main area for shale gas production of the Bossier Formation, is largely defined by the boundary of the positive structural element of the Sabine Uplift (Cicero and Steinhoff, 2013). Horizontal drilling targets gas in fractured shales of the Bossier Formation throughout the uplift. The extent and density of fracturing may be related to structural movements of the Sabine Uplift. The geologic model for the Bossier Interplatform Shale Gas AU is for gas generated from shales of the Bossier Formation, possibly augmented by gas from the Smackover and Haynesville Formations, to be retained within the matrix and fractures of the shales of the Bossier Formation.

The Bossier Western Shale Gas AU is defined by a pod of highly overpressured shales in the Bossier Formation adjacent to faults defining the western margin of the East Texas Basin. Horizontal drilling has shown that parts of the Bossier Formation are characterized by substantial overpressure, where the overpressured shales are close to or exceeding the fracture

gradient as interpreted from mud weight data (S&P Global Commodity Insights, 2025). This AU is commonly referred to as the "Western Haynesville" by industry (Wright, 2024; Morenne, 2025), but the gas is being produced from shales of the Bossier Formation according to an analysis of well logs, seismic data, and well landing zones. Production from the few wells drilled in this AU shows that estimated ultimate recoveries (EURs) are substantially higher than those of typical shales of the Bossier Formation (table 1). From an assessment perspective, given that few wells have been drilled in this AU, it was difficult to categorize the gas in this overpressured pod of shales in the Bossier Formation as being part of a conventional or a continuous gas accumulation. The decision was made to assess the western Bossier Formation as a continuous gas accumulation. The geologic model is for gas to be trapped in highly overpressured, fractured, high-temperature, organic-rich shales of the Bossier Formation.

The Bossier Peripheral Shale Gas AU is defined as the area of shale of the Bossier Formation outside of the areas of the Bossier Interplatform Shale Gas AU and Bossier Western Shale Gas AU. There is little drilling data from this AU, but the EURs are generally lower in this AU compared to the Bossier Interplatform Shale Gas AU, possibly due to a lower density of fractures. The geologic model is for gas sourced from shales of the Bossier Formation to be in the matrix and fractures, possibly along with gas from the Smackover and Haynesville Formations.

The Bossier Conventional Oil and Gas AU consists of sandstone and carbonate reservoirs in structural and stratigraphic traps sourced by several Jurassic source rocks in the Upper Jurassic–Cretaceous–Tertiary Composite TPS. The updip boundary of this AU is defined by the following: (1) where sandstones and carbonate reservoirs of the Bossier Formation have been eroded or are not present by nondeposition, (2) the downdip technical drilling limits, and (3) the boundary between State and Federal waters. Sandstone-rich depositional systems are prevalent in the Bossier Formation where paleofluvial systems prograded into the area (Snedden and Galloway, 2019). Stratigraphic facies changes, local salt tectonics, and faulting create the known trapping mechanisms in the Bossier Formation conventional reservoirs. The geologic model is for gas from the Bossier Formation, and possibly from the Smackover and Haynesville Formations, to have migrated updip into structural and stratigraphic traps. The general lack of sealing lithologies may be a limiting factor in the resource potential in this AU. The key input data for the four Bossier Formation AUs are shown in table 1 and Gardner (2026).

Table 1. Key input data for three continuous and one conventional assessment units in the Bossier Formation.

[Gray shading indicates not applicable. The average estimated ultimate recovery (EUR) input is the minimum, mode, maximum, and calculated mean. AU, assessment unit; %, percent; MMBO, million barrels of oil; BCFG, billion cubic feet of gas]

Assessment input data—Continuous AUs	Bossier Interplatform Shale Gas AU				Bossier Western Shale Gas AU			
	Minimum	Mode	Maximum	Calculated mean	Minimum	Mode	Maximum	Calculated mean
Potential production area (acres)	1,000	4,400,000	8,700,000	4,367,000	1,000	1,100,000	2,200,000	1,100,333
Average drainage area (acres)	160	200	240	200	90	130	170	130
Success ratio (%)	91	95	99	95	91	95	99	95.0
Untested area (%)	99.4	99.4	99.4	99.4	99.7	99.7	99.7	99.7
Average EUR (MMBO)	3	4	6	4.093	15	25	35	25.34
AU probability	1.0				1.0			

Assessment input data—Continuous AUs	Bossier Peripheral Shale Gas AU			
	Minimum	Mode	Maximum	Calculated mean
Potential production area (acres)	1,000	10,900,000	21,700,000	10,867,000
Average drainage area (acres)	160	200	240	200
Success ratio (%)	10	50	90	50
Untested area (%)	100	100	100	100.0
Average EUR (MMBO)	1	2	3	2.034
AU probability	1.0			

Assessment input data—Conventional AUs	Bossier Conventional Oil and Gas AU			
	Minimum	Median	Maximum	Calculated mean
Number of oil fields	1	3	12	3.3
Number of gas fields	1	30	120	33.1
Size of oil fields (MMBO)	0.5	0.8	10	1.0
Size of gas fields (BCFG)	3	12	300	19.7
AU probability	1.0			

Undiscovered Resources Summary

The USGS quantitatively assessed three continuous and one conventional AUs for undiscovered oil, gas, and natural gas liquid resources in the Bossier Formation. The estimated mean total resources in the four AUs are 3 million barrels of oil (MMBO), with an F95–F5 range from 1 to 8 MMBO; 343,499 billion cubic feet of gas (BCFG), or 343.5 trillion cubic feet of gas, with an F95–F5 range from 103,943 to 611,703 BCFG; and 374 million barrels of natural gas liquids (MMBNGL), with an F95–F5 range from 109 to 721 MMBNGL (table 2).

Table 2. Results for three continuous and one conventional assessment units in the Bossier Formation.

[Gray shading indicates not applicable. Results shown are fully risked estimates. F95 represents a 95-percent chance of at least the amount tabulated; other fractiles are defined similarly. MMBO, million barrels of oil; BCFG, billion cubic feet of gas; NGL, natural gas liquids; MMBNGL, million barrels of natural gas liquids]

Total petroleum system and assessment units (AUs)	AU probability	Accumulation type	Total undiscovered resources											
			Oil (MMBO)				Gas (BCFG)				NGL (MMBNGL)			
			F95	F50	F5	Mean	F95	F50	F5	Mean	F95	F50	F5	Mean
Upper Jurassic–Cretaceous–Tertiary Composite Total Petroleum System														
Bossier Interplatform Shale Gas AU	1.0	Gas					26,562	83,260	144,923	84,253	25	80	157	84
Bossier Western Shale Gas AU	1.0	Gas					63,545	200,546	352,689	203,200	59	194	380	203
Bossier Peripheral Shale Gas AU	1.0	Gas					13,592	50,978	112,807	55,395	13	49	119	55
Total undiscovered continuous oil and gas resources							**103,699**	**334,784**	**610,419**	**342,848**	**97**	**323**	**656**	**342**
Bossier Conventional Oil and Gas AU	1.0	Oil	1	3	8	3	1	3	8	3	0	0	1	0
		Gas					243	584	1,276	648	12	29	64	32
Total undiscovered conventional oil and gas resources			**1**	**3**	**8**	**3**	**244**	**587**	**1,284**	**651**	**12**	**29**	**65**	**32**
Total undiscovered oil and gas resources			**1**	**3**	**8**	**3**	**103,943**	**335,371**	**611,703**	**343,499**	**109**	**352**	**721**	**374**

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Photograph of an outcrop of the Bossier Formation-equivalent Pimienta Formation in the central Huayacocotla Basin, State of Hidalgo, Mexico, showing alternating limestone, bentonite, and organic-rich shale deposited in a semirestricted marine setting. The Bossier Formation is restricted to the subsurface of the United States; therefore, outcrops of equivalent strata in Mexico provide valuable observations not obtainable in the U.S. Gulf Coast region. Geology hammer shown for scale. Photograph by Mario Martínez-Yáñez, used with permission.

For More Information

Assessment results are also available at the USGS Energy Resources Program website, https://www.usgs.gov/programs/energy-resources-program.

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