

Stratigraphic Interpretation of Lower Cretaceous Strata in Onshore Southeast Texas and Louisiana from 2-D Seismic Data

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The U.S. Geological Survey (USGS) is currently conducting an assessment of the technically recoverable undiscovered oil and gas resources in Lower Cretaceous strata of the U.S. Gulf of Mexico Coastal Plain and State Waters. Though extensively explored and produced, these strata may still contain significant volumes of undiscovered oil and gas resources. Detailed stratigraphic interpretation in this region is critical for determining the vertical and areal extent of possible hydrocarbon reservoir units.

For this study, 30 migrated 2D seismic surveys across parts of Southeast Texas and South Louisiana were interpreted in conjunction with well log data and regional cross sections. The seismic data set used is a compilation of several data sets consisting of cross-cutting lines that are regional in extent, where half run roughly perpendicular and half run parallel to stratigraphic dip. These seismic interpretations are being studied to improve our understanding of geologic and total petroleum system models applied to the assessment. In particular, the interpretations are used to evaluate existing depositional and sequence-stratigraphic models of the carbonate shelf complex and reef trends, and to recognize facies patterns that might identify potential reservoirs and stratigraphic traps for petroleum accumulations. For this reason, the focus of this seismic study was on Lower Cretaceous formations associated with significant reef build-up, specifically the Sligo, Glen Rose-Mooringsport, and Edwards-Stuart City Formations.

For the purposes of the assessment the formations were divided into back reef, shelf margin reef build up, and fore-reef assessment units to identify reservoirs that would have genetically similar hydrocarbons with respect to source, migration, burial history and maturation. Therefore, back reef environments characterized by continuous, high amplitude reflectors, reef complex environments characterized by thick intervals of low amplitude reflectors, and fore-reef environments characterized by thin, dipping, high amplitude reflectors were interpreted for the Sligo, Glen Rose-Mooringsport and Edwards-Stuart City Formations from the seismic surveys. The resulting seismic interpretations were used to provide additional constraints on isopach interpretations derived from well log formation tops, and to more precisely define the locations of the reef margins, which will enable a more accurate determination of assessment unit volumes.