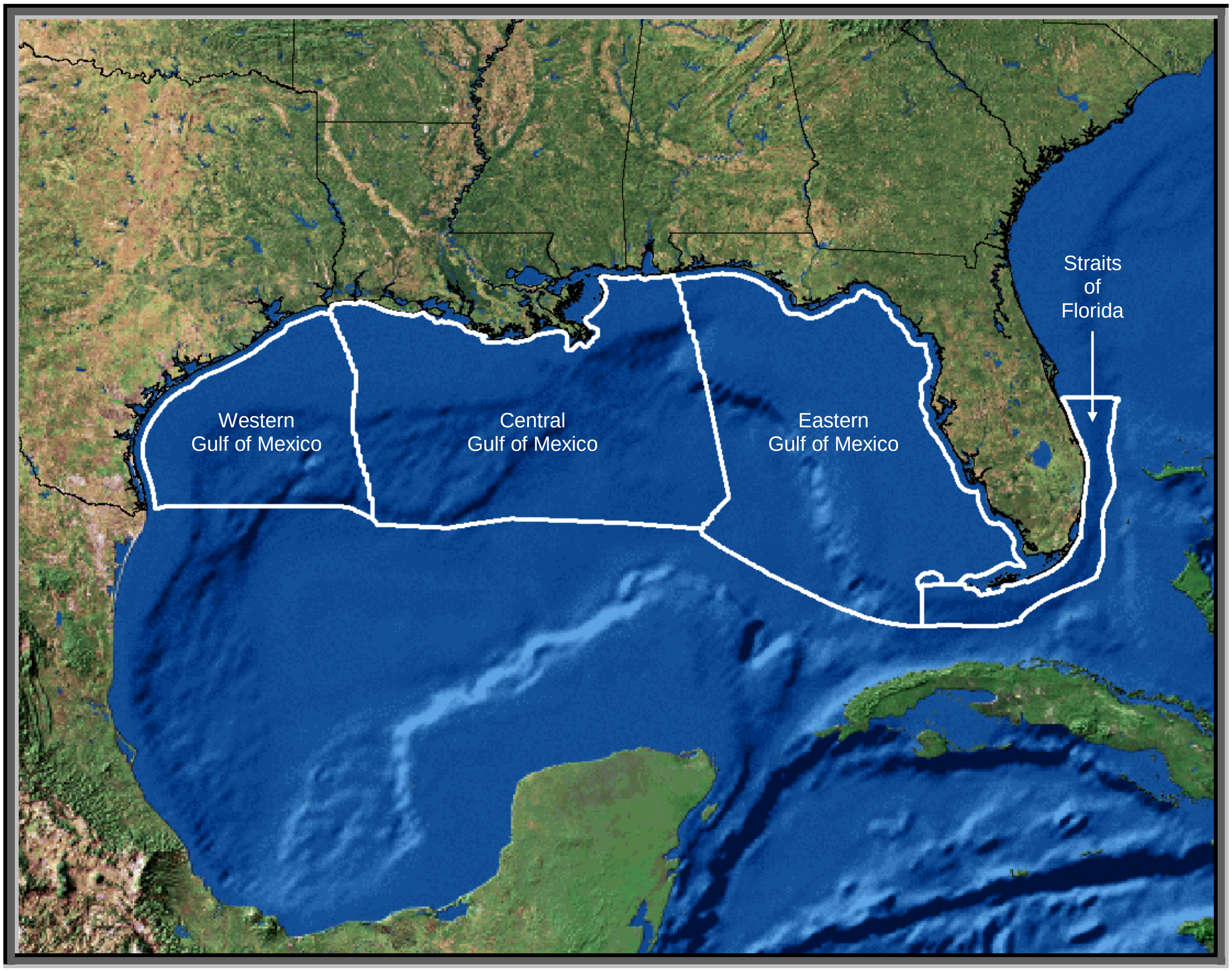
BOEM
Bureau of Ocean Energy Management

Assessment of Technically Recoverable Hydrocarbon Resources of the Gulf of Mexico Outer Continental Shelf as of January 1, 2009



U.S. Department of the Interior
Bureau of Ocean Energy Management
Gulf of Mexico OCS Regional Office
Office of Resource Evaluation

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INTRODUCTION

This assessment by the Bureau of Ocean Energy Management (BOEM) provides estimates of the undiscovered, technically and economically recoverable oil and natural gas resources located outside of known oil and gas fields for the Gulf of Mexico (GoM) portion of the Federal Outer Continental Shelf (OCS) (**see title page**). The OCS comprises the portion of the submerged seabed whose mineral estate is subject to Federal jurisdiction.

This assessment represents a comprehensive appraisal that considered recent geophysical, geological, technological, and economic data and information available as of January 1, 2009, incorporated advances in petroleum exploration and development technologies, and employed new methods of resource assessment. A play-based approach to estimate the undiscovered resources of oil and gas was used. This methodology is suitable for both conceptual plays where there is little or no specific information available, and for established plays where there are discovered oil and gas fields and considerable information is available. A major strength of this method is that it has a strong relationship between information derived from oil and gas exploration activities and the geologic model developed by the assessment team. An extensive effort was involved in developing play models, delineating the geographic limits of each play, and compiling data on critical geologic and reservoir engineering parameters. These parameters were crucial input in the determination of the total quantities of recoverable resources in each play. Due to the inherent uncertainties associated with an assessment of undiscovered resources, probabilistic techniques were employed and the results reported as a range of values corresponding to different probabilities of occurrence. For plays in areas with sparse data, analogs were developed using subjective probabilities to cover the range of uncertainties. For mature areas with significant amounts of data, plays were analyzed using a method based on statistical parameters of discovered pools and historical trends.

The petroleum commodities assessed in this inventory are crude oil, natural gas liquids (condensate), and natural gas that exist in conventional reservoirs and are producible with conventional recovery techniques. Crude oil and condensate are reported jointly as oil; associated and nonassociated gas are reported jointly as gas. Oil volumes are reported as stock tank barrels and gas as standard cubic feet. Oil-equivalent gas is a volume of gas (associated and/or nonassociated) expressed in terms of its energy equivalence to oil (i.e., 5,620 cubic feet of gas per barrel of oil) and is reported in barrels. The combined volume of oil and oil-equivalent gas resources is referred to as barrels of oil equivalent (BOE) and is reported in barrels. This assessment does not include potentially large quantities of hydrocarbon resources that could be recovered from known and future fields by enhanced recovery techniques, gas in geopressured brines, natural gas hydrates, or oil and natural gas that may be present in insufficient quantities or quality (low permeability “tight” reservoirs) to be produced by conventional recovery techniques. In some instances the boundary between these resources is somewhat indistinct; however, any significant volume of unconventional resources are not included in this assessment.

The undiscovered resources resulting from this study are categorized as (1) undiscovered technically recoverable resources (UTRR) that may be produced as a consequence of natural pressure, artificial lift, pressure maintenance, or other secondary recovery methods and (2) undiscovered economically recoverable resources (UERR), which is the portion of the UTRR that is economically recoverable under imposed economic and technologic conditions. The BOEM estimates the mean UTRR in the OCS of the GoM to be 48.4 billion barrels of oil and 219.5 trillion cubic feet of natural gas (total of 87.5 billion barrels of oil equivalent).

This report briefly summarizes the geology and technologic considerations of the GoM, presents play maps, and provides assessment results in abbreviated tabular form. Estimates of UTRR are presented at 95th and 5th percentile levels, as well as the mean estimate. This range of estimates corresponds to a 95-percent probability (a 19 in 20 chance) and a 5-percent probability (a 1 in 20 chance) of there being more than those amounts present, respectively. The 95- and 5-percent probabilities are considered reasonable minimum and maximum values, and the mean is the average or expected value. Estimates of the quantities of total reserves (sum of proved reserves, unproved reserves, and reserves appreciation) and total endowment (sum of total reserves and UTRR) are presented to provide a frame of reference for analyzing the estimates of UTRR.

CENOZOIC GULF OF MEXICO

CENOZOIC ASSESSMENT UNITS

For this inventory of the UTRR in the Cenozoic sediments of the U.S. Gulf of Mexico OCS, the geologic analyses inherent in resource assessments occur at the play level. As with past GoM assessments, each reservoir with proved or unproved reserves in a BOEM-designated field is evaluated and assigned to a distinctive play that shares common geologic factors which influence the accumulation of hydrocarbons. The reservoirs are then aggregated to the sand level, and subsequently each sand is aggregated to the pool level. Reserves appreciation is then applied to these pool-level proved and unproved hydrocarbon volumes. Herein, a pool is the aggregation of all sands within a single field that occur in the same play. These Cenozoic plays are then aggragated into “assessment units” for modeling purposes based on the following two criteria.

1. Geographic Setting (**Figure 1**):
    - modern shelf
    - modern slope

2. Geologic Age (**Table 1**):
    - Pleistocene
    - Pliocene
    - Upper Miocene
    - Middle Miocene
    - Lower Miocene
    - Lower Tertiary

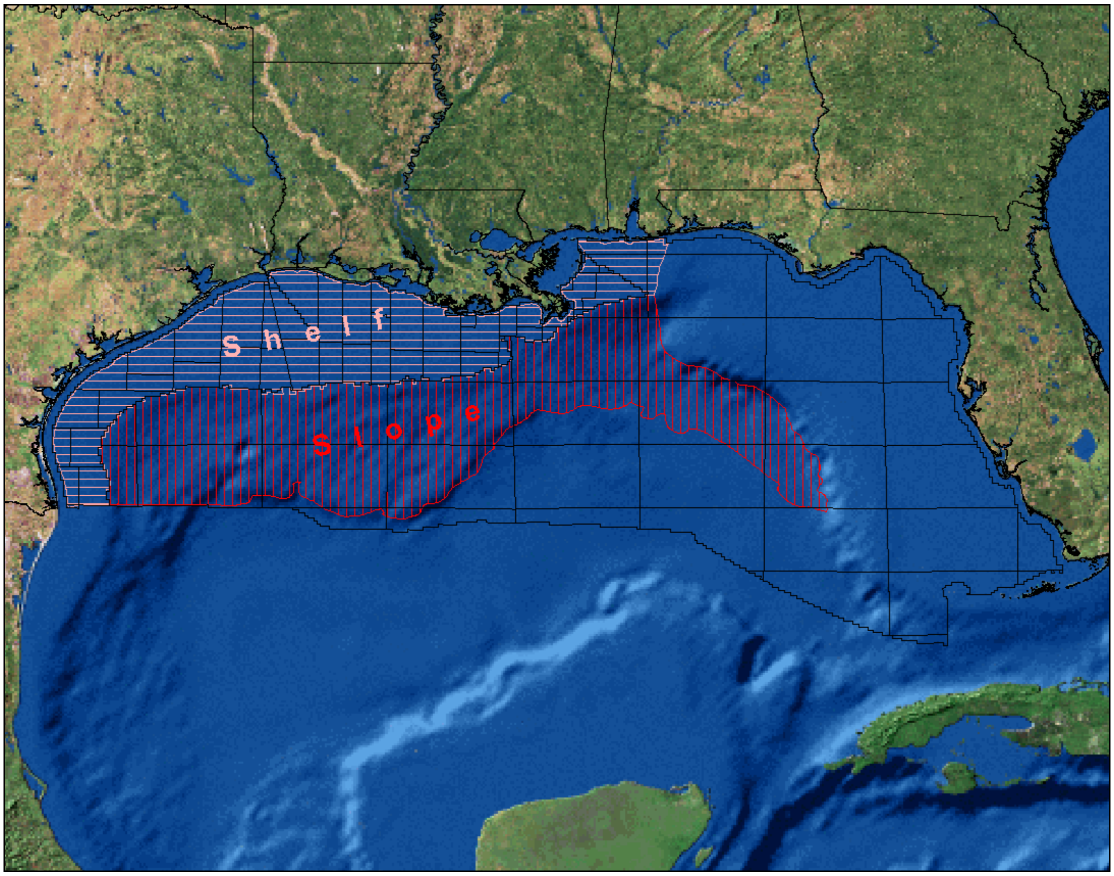

Figure 1. Map of the Gulf of Mexico showing the locations of the shelf and slope assessment units.

This combination results in 12 Cenozoic assessment units, six on the modern shelf and six on the modern slope.

- Pleistocene Shelf
- Pliocene Shelf
- Upper Miocene Shelf
- Middle Miocene Shelf
- Lower Miocene Shelf
- Lower Tertiary Shelf
- Pleistocene Slope
- Pliocene Slope
- Upper Miocene Slope
- Middle Miocene Slope
- Lower Miocene Slope
- Lower Tertiary Slope

Chronostratigraphy						Biostratigraphy	
Erathem	System		Series		Chronozone	Foraminifer	Nannoplankton
Cenozoic	Quaternary		Pleistocene		Upper Pleistocene	Globorotalia flexuosa Sangamon fauna	Emiliania huxleyi (base of acme) Gephyrocapsa oceanica (flood) Gephyrocapsa caribbeanica (flood)
					Middle Pleistocene	Trimosina "A"	Helicosphaera inversa Gephyrocapsa parallela Pseudoemiliania ovata
					Lower Pleistocene	Stilostomella antillea Trimosina "A" (acme) Hyalinea "B" / Trimosina "B" Angulogerina "B" Uvigerina hispida	Pseudoemiliania lacunosa "C" (acme) Calcidiscus macintyrei
	Tertiary	Upper	Pliocene		Upper Pliocene	Globorotalia crassula (acme) Lenticulina 1 Globoquadrina altispira Textularia 1	Discoaster brouweri
					Lower Pliocene	Buccella hannai (acme) Buliminella 1 Globorotalia plesiotumida (acme)	Sphenolithus abies Sphenolithus abies "B" Discoaster quintatus
			Miocene	Upper	Upper Upper Miocene	Globorotalia menardii (coiling change right-to-left) Textularia "X" Robulus "E" Bigenerina "A" Cristellaria "K" Bolivina thalmanni	Discoaster quinqueramus Discoaster berggrenii "A" Minylithus convallis Catinaster mexicanus Discoaster prepentaradiatus (increase)
					Lower Upper Miocene	Discorbis 12 Bigenerina 2 Uvigerina 3	Helicosphaera walbersdorfensis Coccolithus miopelagicus
				Middle	Upper Middle Miocene	Globorotalia fohsi robusta Textularia "W" Globorotalia peripheroacuta	Discoaster kugleri Discoaster kugleri (acme) Discoaster sanmiguelensis (increase)
					Middle Middle Miocene	Bigenerina humblei Cristellaria "I" Cibicides opima	Sphenolithus heteromorphus Sphenolithus heteromorphus (acme)
					Lower Middle Miocene	Cristellaria / Robulus / Lenticulina 53 Amphistegina "B" Robulus 43 Cibicides 38	Helicosphaera ampliaperta Discoaster deflandrei (acme) Discoaster calculosus
				Lower	Upper Lower Miocene	Cristellaria 54 / Eponides 14 Gyroidina "K" Catapsydrax stainforthi	Reticulofenestra gartneri Sphenolithus disbelemnos
					Upper Lower Miocene	Discorbis "B" Marginulina "A"	Orthorhabdus serratus Triquetrorhabdulus carinatus
					Upper Lower Miocene	Siphonina davisi Lenticulina hanseni	Discoaster saundersi Helicosphaera recta
		Lower	Oligocene		Upper Oligocene	Robulus "A" Heterostegina texana Camerina "A" Bolivina mexicana	Dictyococcites bisectus Sphenolithus delphix
					Lower Oligocene	Nonion struma Textularia warreni	Sphenolithus pseudoradians Ismolithus recurvus
			Eocene		Upper Eocene	Hantkenina alabamensis Camerina moodybranchensis	Discoaster saipanensis Cribrocentrum reticulatum Sphenolithus obtusus
					Middle Eocene	Nonionella cockfieldensis Discorbis yeguaensis	Micrantholithus procerus Pemma basquensis Discoaster lodoensis
					Lower Eocene	Globorotalia wilcoxensis	Chiasmolithus californicus Toweius crassus Discoaster multiradiatus
			Paleocene		Upper Paleocene	Morozovella velascoensis Vaginulina longiforma Vaginulina midwayana	Fasciculithus tympaniformis
					Lower Paleocene	Globorotalia trinidadensis Globigerina eugubina	Chiasmolithus danicus

Table 1. Gulf of Mexico Cenozoic chronostratigraphy and corresponding biostratigraphy.

Aggregated assessment units provide a larger population of data, which reduces uncertainty and improves forecasting. Additionally, the focus of this Cenozoic assessment on the modern shelf and slope, the approximate boundary located at a water depth of 656 ft (200 m), results in assessment units with disparate geologic (e.g., extensional shelf vs. compressional toe-of-slope) and technologic (e.g., shallow-water drilling vs. deepwater drilling) considerations. Within these assessment units, hydrocarbon volumes of the specific ages that are associated with a particular oil and/or gas field are aggregated. For example, all reservoirs within a single field located on the slope that are of Middle Miocene age are combined together into a single volume. These volumes are identified by the field from which they are derived (e.g., Mississippi Canyon 778, Thunder Horse). For this Cenozoic assessment, the data from 1,072 and 212 BOEM-designated fields across the offshore shelf and slope areas, respectively, were utilized. This represents a dataset with a cutoff date of January 1, 2009.

CENOZOIC ASSESSMENT RESULTS

About 99 percent of the total proved and unproved reserves in the GoM are in Cenozoic reservoirs, and nearly three-fourths of these reserves occur on the thoroughly explored shelf (**Table 2**). This assessment for the Cenozoic GoM shows that the less mature plays on the slope contain the most undiscovered resources, with Lower Tertiary sediments containing the highest potential for future discoveries (**Table 3**). Comprehensive **reserves**, **geologic**, and **economic** tabular results have also been compiled.

Cenozoic GoM	**Total Reserves**				**Proved Reserves**				**Unproved Reserves**				**Appreciation**		
	no. pools	Oil (Bbbl)	Gas (Tcf)	BOE (Bbbl)	no. pools	Oil (Bbbl)	Gas (Tcf)	BOE (Bbbl)	no. pools	Oil (Bbbl)	Gas (Tcf)	BOE (Bbbl)	Oil (Bbbl)	Gas (Tcf)	BOE (Bbbl)
Pleistocene Shelf	352	1.554	33.285	7.476	349	1.241	26.595	5.973	3	<0.001	0.016	0.003	0.313	6.673	1.500
Pliocene Shelf	474	5.246	58.548	15.664	467	4.581	49.009	13.301	7	0.001	0.054	0.011	0.664	9.484	2.352
Upper Miocene Shelf	455	6.512	49.830	15.378	454	5.943	43.415	13.668	1	<0.001	0.004	0.001	0.569	6.412	1.710
Middle Miocene Shelf	233	0.657	31.225	6.213	233	0.526	26.821	5.299	0	0.000	0.000	0.000	0.131	4.404	0.915
Lower Miocene Shelf	153	0.246	21.771	4.120	153	0.192	16.722	3.168	0	0.000	0.000	0.000	0.054	5.050	0.953
Lower Tertiary Shelf	2	0.001	0.072	0.014	2	0.001	0.045	0.009	0	0.000	0.000	0.000	<0.001	0.027	0.005
Pleistocene Slope	62	0.332	3.323	0.924	57	0.209	2.223	0.604	5	0.009	0.042	0.017	0.114	1.058	0.302
Pliocene Slope	107	4.338	14.761	6.965	93	2.747	9.224	4.388	14	0.089	0.537	0.185	1.502	5.000	2.392
Upper Miocene Slope	71	4.208	12.000	6.344	62	2.666	7.456	3.993	9	0.044	0.258	0.090	1.498	4.287	2.261
Middle Miocene Slope	52	5.417	9.572	7.120	37	2.235	4.719	3.075	15	0.972	1.133	1.174	2.210	3.720	2.872
Lower Miocene Slope	5	1.584	0.906	1.746	5	0.951	0.544	1.048	0	0.000	0.000	0.000	0.633	0.362	0.698
Lower Tertiary Slope	12	4.205	1.582	4.486	2	0.162	0.276	0.211	10	2.216	0.627	2.328	1.826	0.678	1.947

Table 2. Reserves for the Cenozoic Gulf of Mexico.

Cenozoic GoM	**Total Endowment**				**Undiscovered Technically Recoverable Resources**									
	no. pools	Oil (Bbbl)	Gas (Tcf)	BOE (Bbbl)	no. pools	Oil (Bbbl)			Gas (Tcf)			BOE (Bbbl)		
	mean	mean	mean	mean	mean	F95	mean	F5	F95	mean	F5	F95	mean	F5
Pleistocene Shelf	520	1.728	40.678	8.966	168	0.055	0.174	0.340	2.192	7.394	15.027	0.445	1.490	3.014
Pliocene Shelf	605	5.721	67.297	17.695	131	0.151	0.474	1.162	3.076	8.749	16.632	0.698	2.031	4.122
Upper Miocene Shelf	629	7.029	60.303	17.759	174	0.073	0.517	1.226	1.563	10.472	23.960	0.352	2.381	5.489
Middle Miocene Shelf	405	1.044	46.755	9.363	172	0.125	0.386	0.701	5.051	15.530	27.646	1.023	3.150	5.620
Lower Miocene Shelf	252	0.443	34.516	6.584	99	0.017	0.196	0.445	1.045	12.745	27.031	0.203	2.464	5.254
Lower Tertiary Shelf	205	1.249	45.227	9.297	203	0.760	1.248	1.766	27.246	45.155	65.742	5.608	9.283	13.464
Pleistocene Slope	142	0.761	9.916	2.525	80	0.236	0.429	0.631	3.329	6.593	10.405	0.828	1.602	2.483
Pliocene Slope	240	7.769	28.609	12.859	133	0.794	3.431	6.737	3.380	13.848	27.056	1.396	5.895	11.551
Upper Miocene Slope	262	9.423	31.189	14.973	191	2.417	5.215	8.304	9.015	19.189	30.165	4.021	8.629	13.672
Middle Miocene Slope	254	13.141	40.499	20.347	202	3.830	7.724	11.998	15.621	30.927	48.743	6.610	13.227	20.671
Lower Miocene Slope	71	7.724	4.775	8.573	66	1.384	6.139	12.410	0.891	3.869	7.697	1.542	6.828	13.780
Lower Tertiary Slope	350	19.868	14.577	22.461	338	5.857	15.663	29.144	4.782	12.995	24.231	6.708	17.975	33.456

Table 3. Resources for the Cenozoic Gulf of Mexico.

GEOLOGY

The GoM is a basin that formed during the Middle Triassic (?) to Middle Jurassic Periods with the breakup of the Pangaean supercontinent when Africa and South America separated from North America. As rifting continued, a series of shallow seas formed that were periodically separated from open ocean waters. Cycles of seawater influx and evaporation precipitated massive accumulations of salt (Louann Salt). During the Late Jurassic, the basin was exposed to the open sea, changing the depositional environment to shallow marine. In these shallow seas, broad carbonate banks grew around the margins of the basin during the Cretaceous Period. Uplift of the North American continent and the subsequent Laramide Orogeny in the Late Cretaceous provided the source for large amounts of siliciclastic sand and mud that were transported to the Texas and Louisiana coasts by the Mississippi River and other ancient river systems throughout the Cenozoic Era. The depocenters of these rivers generally shifted from west to east and prograded north to south through time. Deposition of these gulfward prograding depocenters was interrupted repeatedly by transgressions that reflected increases in relative sea level and resulted in the deposition of marine shales. Regional marine-shale wedges reflect these widespread periods of submergence of the continental platform. After these flooding events when relative sea level dropped, progradation resulted in deposition of progressively more sand-rich sediments of the next youngest depocenter. Late in the Cenozoic, episodes of continental glaciation provided an increased clastic sediment load to the basin, resulting in the modern Texas and Louisiana shelf and slope that are characterized by massive amounts of clastic materials. This loading and subsequent deformation of the Louann Salt throughout time created many of the regional structures that are favorable for the entrapment of hydrocarbons.

Modern Shelf

The assessed area of the shelf occurs between the Federal/State water boundary and the modern shelf edge (**Figure 1**). The geology of the shelf varies from west to east, as well as from north to south. The offshore Texas area is characterized by a series of large, down-to-the-basin, expansion fault systems that trend parallel to the Texas coastline (**Figure 2**). The fault systems are progressively younger basinward, with successively younger strata involved in the expansion as follows.

- Lunker, Upper Oligocene to Lower Miocene
- Clemente-Tomas, Lower Miocene
- Corsair, Lower to Middle Miocene
- Wanda, Upper Miocene

These fault systems developed when progradational deltaic wedges differentially loaded overpressured shale or salt. This loading mobilized the incompetent shale or salt into downdip shale- or salt-cored anticlines, causing extension taken up by the fault systems. The shallow sections of these fault systems have been thoroughly explored, and rollover anticlines located on the downthrown sides of the faults have been prolific gas producers from Miocene reservoirs for decades. Currently, exploration is trending to very deep prospects driven by the deep gas initiative (royalty relief granted to new production on the shelf below 15,000 ft or 4,572 m).

Farther east, the Louisiana shelf is characterized by a series of down-to-the-basin, listric, normal fault-related trends that generally become younger basinward as follows.

- Inner shelf, Miocene sediments
- Middle shelf, Pliocene sediments
- Outer shelf, Pleistocene sediments

The complexity and abundance of salt structures generally increase to the south, and include salt domes, associated counter-regional faults, salt feeders, and salt welds. Near the modern shelf edge are significant tabular salt bodies (**Figure 2**). The shallow sections of the Louisiana shelf have been extensively explored, and reservoir sands trapped by faulted anticlines, normal faults, and salt domes have been producing gas and oil for decades, with first production dating back to 1947. The deep gas initiative has focused exploration on deep salt features and related structures of Miocene and older ages.

Examples of reservoir sand depositional environments of the modern shelf include (1) fluvial environments such as channels and point bars; (2) lower delta plain environments such as distributary channels, distributary-mouth bars, and bays; and (3) deepwater fan environments such as channels, channel-levee complexes, and sheet-sand lobes.

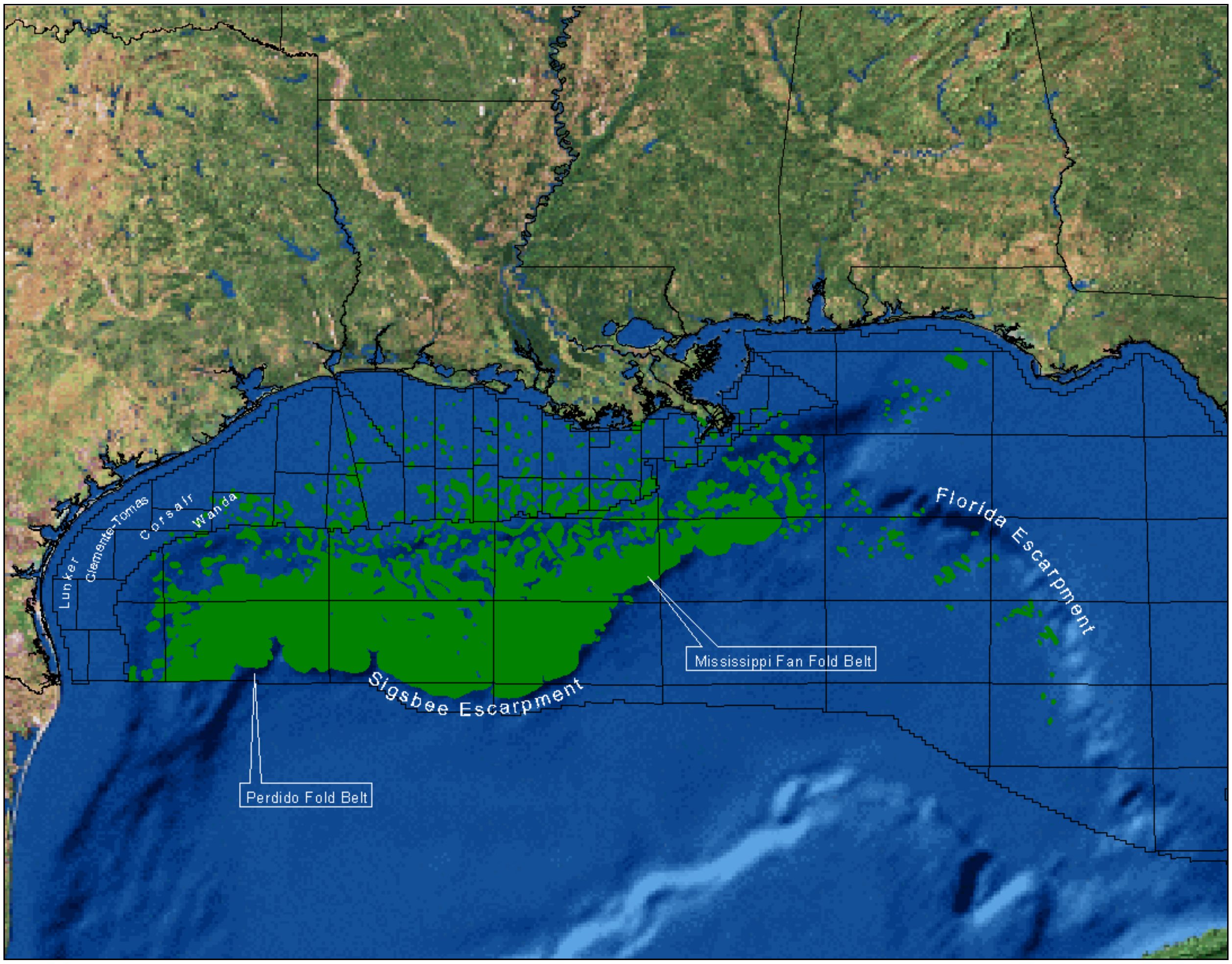

Figure 2. Allochthonous salt distribution in the Federal waters of the Gulf of Mexico (after Simmons, 1992).

Modern Slope

The assessed area of the slope occurs between the modern shelf edge and the (1) Sigsbee Escarpment, (2) large compressional structures in front of the Sigsbee Escarpment, or (3) depositional limit of Louann Salt (Figure 1). The Sigsbee Escarpment is the southernmost extent of where large salt bodies override the abyssal plain. The slope contains a wide variety of salt-tectonic features. Very generally, the slope is characterized by displaced salt sheets (allochthons), with a gradual transition from small, isolated salt bodies (e.g., stocks, tongues, walls) in the upper slope to large, contiguous salt canopies in the lower slope (**Figure 2**). Basically, as a result of load-induced evacuation, flowing Jurassic Louann Salt has climbed the Mesozoic and Cenozoic stratigraphy as allochthonous tiers and glaciers in a prograding extensional setting with a compressional toe-of-slope.

As previously stated, during the early geologic history of the GoM, the Louann Salt was deposited within Jurassic rift basins. The salt was thickest in the grabens and thin or absent over the horst blocks. The salt was subsequently covered by overburden, causing a loading effect. The Louann Salt reacted by flowing to form pillows within the grabens. As deposition continued, the mobilized salt flowed out of the grabens onto the neighboring horst blocks, primarily in a southerly direction away from the source of sedimentation. Over time the salt remained at a consistent isostatic level by rising through the overburden often along reverse or thrust faults. As the salt withdrew from the grabens, topographic lows formed on the seafloor providing a focus for additional sediment deposition. With time, these topographic lows became salt-withdrawal basins ("minibasins") accumulating very thick sections of younger sediments. Some of the larger discoveries in the GoM, such as Mars, Ursa, and Auger, are along the flanks of such minibasins. Where the salt was entirely evacuated from its source, the synclinal flanks of the minibasins collapsed leaving an inverted sediment pile anticline, or "turtle" structure. Such a turtle structure yielded Thunder Horse, one of the largest discoveries in the GoM.

In places, actively inflating salt extruded through to the seafloor and flowed laterally as a salt glacier (Fletcher et al., 1995). As salt extrusion continued, the salt glacier flowed up and across newly deposited sediment, meaning that as it moved away from its feeder, the salt climbed over progressively younger sediment. In fact, a single allochthon can become multiple tiers ascending into higher stratigraphic levels. Eventually, the allochthon became completely isolated from its feeder and could continue flowing only by withdrawing salt from its trailing edge (Fletcher et al., 1995; Schuster, 1995). Two end member structural systems have been recognized when allochthons are loaded and evacuated (Schuster, 1995). If the salt is not completely withdrawn from its trailing edge, smaller residual salt bodies are left behind. These fault-segmented bodies, or "roho" systems, are characterized by major, listric, down-to-the-basin growth faults that sole into the horizontal salt weld left by the evacuating salt. If the salt is completely withdrawn from its trailing edge, a stepped counter-regional system results. Strata above the deflating salt subside to form a landward-dipping, shallow flat step. The step resembles a growth fault, but the step is not a true fault over most of its length and actually is the salt weld left by the evacuating salt.

The entire process of salt evacuation, minibasin formation, and allochthon emplacement can repeat through time. In fact, an extensive paleo-salt canopy covered much of the shelf and slope during the Upper Miocene. Subsequently, renewed sediment loading during the Pliocene and Pleistocene created even younger minibasins where this paleo-canopy was located, squeezing the salt upward along a new series of counter-regional faults to form the modern Sigsbee Salt Canopy.

In the southern portion of the slope, several fold and thrust belts are present, including the well known Perdido Fold Belt and Mississippi Fan Fold Belt (**Figure 2**). These fold belts contain classic thrust-related structural features such as large folds, thrust-fault anticlines, duplexes, and imbricate faults, and represent the downslope part of a linked system in which upslope extension results in downdip compression (Rowan et al., 2000). In the upslope part of the system, differential loading from sediment progradation causes extension. Gravity gliding and/or spreading above a salt detachment translates into the contraction that results in the downslope fold belt. Many of the structures associated with the fold belts contain very large discoveries. Among these are Miocene discoveries in Green Canyon (Atlantis and Mad Dog) and Lower Tertiary discoveries in Walker Ridge (Cascade and Chinook) and Alaminos Canyon (Great White and Trident).

Exploration plays on the slope include Miocene and older objectives in subsalt structures associated with large compressional folds, turtle structures, and the younger Pliocene and Pleistocene minibasins situated above and between tabular salt bodies. In the southern portions of Keathley Canyon and Walker Ridge, the modern salt canopy may override Pliocene and Pleistocene sands to form subsalt reservoirs. Reservoir sands of the modern slope were deposited as deepwater fans in channels, channel-levee complexes, and sheet-sand lobes.

In the southeastern extension of the slope assessment unit area (**Figure 1**) along the Florida Escarpment (**Figure 2**), salt structure growth may occur throughout the Upper Jurassic through Pleistocene stratigraphic section. Norphlet eolian dunes define the Mesozoic portion of the play. In the Cenozoic portion of the play, deepwater fans may occur in hydrocarbon traps consisting of high-relief, autochthonous (in place) salt swells and vertical welds/pinnacle salt structures. These structures formed when updip extension and associated gravity gliding continued into the Cenozoic, and adequate salt volumes existed to provide salt to core them.

MESOZOIC GULF OF MEXICO

MESOZOIC ASSESSMENT UNITS

For this inventory of the UTRR in the Mesozoic sediments of the U.S. Gulf of Mexico OCS, most Mesozoic plays were assessed based on individual geologic formations (e.g., the Norphlet Formation). For this Mesozoic study, Mesozoic sediments were divided into 16 plays. As of January 1, 2009, three of these plays have at least one field, with data from 25 BOEM-designated fields utilized to assess these established plays (**Table 4**). The assessment of the plays with no or very few discoveries heavily relied upon analog data for modeling.

MESOZOIC ASSESSMENT RESULTS

Assessment results (**Table 5**) show that of the three established Mesozoic plays, the Norphlet Play is predicted to have the greatest potential for future discoveries, mainly in its immature deepwater portion. For the 13 Mesozoic plays with no discoveries, the Mesozoic Slope and the various Buried Hill Plays contain the highest potential for future discoveries. Comprehensive **reserves**, **geologic**, and **economic** tabular results have also been compiled.

Mesozoic GoM	Total Reserves				Proved Reserves				Unproved Reserves				Appreciation		
	no. pools	Oil (Bbbl)	Gas (Tcf)	BOE (Bbbl)	no. pools	Oil (Bbbl)	Gas (Tcf)	BOE (Bbbl)	no. pools	Oil (Bbbl)	Gas (Tcf)	BOE (Bbbl)	Oil (Bbbl)	Gas (Tcf)	BOE (Bbbl)
Mesozoic Deep Shelf	0	0.000	0.000	0.000	0	0.000	0.000	0.000	0	0.000	0.000	0.000	0.000	0.000	0.000
Mesozoic Slope	0	0.000	0.000	0.000	0	0.000	0.000	0.000	0	0.000	0.000	0.000	0.000	0.000	0.000
Buried Hill Structural	0	0.000	0.000	0.000	0	0.000	0.000	0.000	0	0.000	0.000	0.000	0.000	0.000	0.000
Buried Hill Stratigraphic	0	0.000	0.000	0.000	0	0.000	0.000	0.000	0	0.000	0.000	0.000	0.000	0.000	0.000
Buried Hill Drape	0	0.000	0.000	0.000	0	0.000	0.000	0.000	0	0.000	0.000	0.000	0.000	0.000	0.000
Tuscaloosa	0	0.000	0.000	0.000	0	0.000	0.000	0.000	0	0.000	0.000	0.000	0.000	0.000	0.000
Lower Cretaceous Clastic	0	0.000	0.000	0.000	0	0.000	0.000	0.000	0	0.000	0.000	0.000	0.000	0.000	0.000
Andrew	1	<0.001	<0.001	<0.001	1	<0.001	<0.001	<0.001	0	0.000	0.000	0.000	<0.001	<0.001	<0.001
James	10	<0.001	0.701	0.125	8	<0.001	0.414	0.074	2	<0.001	0.012	0.002	<0.001	0.276	0.049
Sligo	0	0.000	0.000	0.000	0	0.000	0.000	0.000	0	0.000	0.000	0.000	0.000	0.000	0.000
Sunniland	0	0.000	0.000	0.000	0	0.000	0.000	0.000	0	0.000	0.000	0.000	0.000	0.000	0.000
Basement Clastic	0	0.000	0.000	0.000	0	0.000	0.000	0.000	0	0.000	0.000	0.000	0.000	0.000	0.000
Knowles Carbonate	0	0.000	0.000	0.000	0	0.000	0.000	0.000	0	0.000	0.000	0.000	0.000	0.000	0.000
Cotton Valley Clastic	0	0.000	0.000	0.000	0	0.000	0.000	0.000	0	0.000	0.000	0.000	0.000	0.000	0.000
Smackover	0	0.000	0.000	0.000	0	0.000	0.000	0.000	0	0.000	0.000	0.000	0.000	0.000	0.000
Norphlet	15	0.019	3.311	0.608	13	<0.001	1.778	0.317	2	0.010	0.495	0.098	0.008	1.039	0.193

Table 4. Reserves for the Mesozoic Gulf of Mexico.

Mesozoic GoM	Total Endowment				Undiscovered Technically Recoverable Resources									
	no. pools	Oil (Bbbl)	Gas (Tcf)	BOE (Bbbl)	no. pools	Oil (Bbbl)			Gas (Tcf)			BOE (Bbbl)		
	mean	mean	mean	mean	mean	F95	mean	F5	F95	mean	F5	F95	mean	F5
Mesozoic Deep Shelf	5	0.001	4.335	0.772	5	0.000	0.001	0.003	0.000	4.335	18.620	0.000	0.772	3.316
Mesozoic Slope	25	1.638	5.834	2.676	25	0.696	1.638	2.853	2.550	5.834	10.200	1.150	2.676	4.668
Buried Hill Structural	10	1.232	2.073	1.601	10	0.000	1.232	5.330	0.000	2.073	8.690	0.000	1.601	6.876
Buried Hill Stratigraphic	6	0.488	1.462	0.748	6	0.000	0.488	2.153	0.000	1.462	6.500	0.000	0.748	3.310
Buried Hill Drape	12	0.536	2.469	0.975	12	0.000	0.536	2.381	0.000	2.469	10.162	0.000	0.975	4.189
Tuscaloosa	4	0.062	0.106	0.081	4	0.000	0.062	0.235	0.000	0.106	0.245	0.000	0.081	0.279
Lower Cretaceous Clastic	5	0.019	0.047	0.027	5	0.000	0.019	0.062	0.000	0.047	0.133	0.000	0.027	0.086
Andrew	7	0.037	0.110	0.057	6	0.005	0.037	0.083	0.011	0.110	0.243	0.007	0.057	0.126
James	50	0.043	1.623	0.332	40	0.020	0.043	0.076	0.428	0.922	1.521	0.096	0.207	0.347
Sligo	5	0.032	0.251	0.077	5	0.000	0.032	0.136	0.000	0.251	0.613	0.000	0.077	0.245
Sunniland	40	0.355	0.288	0.407	40	0.177	0.355	0.583	0.164	0.288	0.441	0.206	0.407	0.661
Basement Clastic	10	0.003	0.051	0.012	10	0.000	0.003	0.009	0.000	0.051	0.161	0.000	0.012	0.038
Knowles Carbonate	10	0.000	0.208	0.037	10	<0.001	<0.001	<0.001	0.069	0.208	0.392	0.012	0.037	0.070
Cotton Valley Clastic	15	0.051	0.355	0.114	15	0.004	0.051	0.177	0.078	0.355	0.681	0.018	0.114	0.299
Smackover	50	0.016	0.188	0.049	50	0.007	0.016	0.026	0.094	0.188	0.317	0.024	0.049	0.083
Norphlet	77	2.312	16.602	5.266	62	1.174	2.293	3.712	8.497	13.291	19.340	2.686	4.658	7.153

Table 5. Resources for the Mesozoic Gulf of Mexico.

GEOLOGY

Mesozoic sediments initially formed during the Middle Triassic (?) to Middle Jurassic Period rifting episode that created the GoM. This breakup event formed a series of northeast-southwest-trending rifts offset by northwest-southeast-trending transfer faults/zones. The Wiggins Arch and parts of the Sarasota Arch represent Paleozoic Era remnants left behind during the rifting stage (**Figure 3**). The rift grabens were active depocenters receiving lacustrine and alluvial deposits. During the Middle Jurassic, marine water sporadically entered the incipient GoM Basin, resulting in the deposition of thick evaporative deposits of the Louann Salt. During the Late Jurassic, a widespread marine transgression deposited an organic-rich carbonate mudstone that became a major hydrocarbon source rock for the GoM. A series of transgressions and regressions led to the deposition of high-energy siliciclastics and carbonates, which caused progradation of the shelf edge in the northeastern GoM Basin. During the Cretaceous Period, thick reef complexes developed along the shelf edge. These reef complexes interfingered with carbonates and siliciclastics in backreef areas.

Primary Mesozoic exploration targets to date have been Upper Jurassic siliciclastic Norphlet dunes and Lower Cretaceous James reefs in the shallow OCS waters. The greatest future reservoir potential is forecast to be related to fold structures, buried hills, and Norphlet dunes in the deepwater GoM. In offshore Federal waters of the South Florida Basin (**Figure 3**), the Sunniland Formation has the greatest reservoir potential. The stratigraphic relationship of Mesozoic geologic groups and formations in the northeastern GoM and the South Florida Basin are illustrated in **Table 6**. Detailed paleontological analyses provided the basis for the Mesozoic chronostratigraphic chart (**Table 7**).

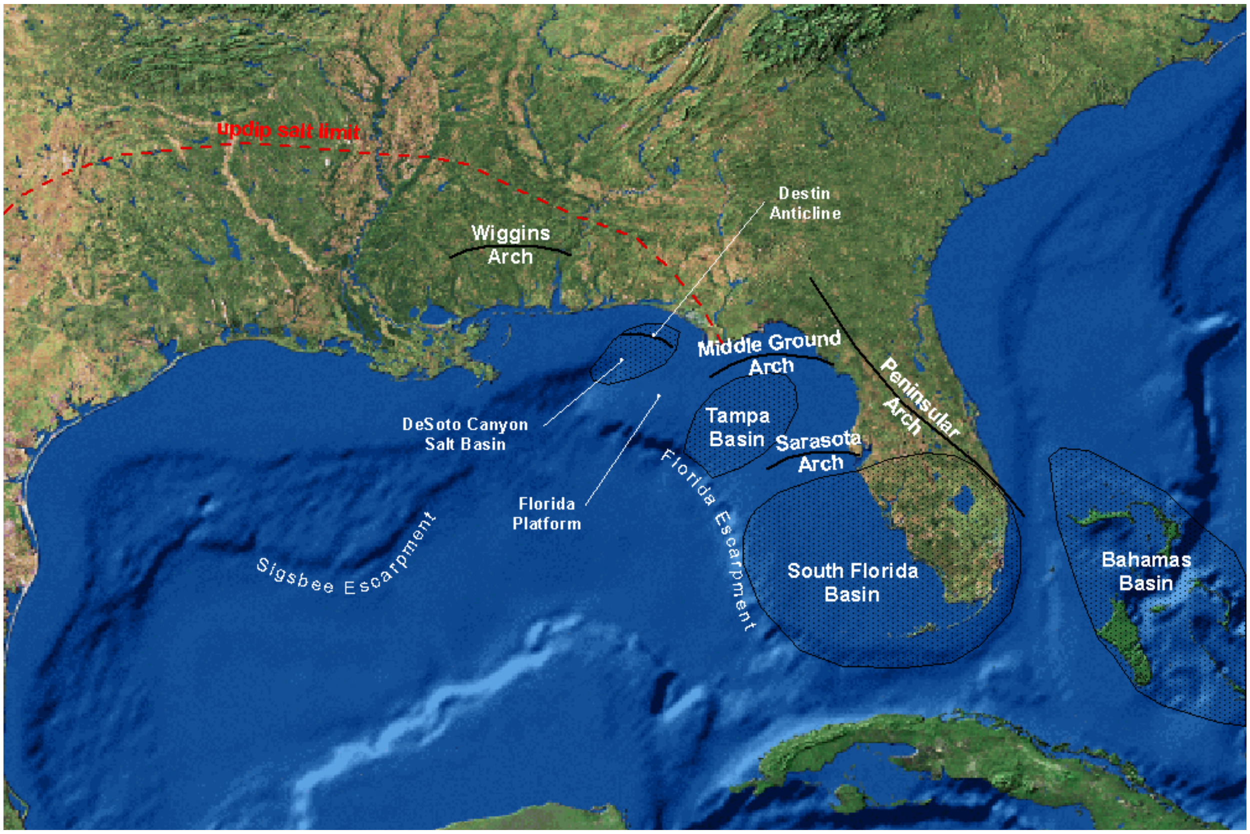

Figure 3. Generalized physiographic map of the Gulf coast area.

		Northeastern GoM	South Florida Basin
Cretaceous	Upper	Selma Gp Taylor Gp Eutaw Fm Eagle Ford Gp Tuscaloosa Fm	Pine Key Fm
	Lower	Dantzler Fm Washita Gp Fredericksburg Gp Paluxy Fm Glen Rose Fm Mooringsport Fm Ferry Lake Fm Rodessa Fm James Fm Pine Island Fm Sligo (Pettet) Fm Hosston Fm Cotton Valley Gp	Dollar Bay Fm Sunniland Fm Brown Dolomite Zone Pumpkin Bay Fm Bone Island Fm
Jurassic	Upper	Cotton Valley Gp Haynesville Gp Buckner Fm Smackover Fm Norphlet Fm	Wood River Fm Basement Clastics
	Middle	Louann Salt	Non-deposition
	Lower		Basement
Triassic	Upper	Eagle Mills Fm Basement	

Table 6. Mesozoic stratigraphy comparing rock units in the northeastern Gulf of Mexico and South Florida Basin. (Rock unit positions do not imply exact age relationships.)

Chronostratigraphy				Biostratigraphy	
Erathem	System	Series	Chronozone	Foraminifer & Ostracod (O)	Nannoplankton
Mesozoic	Cretaceous	Upper	Upper Upper Cretaceous	Abathomphalus mayaroensis Rosita fornicata Dicarinella concavata Hedbergella amabilis	Micula decussata Micula prinsii FAD Lithastrinus moratus Stoverius achylosus
			Lower Upper Cretaceous	Dicarinella hagni Planulina eaglefordensis Rotalipora cushmani Favusella (Globigerina) washitaensis Rotalipora gandolfii	Lithraphidites acutus
		Lower	Upper Lower Cretaceous	Lenticulina washitaensis Fossocytheridea lenoirensis Cythereis fredericksburgensis (O) Ammobaculites goodlandensis	Hayesites albiensis Braarudosphaera hockwoldensis
			Middle Lower Cretaceous	Dictyoconus walnutensis Eocytheropteron trinitiensis (O) Orbitolina texana Rehacythereis? aff. R. glabrella (O)	Rucinolithus irregularis
			Lower Lower Cretaceous	Ticinella bejaouaensis Choffatella decipiens Schuleridea lacustris (O) Schuleridea acuminata (O)	Diadorhombus rectus Polycostella beckmanni
	Jurassic	Upper	Upper Jurassic	Gallaecytheridea postrotunda (O) Epistomina uhligi Epistomina mosquensis Alveosepta (Pseudocyclammina) jaccardi Paalzowella feifeli	Hexalithus noelae Stephanolithion bigotii bigotii Stephanolithion bigotii maximum Stephanolithion speciosum
		Middle	Middle Jurassic	Epistomina regularis	Watznaueria crucicentralis
		Lower	Lower Jurassic		
	Triassic	Upper	Upper Triassic		
		Middle	Middle Triassic		
		Lower	Lower Triassic		

Table 7. Gulf of Mexico Mesozoic chronostratigraphy and corresponding biostratigraphy.

ASSESSED PLAYS

Mesozoic Deep Shelf

The Mesozoic Deep Shelf Play is defined by 1) a series of large, four-way dipping structural closures on the Louisiana Shelf and 2) source, reservoir, and seal lithologies that comprise seismically-correlated units of Upper Jurassic through Upper Cretaceous age. The play is located in relatively shallow water on the Texas-Louisiana shelf, and extends from High Island East Addition to Grand Isle South Addition, a distance of approximately 225 mi (**Figure 4**). At its widest, the play is approximately 65 mi wide. These dimensions provide a play area of roughly 10,233 mi^2 (6.5 million acres). The play area is outlined by high-resolution aeromagnetics, while individual prospects are defined by deep-resolution seismic data. Aeromagnetics and deep-penetrating seismic data delineate a series of rift-formed horst blocks that subsequently develop four-way dipping structures. These form the primary targets in the play. The origin, evolution, and development of these blocks are analogous to those described for the Buried Hill Plays. Consequently, the absence of these structure-forming blocks defines the updip, downdip and lateral extent of the play.

Similar to the Buried Hill Plays that are currently located in ultra-deep waters, the rift-related horst blocks that form the Mesozoic Deep Shelf Play are related to the Late Middle Triassic (?) to Late Middle Jurassic transtensional rifting episode(s) that resulted in the breakup of Pangaea and created the GoM Basin. The generally east-west trending high blocks interpreted on the aeromagnetics to form the Mesozoic Deep Shelf Play are generally parallel to the Wiggins Arch of southern Mississippi (**Figure 3**).

Located below salt welds and salt décollements on the shelf, the play is interpreted to consist of a series of four-way dipping structural closures on which depth to the objective Mesozoic units ranges from 30,000 to 35,000 ft (9,144 to 10,668 m) below sea level. Depending upon the relief of individual horst blocks, and if the Mesozoic facies are carbonate dominated sea level fluctuation, high-energy carbonate grainstones, reefs, and carbonate detrital talus/breccias are the most likely reservoirs. Similar carbonate facies are the primary reservoirs found in the Golden Lane and Poza Rica Fields in Mexico. As is the case with the Mexican reservoir analogs, the key to porosity and permeability development in any of these carbonate facies will be exposure to meteoric water either through subaerial exposure or via communication with fresh water migration paths.

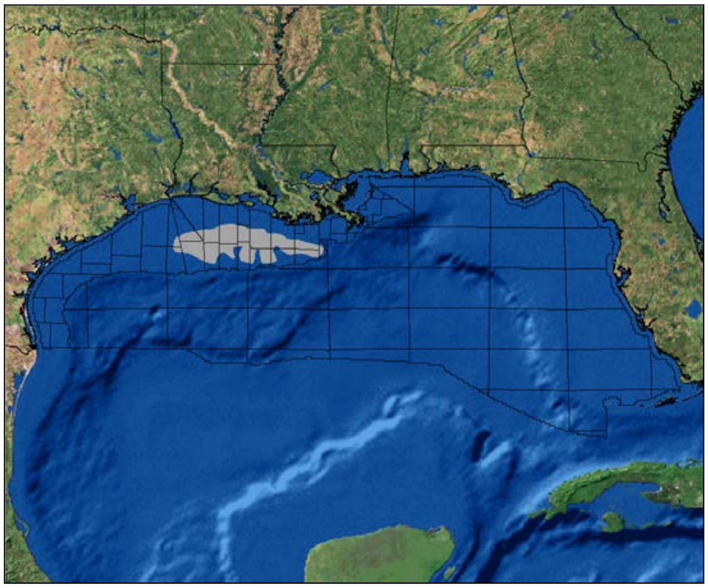
Figure 4. Mesozoic Deep Shelf Play area.

Source rocks for the play are likely to be Late Jurassic, Oxfordian and Tithonian, in age. The shallower Tertiary siliciclastic reservoirs in the northern part of the play are primarily sourced from Eocene-Paleocene shales. However, in the southern part of the play area, counter-regional faults related to the vertical stage of salt movement and canopy emplacement appear to provide conduits for a mixture of Tithonian and Eocene-Paleocene hydrocarbons (Hood et al., 2002). Seals are likely to be fine-grained pelagic carbonate rocks (i.e., micrites and marls) of intraformational, local, and regional extent.

There have been no discoveries in the play prior to this study’s January 1, 2009, cutoff date. The play is considered immature, with its primary risks being related to the presence of reservoir-quality rocks in its objective section.

Mesozoic Slope

The Mesozoic Slope is defined by reservoirs associated with seismically delineated structures of the Perdido and Mississippi Fan Fold Belt Plays in the deepwater GoM. These plays were extensively described in Lore et al. (2001) (including references) and consequently are only briefly summarized herein highlighting changes. The Perdido Fold Belt is located in the Alaminos Canyon and southwestern Keathley Canyon Areas, and the Mississippi Fan Fold Belt occurs primarily in the east-central Keathley Canyon, Walker Ridge, Green Canyon, Atwater Valley, and southern Mississippi Canyon Areas (**Figure 5**). Significant parts of each play are beneath salt canopies. The Perdido and Mississippi Fan Fold Belts are both located at the basinward limit of a balanced and linked, complex system in which updip sedimentary loading and gravity-driven collapse associated with extension are accommodated by the extrusion of salt canopies and downdip contraction (Rowan et al., 2000). Although the fold belts differ in their times of primary deformation, the Perdido Fold Belt being older, there may be a linkage/connection between them via the Keathley Canyon

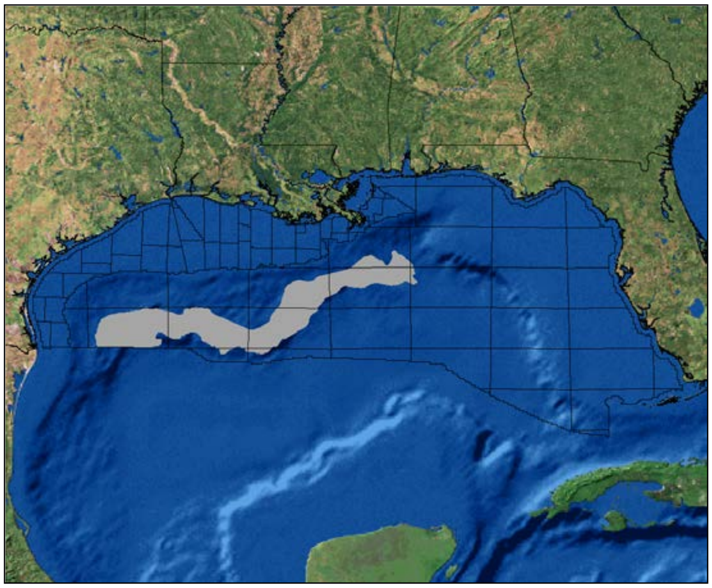
Figure 5. Mesozoic Slope Play area.

Fracture Zone (Liro, 2002).

The Perdido Fold Belt is composed of a series of elongate southwest- to northeast-trending detachment folds overlying the ductile décollement layer of the Louann Salt. Detachment fold crests are bounded by kink bands (i.e., narrow zones of angularly folded strata) (Camerlo and Benson, 2006). The main stage of fold development involved Late Jurassic to Eocene sediments and occurred primarily during the Early Oligocene to possibly Early Miocene in response to updip Paleogene sedimentary loading and accompanying extension. Deformation on the most basinward folds appears to terminate at the end of the Early Oligocene, whereas deformation on folds to the northwest may have continued into the Late Oligocene or Early Miocene, as evidenced by the thicker salt cores and higher relief. A minor phase of reactivation in the Middle and Late Miocene affects some folds. A late stage of localized secondary uplift occurs from the Pliocene to present-day in those folds that have the thickest Louann Salt and are closest to the Sigsbee Salt Canopy. Possible causes for this most recent phase of structural uplift may be renewed shortening or a broad loading phenomenon related to the emplacement of the Sigsbee Salt Canopy (Trudgill et al., 1999; Fiduk et al., 1999).

Structures of the Mississippi Fan Fold Belt consist of a series of east-northeast to south-southwest trending, subparallel, salt-cored folds. The folds are asymmetric, basinward-vergent, with landward-dipping, typically listric reverse faults that cut the basinward limb of the fold. The Late Jurassic-Cretaceous seismic interval thins on some structures in the play. This is interpreted to indicate a possible local, early structural growth stage contemporaneous with deposition in this section (Rowan et al., 2000). The later, regional, early stage of fold development occurred between the Late Oligocene and Middle Miocene. The main growth stage of the folds, coincident with break-thrust development, took place during the Middle to Late Miocene in response to increased rates of sedimentation updip (Rowan et al., 2000). Fold growth continued with only minor thrusting from the Late Miocene to Pleistocene.

Prolific Cenozoic production has been established from structures in both fold belts. However, Mesozoic reservoirs have not yet been commercial. This may be explained by analogy with the chalk reservoirs in the North Sea where a clear spatial relationship exists between the location of fields with chalk reservoirs and the pinchout of overlying basal Paleogene sandstones. These higher porosity and permeability Paleogene sandstones provide an escape route for hydrocarbons migrating to the top of the chalk, which has poorer porosity and permeability (Pegrum and Spencer, 1990). In the GoM, the presence of relatively better overlying Paleogene potential reservoirs provides a similar ‘thief zone’ for hydrocarbons that would otherwise be trapped in the underlying poorer reservoir-quality Mesozoic. The analogy can be extended to the GoM deepwater (slope) Paleogene reservoirs themselves, as their viability is generally limited updip by the presence of better quality Miocene reservoirs.

Even though there have been no commercial discoveries in the Mesozoic sediments of the fold belts prior to this study’s January 1, 2009, cutoff date, the presence of hydrocarbon shows indicates a working petroleum system. Primary risks are the presence of reservoir and quality in the carbonate and siliciclastic reservoirs of the Mesozoic, and the occurrence of effective top seals.

Buried Hill

The various Buried Hill Plays (Buried Hill Structural, Buried Hill Stratigraphic, and Buried Hill Drape) are related to a series of paleo-topographic structural features delineated by seismic and potential field data in the deepwater GoM beyond the Sigsbee Escarpment (**Figure 6**). These plays were extensively described in Lore et al. (2001) (including references) and consequently they are only briefly summarized in this report. Buried hills formed during the Late Middle Triassic (?) to Late Middle Jurassic rifting episode(s) that created the GoM Basin. The Marton and Buffler (1993) simple-shear model for GoM opening provides an explanation for the distribution of buried hills, suggesting that they represent a series of continental fragments “calved” from the Yucatan block as this upper plate (hanging wall) rotated/translated southeastward above a low angle detachment (Roberts et al., 2005).

Three-dimensional gravity and magnetic modeling conducted over the region, concentrating on the largest and highest relief buried hills, shows them to have anomalous, low gravity values compared with “typical” oceanic crust. Instead, these values indicate a “granitic” affinity with a thickness greater than 20,000 ft (6,096 m) required to satisfy the potential field signal of the largest mapped buried hill (Roberts et al., 2005). The “granitic” nature of the buried hills, in conjunction with the seismically identified onlapping characteristics of adjacent sediments, suggests that their crestal areas were either emergent or in very shallow water for long periods of geologic time. As a result, a variety of Jurassic, Cretaceous, and

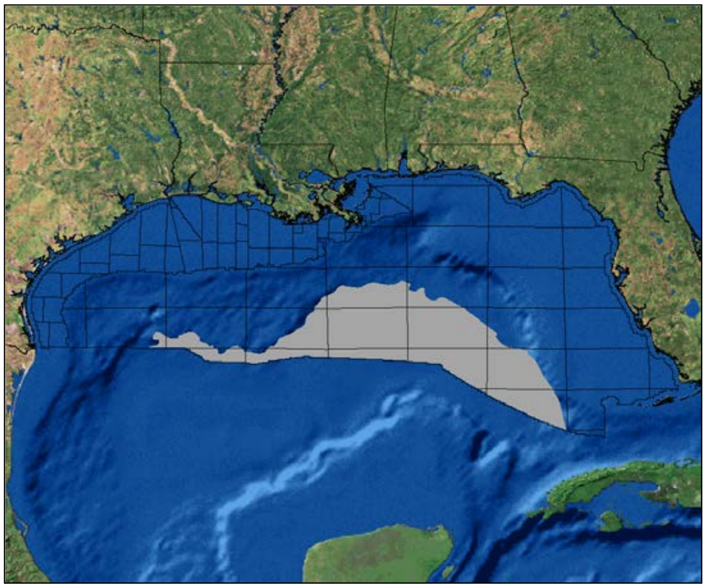

Figure 6. Buried Hill Play area.

Paleogene reservoir objectives could also be associated with these features, the largest of which covers approximately 250,000 acres and has approximately 5,000 ft (1,524 m) of vertical relief.

Three types of reservoir targets are associated with buried hills. In the Buried Hill Structural Play, the buried hill itself is the reservoir target. Reservoir porosity and permeability in the "granitic" core of the buried hill results from its being weathered, fractured, and possibly karstified, resulting in its enhanced porosity and permeability. Source rocks for the Buried Hill Structural Play are always younger than the buried hill and are either laterally adjacent to the buried hill reservoir or onlap and seal it.

The Buried Hill Stratigraphic Play consists of Jurassic and Cretaceous age siliciclastic and carbonate deposits either on or adjacent to the buried hill, or in nearby grabens. Locally derived clastics deposited as alluvial deltas, barrier island-beach systems, fluvial deltas, or fans are potential reservoirs in siliciclastic-dominated sequences; whereas high-energy carbonate grainstones, reefs, and carbonate detrital talus/breccias are the most likely reservoirs in the carbonate-dominated facies.

The Buried Hill Drape Play is defined by compaction of sediments over buried hill features. Depending on the relief of individual buried hills, potential reservoirs primarily in overlying Cretaceous and Paleogene age sediments may be present as turbidite deposits in relatively low-relief structural closures developed by differential compaction of sediments of these ages over the more rigid, less compacting, buried hills. Depending on their location and paleo-topographic relief, Jurassic sediments could also provide reservoir objectives.

No wells have been drilled in any of these plays prior to this study's January 1, 2009, cutoff date. The various Buried Hill Play types represent prolific, productive plays in Southeast and East Asia, North and South America, Africa, Europe, and Australasia. A number of references were used to develop the analog used in this play. Among these are: Landes et al., 1960; Chung-Hsiang P'An, 1982; Zhai and Zha, 1982; Zheng, 1988; Yu and Li, 1989; Horn, 1990; Tong and Huang, 1991; Areshev et al., 1992; Tran et al., 1994; Blanche and Blanche, 1997; and Sladen, 1997.

Primary risks for the Buried Hill Structural Play are developing and maintaining reservoir-quality porosity and permeability in the core of the buried hill, the presence of source rocks that have generated and expelled hydrocarbons, and the preservation of those hydrocarbons in the relatively unconventional reservoir of the buried hill. The Buried Hill Stratigraphic Play has risks related to the presence of interpreted reservoirs in these seismically interpreted siliciclastic and carbonate reservoir facies. Source rock presence, their generation and expulsion history, and the preservation of hydrocarbons in the traps are also risks. Risks in the Buried Hill Drape Play are related to the presence of and the porosity/permeability characteristics of interpreted reservoir facies. Source rock presence, maturity, etc., are also risks as is the presence of migration conduits connecting possible Paleogene reservoirs and Jurassic source rocks.

Tuscaloosa

The Lower Upper Cretaceous Clastic Tuscaloosa Formation Play occurs within the *Rotalipora cushmani* biozone (**Table 7**) and is defined by aggradational and progradational sands of the Tuscaloosa Formation (**Table 6**). The play extends from the Mobile and Viosca Knoll Areas offshore Mississippi and Alabama to the Pensacola and Destin Dome Areas offshore Florida (**Figure 7**). Updip, the play extends onshore where it is productive, while downdip the play's boundary occurs where Upper Cretaceous sands interfinger with prodelta shales. No significant accumulations of hydrocarbon have been encountered to date in the numerous Federal OCS wells that have penetrated the play.

Onshore, the play consists of progradational deltaic sands, aggradational stacked barrier bar and channel sands, and reworked retrogradational sands. In the Federal OCS, however, the Tuscaloosa has a more distal depositional setting and sands tend to be of lower reservoir quality. Significant structural features in the play are anticlines and faults, both related to salt movement. Potential source rocks are Oxfordian laminated carbonate mudstones represented by the basal part of the Upper Jurassic Smackover Formation. Potential seals are provided by the juxtaposition of reservoir sands with shales and salt, either structurally (e.g., faulting, diapirism) or stratigraphically (e.g., lateral shale-outs, overlying shales). For a detailed discussion, see Petty (1997).

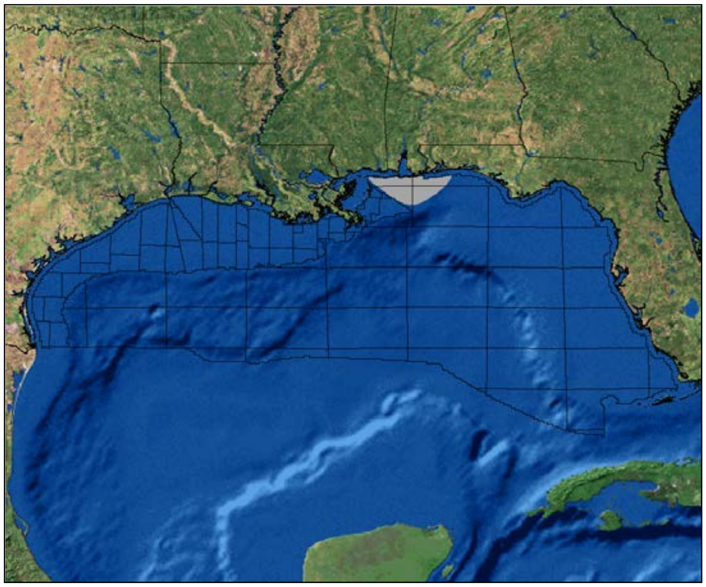
Figure 7. Tuscaloosa Play area.

Lower Cretaceous Clastic

The Lower Cretaceous Clastic Play occurs within the *Schuleridea lacustris*, *Eocytheropteron trinitiensis*, *Cythereis fredericksburgensis*, *Fossocytheridea lenoirensis*, and *Lenticulina washitaensis* biozones (**Table 7**). The play is also defined by a mostly aggradational depositional style, with some progradational, resulting from siliciclastic sedimentation in barrier bar and channel facies of the Hosston, Paluxy, and Dantzler Formations (**Table 6**). The play extends south from Mississippi, Alabama, and Florida offshore State waters into the northern portions of the Mobile, Destin Dome, Apalachicola, and Gainesville Areas (**Figure 8**). The downdip limit is located where Lower Cretaceous clastic sands interfinger with prodelta shales. Of the Federal OCS wells that penetrated this play, all were dry; however, this play was probably not the primary exploration target for these wells.

The Hosston Formation has a gross interval thickness of 2,000 ft (610 m) in the Mobile Area and 2,700 ft (823 m) in the Destin Dome Area. The Paluxy Formation is widespread offshore and locally has high porosity in barrier bars and stream channels, with gross interval thicknesses ranging from 900 ft (274 m) in the Mobile Area to over 2,200 ft (671 m) in the Destin Dome Area. The Dantzler Formation is thickest over the Destin Dome, but thins to the south away from its source area. Structural traps in the play are related to salt tectonics and faulting, while stratigraphic traps are related to facies changes. The Upper Jurassic Smackover Formation is the main source rock for the play, while Lower Cretaceous marine shales provide seals.

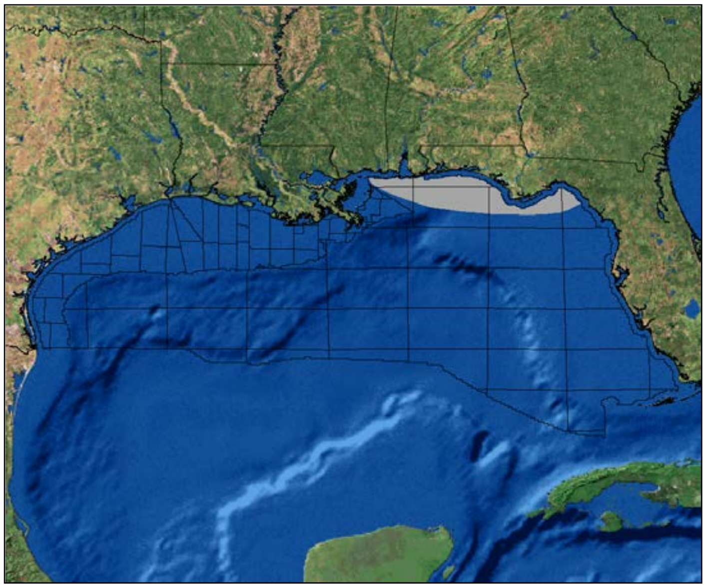
Figure 8. Lower Cretaceous Clastic Play area.

Andrew

The established Upper Lower Cretaceous Carbonate Andrew Formation Play occurs within the *Cythereis fredericksburgensis* and *Lenticulina washitaensis* biozones (**Table 7**). The “Andrew Limestone” is a term used by drilling operators to describe undifferentiated carbonates of Washita-Fredericksburg age (**Table 6**). The Andrew Play is located along a narrow Lower Cretaceous shelf edge rudist reef zone that extends from the Chandeleur through the northern Vernon Basin Areas (**Figure 9**). Farther to the southeast, this carbonate trend ends where along strike, stratigraphic equivalents begin in the Lower Cretaceous Carbonate Sunniland Formation Play. The play is limited updip to the northeast by a muddy backreef platform facies. Downdip to the southwest, the play is bound by a forereef facies of dark shales and carbonate muds. Only one field has produced in the play.

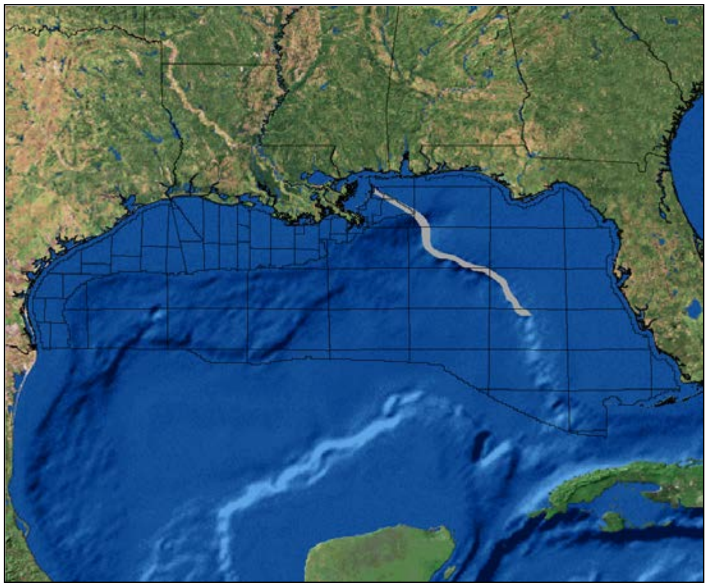
Figure 9. Andrew Play area.

Generally for the Lower Cretaceous, a well defined rudist reef crests the shelf edge and foreslope leading into open marine environments (Yurewicz et al., 1993). The Andrew Play (Albian age) is defined by this shelf edge reef facies. Flanking the rudist reefs are oolitic packstones and shelf grainstones adjacent and trending subparallel to shelf edge boundstones and packstones. Updip are lagoonal, nonporous wackestones and mudstones interbedded with basin wide shales representing transgressive units (Yurewicz et al., 1993; Petty, 1999). Anhydrites were deposited in the highly restrictive backreef platform that was cut off from open circulation (Petty, 1995).

Hydrocarbons have been encountered within several biostrome shoals that have come in contact with hydrocarbon migration routes from Lower Cretaceous source beds (Wagner et al., 1994). The single field in the play, Main Pass 253, produced from reefal and flanking talus facies. Reservoir porosity and permeability are controlled by a combination of primary fabric, digenetic leaching, and dolomitization. Hydrocarbons are trapped in small anticlines located within the porous and permeable facies. Marine shales, micrites, and anhydrites provide seals for the play. For a detailed discussion, see Petty (1999) and Bascle et al. (2001).

James

The established Lower Lower Cretaceous James Limestone Play extends from the Mobile Area southeastward along the Lower Cretaceous shelf edge through the northern Viosca Knoll, Destin Dome, DeSoto Canyon, Florida Middle Ground, The Elbow, and northern Vernon Basin Areas (**Figure 10**). Farther to the southeast, this carbonate trend ends where along strike, stratigraphic equivalents begin in the Lower Cretaceous Carbonate Sunniland Formation Play. Updip to the northeast, the play is limited by backreef lagoonal carbonate muds, while downdip to the southwest, the play grades into a forereef facies of dark shales and carbonate muds. As of this study's January 1, 2009, cutoff date, the play contains 10 fields.

The James Limestone (Aptain age) is a member of the Pearsall Formation. The Pearsall Formation consists of three members: (1) the uppermost Bexar Shale, (2) the James Limestone, and (3) the basal Pine Island Shale (**Table 6**). A poorly developed, 10-ft thick Bexar Shale Member is found in the Federal OCS. The Pine Island Shale Member found onshore in the Pearsall Formation is a carbonate in the Federal OCS that is lithologically indistinguishable from the James Limestone. In the offshore, the James Limestone and Pine Island Shale Members are commonly identified by operators as the upper and lower James Limestone.

Carbonate depositional environments were widespread throughout the Lower Cretaceous in the eastern GOM. Although barrier reef complexes are important stratigraphic features along the shelf edge, more prolific oil and gas fields have been discovered in patch reefs and debris mounds behind the shelf edge reef trend and, therefore, are more attractive targets for hydrocarbon exploration (Sams, 1982). The James Play is defined by such a patch reef trend in a backreef environment. The 10 fields in the play are part of a patch reef trend oriented northwest to southeast. The patch reefs are typically elliptical with their 3-to-5 mi (4.8-to-8 km) long axis oriented perpendicularly to the basin. The reefs consist of a central core of rudist boundstone surrounded by concentric deposits of grainstone and packstone bioclastic debris.

This bioclastic debris is then surrounded by grainstones redistributed by wave action across the interior platform. Lower energy lagoonal mudstones, marine shales, and anhydrite interfinger with these grainstones and provide seals. The grainstone/packstone bioclastic debris facies and the reworked interior platform grainstone facies hold the greatest exploration potential.

Patch reef log signatures are characterized by erratic SP and high resistivity curves. Payzone thicknesses in the 10 fields range from about 10 to 100 ft (3 to 30 m) on well logs, with most fields containing more than one porosity/payzone. Payzones are often, but not always, associated with seismic hydrocarbon indicators (bright spots). Hydrocarbon traps are formed by small anticlines located within porous areas of the patch reefs. These porous zones occur in dolomitized reefal material and in flanking talus. Reservoir permeability and porosity are controlled by a combination of primary fabric, diagenetic leaching, and dolomitization. Potential source rocks are laminated shales and micrites of the Upper Cretaceous Smackover Formation that underwent hydrocarbon generation during the Lower Cretaceous. For a detailed discussion, see Petty (1999) and Bascle et al. (2001).

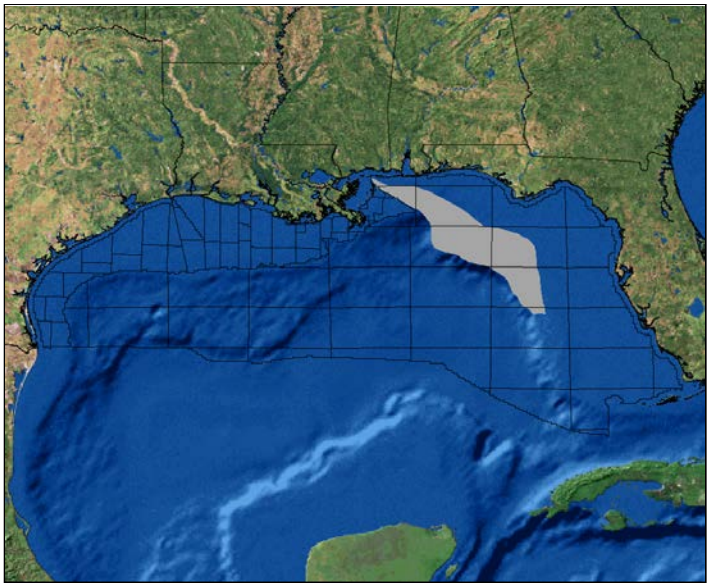
Figure 10. James and Sligo Play area.

Sligo

Similar to the slightly younger James Play (**Table 6**), the Lower Lower Cretaceous Carbonate Sligo Formation Play is defined by reef and reef talus. The play extends from the Mobile Area southeastward along the Lower Cretaceous shelf edge through the northern Viosca Knoll, Destin Dome, DeSoto Canyon, Florida Middle Ground, The Elbow, and northern Vernon Basin Areas (**Figure 10**). Farther to the southeast, this carbonate trend ends where along strike, stratigraphic equivalents begin in the Lower Cretaceous Carbonate Sunniland Formation Play. Updip to the northeast, the play is limited by backreef lagoonal wackestones and mudstones interbedded with regional transgressive marine shales (Yurewicz et al., 1993). Downdip to the southwest, the play grades into a forereef facies of dark shales and carbonate muds. The play contains no fields in offshore Federal waters.

Objectives in the play include algal/rudist reef boundstones flanked by grainstone talus and oolitic packstones. The grainstones and packstones trend subparallel to the boundstone reefs. Porous zones occur within dolomitized reefal material and in flanking talus. Potential hydrocarbon traps are formed by small anticlines located within such porous zones. Reservoir permeability and porosity are controlled by a combination of primary fabric, diagenetic leaching, and dolomitization. Potential source rocks are laminated shales and micrites of the Upper Cretaceous Smackover Formation that underwent hydrocarbon generation during the Lower Cretaceous.

Sunniland

The Lower Cretaceous Carbonate Sunniland Formation Play occurs within the *Choffatella decipiens*, *Orbitolina texana*, *Dictyoconus walnutensis* and *Lenticulina washitaensis* biozones (**Table 7**). The play is located in the South Florida Basin area (**Figure 3** and **Figure 11**). To the north, a facies change from carbonates to siliciclastics limits the play. Forereef facies of dark shales and carbonate muds bound the play to the south and west. To the east, the play continues onshore into Florida as the producing Sunniland Trend. There are no declared Federal OCS fields in this play to date.

The play consists of rudist reefs and reef debris haloes along the shelf edge, and interior platform grainstones, patch reefs, and debris haloes in the backreef areas associated with the Bone Island, Pumpkin Bay, and Sunniland Formations, and the Brown Dolomite Zone of the Lehigh Acres Formation (**Table 6**). Potential reservoirs in the play primarily are patch reefs built up on local basement highs. Other reservoirs might include platform grainstones and reef talus. Structural closures over reefal buildups are possible, but traps are mainly stratigraphic.

Potential source rocks are thought to exist in Early Cretaceous, locally occurring, organic rich, lagoonal carbonates, deepwater limestones, or shales, depending on where the potential reservoirs are within the reef system in the South Florida Basin. Early Cretaceous marine shales, carbonate mudstones, and anhydrites provide seals for the play.

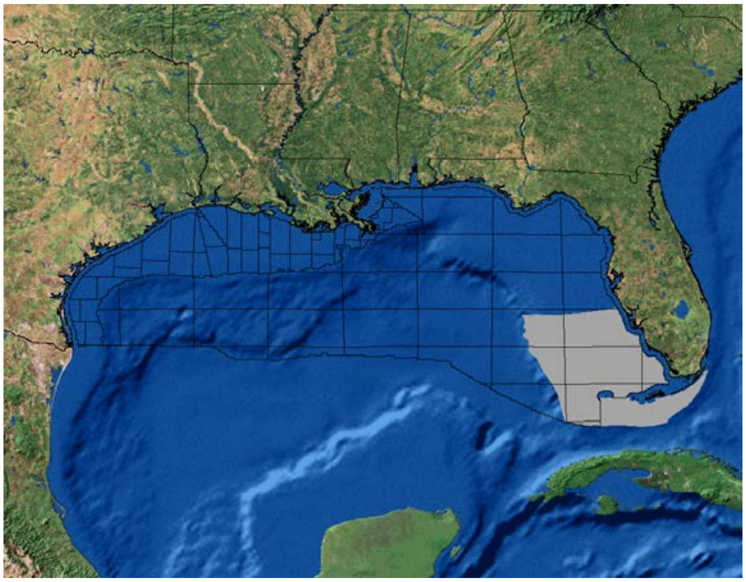

Figure 11. Sunniland and Basement Clastic Play area.

Basement Clastic

The Middle to Upper Jurassic Florida Basement Clastic Play is defined by siliciclastics eroded from weathered basement rocks exposed from Middle to Late Jurassic time associated with the South Florida Basin (**Figure 11**). The play may also extend into the Tampa Basin across the Florida Peninsular Arch into the Bahamas Basin and northward into the Atlantic Region along the east coast of Florida (**Figure 3**). There are no discoveries in this play in Federal OCS waters.

Potential reservoirs were deposited as alluvial fans, barrier island/beach systems, and fluvial deltas immediately overlying the basement rocks. Basement clastic sands penetrated to date have been less than 150 ft (46 m) thick and are rich in mica and feldspar. The biggest risk is poor quality of the potential reservoir sands. The Great Isaac well in the Bahamas Basin did contain a hydrocarbon show.

Knowles Carbonate

The Cotton Valley Group (**Table 6**) consists of carbonates (Knowles Limestone) and siliciclastics and ranges in age from Upper Jurassic (Tithonian) to Lower Cretaceous (Valanginian). The Knowles Limestone overlies the Cotton Valley clastics. The carbonates in the Cotton Valley Group range in age from Tithonian to Valanginian, with the paleontological zonal top of the Valanginian defined by the ostracod *Schuleridea acuminata* (**Table 7**). The Knowles Limestone is composed of Tithonian/Berriasian ramps and Valanginian platforms.

Knowles carbonate development initiated along the Tithonian shelf edge. Reefs grew along the shelf edge into the Berriasian, while clastics were deposited in backreef shelf areas. Penecontemporaneous clastics prograded beyond the Tithonian/Berriasian shelf edge extending the shelf seaward. Three carbonate platforms developed over the seaward prograding clastic wedge during the early Valanginian, with the uppermost platform extending 100 mi (161 km) landward of the shelf edge. This extensivemarker was later subaerialy exposed. The packstones and grainstones of the three platforms are separated by intra-platform gray shales and gray mudstones. Each ramp and platform is thicker along the prograding shelf edge and interfingers landward with delta plain clastics. Combined thickness of the Knowles Limestone ranges from 2,200 ft (670 m) at the shelf edge to zero over the Destin Anticline. Shoreward, carbonates have less developed spontaneous potential (SP) signatures in all inner ramps and platforms, reflecting a change from the better developed SP outer ramp and platform bioclasts to less developed SP inner ramp and platform mudstones (Finneran et al., 1984; Cregg and Ahr, 1983). The best development of the outer ramp and platform bioclasts is in the Viosca Knoll and western Destin Dome Areas (**Figure 12**).

The nearest production to the Federal offshore from the Knowles Limestone extends onshore from the southern Arkansas-northern Louisiana area to the southwestern edge of the East Texas Basin (Cregg and Ahr, 1983). Even though there are no commercial discoveries thus far in the Federal OCS, gas shows have been encountered in the Knowles Limestone of the Cotton Valley Group (e.g., Main Pass block 154 well no. 1 and Viosca Knoll block 202 well no. 1). Thus, further hydrocarbon exploration in the Federal OCS within the Knowles Limestone is warranted. For a detailed discussion, see Petty (2008).

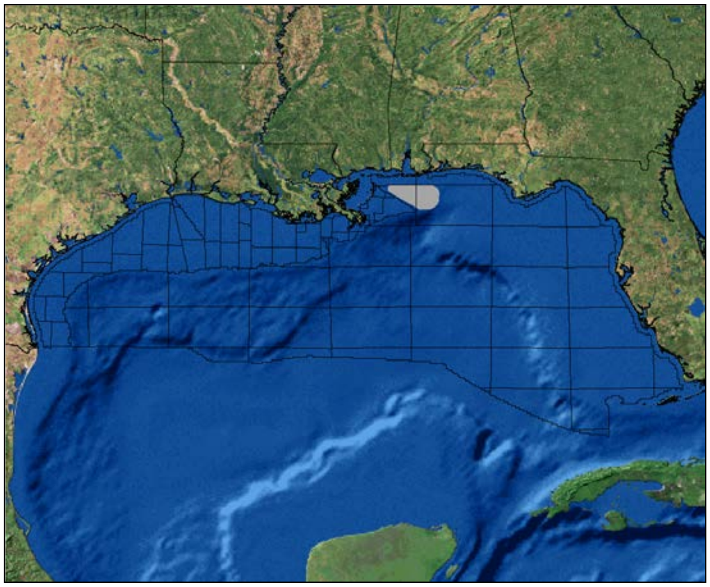

Figure 12. Knowles Carbonate Play area.

Cotton Valley Clastic

The Cotton Valley Group consists of siliciclastics and carbonates (Knowles Limestone) and ranges in age from Upper Jurassic (Tithonian) to Lower Cretaceous (Valanginian). Cotton Valley clastics are found below the Knowles Limestone and overlie the lithologically similar clastics of the Haynesville Group (**Table 6**). Cotton Valley sediments extend as far south as the Sarasota Arch (**Figure 3**). To the north the play extends onshore, and to the east sediments terminate on the Florida Middle Ground Arch (**Figure 3**). Cotton Valley clastics are Upper Jurassic (Tithonian) in age characterized by the paleontological zonal top of the nannofossil *Hexalithus noelae* and the foraminifer *Gallaecytheridea postrotunda* (**Table 7**). These Upper Jurassic sands, shales, and siltstones were deposited, from landward to basinward, in delta plain, prodelta, restricted lagoonal, barrier bar systems, and in open to marginal marine conditions.

The Cotton Valley Clastic Play itself is defined by the fine-grained sands and siltstones contained in stacked coastal barrier islands in the Mobile, Viosca Knoll, and Destin Dome Areas (**Figure 13**). Clastics were deposited in the landward perimeter of the 12 km (7.5 mi) deep DeSoto Canyon Salt Basin (**Figure 3**) later to be reworked into elongate sand bodies trending subparallel to the shoreline. These barrier clastics had finer clay size particles removed by wave action to provide reservoir-quality rock surrounded by seals from marine and lagoonal shales. Sands in the barrier bar system are clear to white and well sorted, whereas sands deposited in updip delta plain areas are red to brown with traces of lignite and red shale. Downdip on the marine side of the barrier bar system, shales are dark gray, silty, and calcareous. Interbedded with the shales are minor, hard, brown limestone and calcareous, fine-to-medium grained, gray sandstone. The barrier bar system consists of three facies: (1) an eolian section where barrier tops were exposed, (2) a sand-rich shoreface in the center of the barrier, and (3) siltstones on the outer flanks interbedded with shales. Adjacent to the landward side are lagoonal shales indicating the barrier system is a regressive system.

The Main Pass block 154 well no. 1 penetrated 500 ft (152 m) of marine gray shale and small sand stringers. To the east, Destin Dome block 529 well no. 1 penetrated the toe portion of the barrier island system where the clastics coarsen upward and have an identity that affects wave behavior and consequently reservoir rock development. Updip in Viosca Knoll block 251 well no. 1, 1,450 ft (442 m) of sand-rich barrier islands were penetrated. These sands are blockier in SP development than sands in delta plain regions and are located in seismically well defined stratified regions of the DeSoto

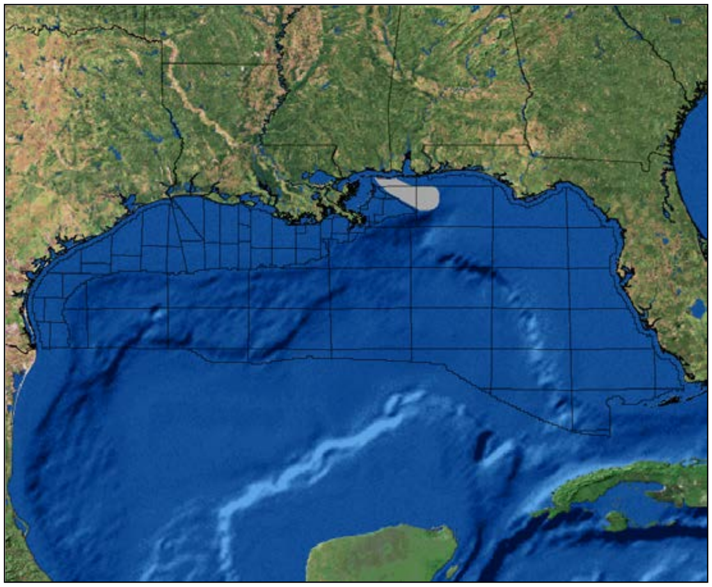

Figure 13. Cotton Valley Clastic Play area.

Canyon Salt Basin. Viosca Knoll block 117 well no. 1 penetrated a complete section of Cotton Valley clastics, with a thickness of 1,950 ft (594 m) deposited on the edge of the DeSoto Canyon Salt Basin. The sands in this section are interbedded with marine carbonates and shales. Further eastward and updip in Mobile block 991 well no. 2, a wide variety of environments is displayed as defined by kerogen type ranging from nonmarine, fluvial, lagoonal, marginal marine to marine. This area represents a transitional zone between the barrier island system and the lagoonal/delta plain areas.

The Cotton Valley Group produces from several onshore fields in northern Louisiana, southern Mississippi, and southern Alabama, with the nearest onshore production to the offshore Cotton Valley from the Catahoula Creek Field in Hancock County, Mississippi. Reservoir sands at the Catahoula Creek Field were deposited in a barrier island environment that can be traced offshore into the Destin Dome Area (Ericksen and Thieling, 1993). Even though there are no commercial discoveries thus far in the Federal OCS, gas potential has been demonstrated in the barrier islands sands of the Cotton Valley Group (e.g., Viosca Knoll block 117 well no. 1). With a demonstrated working petroleum system, additional hydrocarbon exploration in the Federal OCS within the Cotton Valley clastics is warranted. For a detailed discussion, see Petty (2008).

Smackover

The Upper Jurassic Carbonate Smackover Formation (**Table 6**) Play occurs within the *Alveosepta (Pseudocyclammina) jaccardi* biozone (**Table 7**). The play in Federal waters is located primarily in the Pensacola, Apalachicola, DeSoto Canyon, Florida Middle Ground, and The Elbow Areas (**Figure 14**). To the north, the play extends onshore where it is productive, while to the south, the play grades into nonporous carbonate mudstones and shales. No Smackover fields have been declared in Federal waters.

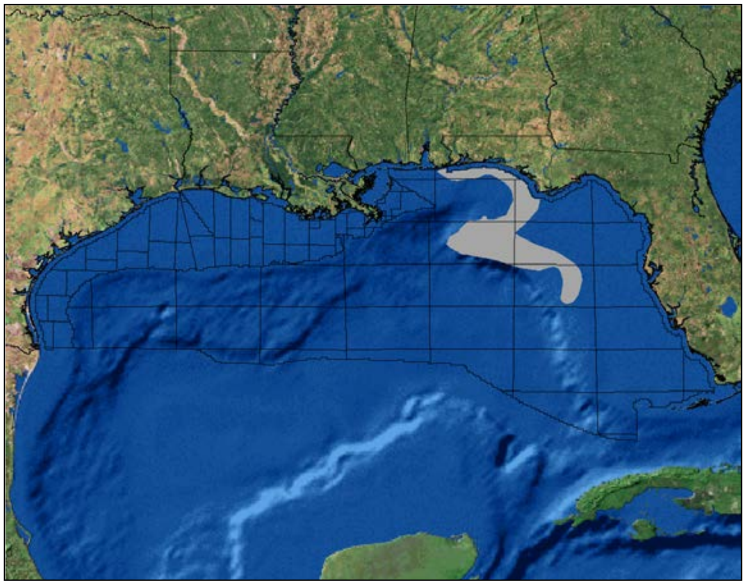
Figure 14. Smackover Play area.

The upper Smackover section consists of inner ramp, high energy oolitic grainstones alternating with carbonate mudstones. Localized thrombolitic reefs and grainstone shoals developed on basement highs, over salt pillow structures, and over topographic highs related to large sand dunes of the underlying Norphlet Formation. Porosity in the grainstones is enhanced by dolomitization and subaerial leaching of carbonate cements. The downdip and lower Smackover section consists of laminated lime mudstones, wackestones, some porous packstones, siliciclastic siltstones, and shales. Any paleostructural highs that favored reef and grainstone shoal development are drilling objectives. Later faulting along the flanks of these highs created fault traps, although most Smackover traps possess a strong stratigraphic component. Basal anhydrites of the overlying Buckner Formation create seals at the top of the Smackover section, while carbonate mudstones, anhydrites, and shales form seals within the formation. The Smackover is self-sourcing, with hydrocarbons being derived from the low-energy, algal-rich, laminated carbonate mudstones located near the base of the section. For a detailed discussion, see Petty (2010).

Norphlet

The Norphlet and Salt Roller/High-Relief Salt Structure Plays were extensively described (including references) in Lore et al. (2001). As exploration progressed into deepwater, these plays have been combined based on the identification of Norphlet reservoirs in the previously undrilled deepwater area of the Salt Roller/High-Relief Salt Structure Play. Consequently, the combined play, designated as the Norphlet Play is only briefly summarized in this report. Norphlet Formation (**Table 6**) (Late Jurassic–Oxfordian) eolian dune and interdune facies define the play, which covers all or part of a number of protraction areas (**Figure 15**). The north and northeast play boundaries generally coincide with the updip depositional limit of the Jurassic Louann Salt (**Figure 3**). To the west, the occurrence of high-relief salt-cored structures (salt canopies, salt domes, salt diapirs, salt-floored minibasins, and salt-cored compressional folds) defines the play limits. The south and southwest play boundary is interpreted to coincide with the downdip depositional limit of the Louann Salt. Over its history, the established Norphlet Play evolved from onshore Mississippi, Alabama, and Florida into Alabama State waters, shallow waters of the OCS shelf, and recently into deepwater areas.

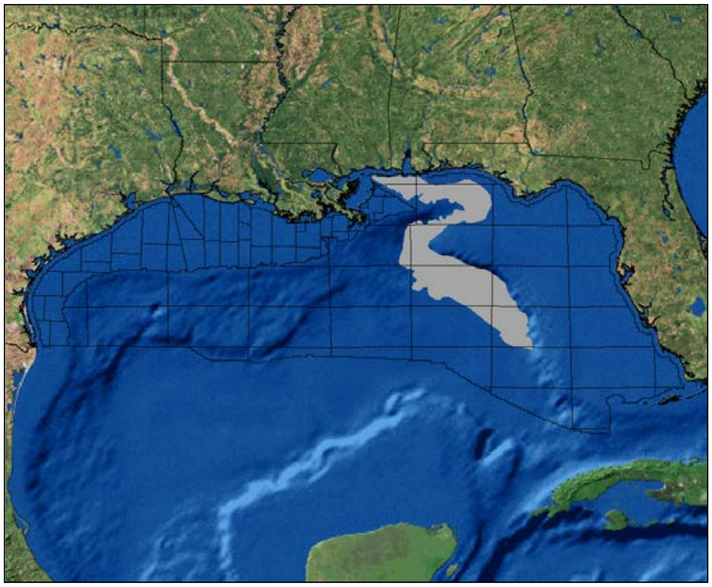

Figure 15. Norphlet Play area.

The Smackover-Norphlet is a closed petroleum system, the laminated, algal-rich lime mudstones of the overlying lower Smackover Formation (Jurassic, Oxfordian) being geochemically typed as the source rocks for the Norphlet (Sassen, 1990) and providing the overlying top seal for Norphlet reservoirs (Mankiewicz et al., 2009). With the exception of a few onshore fields, the Norphlet is only productive where there is no porosity in the upper Smackover. Where there is porosity in the upper Smackover, the Norphlet only contains commercial volumes of hydrocarbons after all available Smackover porosity has been hydrocarbon-filled.

Norphlet reservoirs in the GoM consist of eolian dunes. Sand-thickness isopachs, based on 3-D seismic data in the Mobile Bay area, show Norphlet dune fields in that area consist of northwest-southeast–oriented, subparallel, elongate sand bodies up to 800 ft (244 m) thick, and 5000 ft (1,524 m) across (Ajdukiewicz et al., 2010). These thicknesses are thought to be less than the original topography because of postdepositional sediment compaction (Ajdukiewicz et al., 2010). The generally elongate Norphlet dunes have a similar morphology and scale to modern linear dunes of the Namib Desert, where elongate dune complexes consisting of seif and star dunes and are up to 1,060 ft (323 m) high (Mankiewicz, et al., 2009). Dunes are separated from each other by areas with sand thickness less than a seismic resolution of 300 ft (91 m), and are interpreted to be interdune areas (Ajdukiewicz, et al. 2010). Although postdepositional sediment compaction, structuring, and salt tectonics have distorted the original dune configuration, Story (1998) notes that overlying Smackover and lower Haynesville carbonates thin over Norphlet dune crests and thicken over interdune areas, indicating dune topography was present when the carbonates were deposited (Ajdukiewicz et al., 2010).

The Norphlet Play in the shallow waters of the OCS is considered to be mature, with 14 fields as of this study's January 1, 2009, cutoff date. However, the play is in its early stages of exploration in the deeper water areas with one unproved field and Shell and partners reporting discoveries at the Shiloh (DeSoto Canyon block 269), Vicksburg (Mississippi Canyon block 72), and Appomattox (Mississippi Canyon blocks 391 and 392) prospects. In the deepwater area, primary play risks are interpreted to relate to reservoir quality, including hydrocarbon properties because the presence of asphaltenes in reservoired hydrocarbons can restrict hydrocarbon flow through small pore throats. Other risks include trap seal (which could relate to trap fill) and consequently hydrocarbon preservation.

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ABBREVIATIONS AND ACRONYMS

3-D	three dimensional
Bbbl	billion barrels
BOE	barrels of oil equivalent
BOEM	Bureau of Ocean Energy Management
Fm	Formation
ft	feet
GoM	Gulf of Mexico
Gp	Group
km	kilometers
mi	miles
no.	number
OCS	Outer Continental Shelf
SP	spontaneous potential
Tcf	trillion cubic feet
UERR	undiscovered economically recoverable resources
U.S.	United States
UTRR	undiscovered technically recoverable resources

TERMINOLOGY

Assessment Unit: All reservoirs of a specific geologic age in a specified geographic area.

Cumulative production: The sum of all produced volumes of oil and gas prior to a specified point in time.

Field: A producible accumulation of hydrocarbons consisting of a single pool or multiple pools related to the same geologic structure and/or stratigraphic condition. In general usage this term refers to a commercial accumulation.

Play: A group of known and/or postulated pools that share common geologic, geographic, and temporal properties, such as history of hydrocarbon generation, migration, reservoir development, and entrapment.

Conceptual play: A play hypothesized on the basis of subsurface geophysical data and regional geologic knowledge of the area. It is still a hypothesis, and the play concept has not been verified.

Established play: A play in which hydrocarbons have been discovered in one or more pools for which reserves have been estimated.

Frontier play: A play in which exploration activities are at an early stage. Some wells have already been drilled to verify the play concept.

Pool: A discovered or undiscovered hydrocarbon accumulation, typically within a single stratigraphic interval. As utilized in this report, it is the aggregation of all sands within a field that occur in the same play.

Probability: A means of expressing an outcome on a numerical scale that ranges from impossibility to absolute certainty; the chance that a specified event will occur.

Reserves: The quantities of hydrocarbon resources anticipated to be recovered from known accumulations from a given date forward. All reserve estimates involve some degree of uncertainty.

Total reserves: The quantities of hydrocarbon resources that are anticipated to be recovered from known accumulations plus the observed incremental increase through time in the estimates of those resources. Estimates of total reserves equal reserves (proved and unproved) plus reserves appreciation.

Proved reserves: The quantities of hydrocarbons estimated with reasonable certainty to be commercially recoverable from known accumulations and under current economic conditions, operating methods, and government regulations. Current economic conditions include prices and costs prevailing at the time of the estimate. Estimates of proved reserves do not include reserves appreciation.

Remaining proved reserves: The quantities of proved reserves currently estimated to be recoverable. Estimates of remaining proved reserves equal proved reserves minus cumulative production.

Reserves appreciation: The observed incremental increase through time in the estimates of reserves (proved and unproved) of an oil and/or gas field. It is that part of the known resources over and above proved and unproved reserves that will be added to existing fields through extension, revision, improved recovery, and the addition of new reservoirs. Also referred to as reserves growth or field growth.

Unproved reserves: Quantities of hydrocarbon reserves that are assessed based on geologic and engineering information similar to that used in developing estimates of proved reserves; however, technical, contractual, economic, or regulatory uncertainty precludes such reserves being classified as proved. Estimates of unproved reserves do not include reserves appreciation.

Reservoir: A subsurface, porous, permeable rock body in which an isolated accumulation of oil and/or gas is stored.

Resources: Concentrations in the earth's crust of naturally occurring liquid or gaseous hydrocarbons that can conceivable by discovered and recovered. Normal use encompasses both discovered and undiscovered resources.

Undiscovered resources: Resources postulated, on the basis of geologic knowledge and theory, to exist outside of known fields or accumulations.

Undiscovered technically recoverable resources (UTRR): Oil and gas that may be produced as a consequence of natural pressure, artificial lift, pressure maintenance, or other secondary recovery methods, but without any consideration of economic viability.

Undiscovered economically recoverable resources (UERR): The portion of the undiscovered technically recoverable resources that is economically recoverable under imposed economic and technologic conditions.

Sand: The aggregation of all fault-block portions of an originally continuous sandstone body.

Total endowment: All technically recoverable hydrocarbon resources of an area. Estimates of total endowment equal the sum of undiscovered technically recoverable resources and total reserves.

AUTHORS

Ralph Klazynski
Elizabeth Klocek
Lesley Nixon
Andy Petty
Paul Post

CONTRIBUTING PERSONNEL

Shawn Alonso
Randy Altobelli
Bill Ballard
Michael Barton
Taylor Blood
John Blum
Larry Boudreau
Bob Broome
Caesar Brown
Dave Callaway
Mike Celata
Ty Collins
Dave Cooke
Aaron Croy
Larry Daugherty
Thierry DeCort
Steve Haley
Peter Harrison
Leipin He
Amy Hill
Amanda Foret Hoke
Lisa Kennedy
Greg Klocek
Dan Lasco
Kun Li
Ric Mostert
Sean O’Brien
Scott Palazzo
Stephen Palmes
Bruce Perry
Rex Poling
Cina Poyer
Tommy Riches

Linda Wallace
Rick Wells
Chee Yu

Appendix A – Comprehensive Tabular Results

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2011 Gulf of Mexico OCS Assessment

Reserves and Production by Play/Assessment Unit

U.S. Department of the Interior
March 3, 1849

Region	Reserves and Production																				
	Total Reserves[1]				Proved Reserves[2]				Cumulative Production			Remaining Proved Reserves			Unproved Reserves				Reserves Appreciation[3]		
Play/Assessment Unit	No. Pools	Oil (Bbbl)	Gas (Tcf)	BOE (Bbbl)	No. Pools	Oil (Bbbl)	Gas (Tcf)	BOE (Bbbl)	Oil (Bbbl)	Gas (Tcf)	BOE (Bbbl)	Oil (Bbbl)	Gas (Tcf)	BOE (Bbbl)	No. Pools	Oil (Bbbl)	Gas (Tcf)	BOE (Bbbl)	Oil (Bbbl)	Gas (Tcf)	BOE (Bbbl)
Gulf of Mexico OCS	**2,004**	**34.32**	**240.89**	**77.18**	**1,936**	**21.45**	**189.24**	**55.13**	**15.55**	**169.57**	**45.72**	**5.90**	**19.68**	**9.40**	**68**	**3.34**	**3.18**	**3.91**	**9.52**	**48.47**	**18.15**
Pleistocene Shelf	352	1.55	33.28	7.48	349	1.24	26.60	5.97	1.13	25.42	5.65	0.11	1.18	0.32	3	<0.01	0.02	<0.01	0.31	6.67	1.50
Pleistocene Slope	62	0.33	3.32	0.92	57	0.21	2.22	0.60	0.13	1.79	0.45	0.07	0.44	0.15	5	0.01	0.04	0.02	0.11	1.06	0.30
Pliocene Shelf	474	5.25	58.55	15.66	467	4.58	49.01	13.30	4.31	46.45	12.57	0.27	2.56	0.73	7	<0.01	0.05	0.01	0.66	9.48	2.35
Pliocene Slope	107	4.34	14.76	6.96	93	2.75	9.22	4.39	2.00	6.96	3.24	0.74	2.26	1.15	14	0.09	0.54	0.18	1.50	5.00	2.39
Upper Miocene Shelf	455	6.51	49.83	15.38	454	5.94	43.41	13.67	5.58	40.39	12.77	0.36	3.03	0.90	1	<0.01	<0.01	<0.01	0.57	6.41	1.71
Upper Miocene Slope	71	4.21	12.00	6.34	62	2.67	7.46	3.99	1.42	4.31	2.18	1.25	3.14	1.81	9	0.04	0.26	0.09	1.50	4.29	2.26
Middle Miocene Shelf	233	0.66	31.23	6.21	233	0.53	26.82	5.30	0.47	25.33	4.98	0.05	1.49	0.32	0	0.00	0.00	0.00	0.13	4.40	0.91
Middle Miocene Slope	52	5.42	9.57	7.12	37	2.24	4.72	3.07	0.31	2.15	0.69	1.93	2.57	2.38	15	0.97	1.13	1.17	2.21	3.72	2.87
Lower Miocene Shelf	153	0.25	21.77	4.12	153	0.19	16.72	3.17	0.17	14.89	2.82	0.03	1.83	0.35	0	0.00	0.00	0.00	0.05	5.05	0.95
Lower Miocene Slope	5	1.58	0.91	1.75	5	0.95	0.54	1.05	0.03	0.01	0.04	0.92	0.53	1.01	0	0.00	0.00	0.00	0.63	0.36	0.70
Lower Tertiary Shelf	2	<0.01	0.07	0.01	2	<0.01	0.05	0.01	<0.01	0.03	0.01	<0.01	0.02	<0.01	0	0.00	0.00	0.00	<0.01	0.03	0.01
Lower Tertiary Slope	12	4.20	1.58	4.49	2	0.16	0.28	0.21	0.00	0.00	0.00	0.16	0.28	0.21	10	2.22	0.63	2.33	1.83	0.68	1.95
Mesozoic Deep Shelf	0	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00
Mesozoic Slope	0	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00
Tuscaloosa	0	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00
Andrew	1	<0.01	<0.01	<0.01	1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.00	0.00	0.00	0	0.00	0.00	0.00	<0.01	<0.01	<0.01
James	10	<0.01	0.70	0.12	8	<0.01	0.41	0.07	<0.01	0.33	0.06	<0.01	0.09	0.02	2	<0.01	0.01	<0.01	<0.01	0.28	0.05
Sligo	0	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00
Lower Cretaceous Clastic	0	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00
Knowles Carbonate	0	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00
Basement Clastic	0	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00
Buried Hill Stratigraphic	0	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00
Buried Hill Structural	0	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00
Buried Hill Drape	0	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00
Norphlet	15	0.02	3.31	0.61	13	<0.01	1.78	0.32	<0.01	1.51	0.27	<0.01	0.27	0.05	2	0.01	0.50	0.10	0.01	1.04	0.19
Smackover	0	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00
Cotton Valley Clastic	0	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00
Sunniland	0	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00

[1] Total Reserves = Proved Reserves + Unproved Reserves + Reserves Appreciation

[2] Proved Reserves = Cumulative Production + Remaining Proved Reserves

[3] Reserves Appreciation = (Grown Proved Reserves - Proved Reserves) + (Grown Unproved Reserves - Unproved Reserves)

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2011 Gulf of Mexico OCS Assessment

Reserves and Production by Water Depth

U.S. DEPARTMENT OF THE INTERIOR
MARCH 3, 1849

Region	Reserves and Production																				
	Total Reserves[1]				Proved Reserves[2]				Cumulative Production			Remaining Proved Reserves			Unproved Reserves				Reserves Appreciation[3]		
Planning Area / Water Depth	No. Pools	Oil (Bbbl)	Gas (Tcf)	BOE (Bbbl)	No. Pools	Oil (Bbbl)	Gas (Tcf)	BOE (Bbbl)	Oil (Bbbl)	Gas (Tcf)	BOE (Bbbl)	Oil (Bbbl)	Gas (Tcf)	BOE (Bbbl)	No. Pools	Oil (Bbbl)	Gas (Tcf)	BOE (Bbbl)	Oil (Bbbl)	Gas (Tcf)	BOE (Bbbl)
Total Gulf of Mexico OCS	**2,004**	**34.32**	**240.89**	**77.18**	**1,936**	**21.45**	**189.24**	**55.13**	**15.55**	**169.57**	**45.72**	**5.90**	**19.68**	**9.40**	**68**	**3.34**	**3.18**	**3.91**	**9.52**	**48.47**	**18.15**
0 - 60m	466	4.21	65.37	15.84	466	3.95	57.21	14.13	3.73	53.18	13.20	0.22	4.03	0.94	0	0.00	0.00	0.00	0.26	8.17	1.71
60 - 200m	819	4.92	80.76	19.29	811	4.45	66.97	16.36	4.16	62.66	15.31	0.28	4.31	1.05	8	<0.01	0.06	0.01	0.48	13.73	2.92
200 - 800m	440	5.53	54.87	15.29	433	4.38	42.19	11.89	4.03	39.97	11.14	0.35	2.22	0.75	7	0.01	0.53	0.10	1.14	12.16	3.30
800 - 1600m	71	1.38	7.42	2.70	68	0.97	5.21	1.90	0.81	4.42	1.60	0.16	0.80	0.30	3	0.01	0.02	0.01	0.40	2.19	0.79
1600 - 2400m	37	1.04	2.57	1.49	36	0.65	1.64	0.94	0.46	1.22	0.67	0.19	0.42	0.27	1	0.01	0.03	0.01	0.38	0.89	0.54
> 2400m	171	17.24	29.90	22.56	122	7.05	16.02	9.90	2.36	8.12	3.80	4.69	7.90	6.10	49	3.32	2.54	3.77	6.87	11.34	8.89
Western Gulf of Mexico OCS	**479**	**1.99**	**48.08**	**10.55**	**469**	**1.22**	**35.10**	**7.46**	**0.79**	**32.23**	**6.52**	**0.43**	**2.87**	**0.94**	**10**	**0.11**	**0.50**	**0.20**	**0.67**	**12.48**	**2.89**
0 - 60m	84	0.12	8.13	1.57	84	0.09	6.07	1.17	0.07	5.60	1.07	0.01	0.47	0.10	0	0.00	0.00	0.00	0.03	2.06	0.40
60 - 200m	262	0.22	19.81	3.74	258	0.17	14.70	2.79	0.16	13.78	2.61	0.01	0.92	0.18	4	<0.01	0.03	0.01	0.05	5.08	0.95
200 - 800m	98	0.41	14.91	3.07	98	0.32	11.57	2.38	0.28	11.01	2.24	0.03	0.56	0.13	0	0.00	0.00	0.00	0.10	3.34	0.69
800 - 1600m	11	0.10	0.71	0.22	10	0.07	0.51	0.16	0.06	0.40	0.13	0.01	0.12	0.03	1	<0.01	<0.01	<0.01	0.03	0.19	0.06
1600 - 2400m	1	<0.01	0.01	0.01	1	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	0	0.00	0.00	0.00	<0.01	0.01	<0.01
> 2400m	23	1.14	4.51	1.94	18	0.57	2.25	0.97	0.21	1.45	0.47	0.36	0.80	0.50	5	0.11	0.46	0.19	0.46	1.80	0.78
Central Gulf of Mexico OCS	**1,523**	**32.33**	**191.99**	**66.49**	**1,467**	**20.24**	**154.14**	**47.66**	**14.76**	**137.34**	**39.20**	**5.47**	**16.80**	**8.46**	**56**	**3.23**	**2.14**	**3.61**	**8.86**	**35.71**	**15.21**
0 - 60m	382	4.09	57.24	14.28	382	3.86	51.14	12.96	3.66	47.58	12.13	0.20	3.56	0.84	0	0.00	0.00	0.00	0.23	6.11	1.31
60 - 200m	557	4.70	60.94	15.55	553	4.28	52.27	13.58	4.01	48.88	12.70	0.27	3.39	0.87	4	<0.01	0.02	<0.01	0.43	8.65	1.97
200 - 800m	341	5.11	39.24	12.10	335	4.06	30.62	9.51	3.74	28.97	8.90	0.32	1.66	0.61	6	0.01	0.04	0.01	1.04	8.58	2.57
800 - 1600m	60	1.28	6.71	2.48	58	0.90	4.70	1.74	0.75	4.02	1.46	0.15	0.68	0.27	2	0.01	0.02	0.01	0.38	2.00	0.73
1600 - 2400m	36	1.03	2.55	1.49	35	0.65	1.64	0.94	0.46	1.22	0.67	0.19	0.42	0.27	1	0.01	0.03	0.01	0.38	0.88	0.53
> 2400m	147	16.10	25.29	20.60	104	6.48	13.77	8.94	2.15	6.67	3.34	4.34	7.10	5.60	43	3.21	2.03	3.57	6.41	9.49	8.09
Eastern Gulf of Mexico OCS	**2**	**<0.01**	**0.82**	**0.15**	**0**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**2**	**<0.01**	**0.54**	**0.10**	**<0.01**	**0.28**	**0.05**
0 - 60m	0	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00
60 - 200m	0	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00
200 - 800m	1	0.00	0.73	0.13	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1	0.00	0.49	0.09	0.00	0.24	0.04
800 - 1600m	0	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00
1600 - 2400m	0	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00
> 2400m	1	<0.01	0.10	0.02	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1	<0.01	0.05	0.01	<0.01	0.04	0.01
Straits of Florida Gulf of Mexico OCS	**0**	**0.00**	**0.00**	**0.00**	**0**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
0 - 60m	0	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00
60 - 200m	0	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00
200 - 800m	0	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00

[1] Total Reserves = Proved Reserves + Unproved Reserves + Reserves Appreciation

[2] Proved Reserves = Cumulative Production + Remaining Proved Reserves

[3] Reserves Appreciation = (Grown Proved Reserves - Proved Reserves) + (Grown Unproved Reserves - Unproved Reserves)

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2011 Gulf of Mexico OCS Assessment

UTRR and Total Endowment by Play/Assessment Unit

U.S. Department of the Interior
March 3, 1849

Region	Total Reserves[1]				Undiscovered Technically Recoverable Resources (UTRR)									Total Endowment[2]		
	No.	Oil	Gas	BOE	Oil (Bbbl)			Gas (Tcf)			BOE (Bbbl)			Oil (Bbbl)	Gas (Tcf)	BOE (Bbbl)
Play/Assessment Unit	Pools	(Bbbl)	(Tcf)	(Bbbl)	95%	Mean	5%	95%	Mean	5%	95%	Mean	5%	Mean	Mean	Mean
Gulf of Mexico OCS	**2,004**	**34.32**	**240.89**	**77.18**	**38.86**	**48.40**	**59.18**	**193.99**	**219.46**	**245.25**	**73.38**	**87.45**	**102.82**	**82.72**	**460.34**	**164.63**
Pleistocene Shelf	352	1.55	33.28	7.48	0.05	0.17	0.34	2.19	7.39	15.03	0.44	1.49	3.01	1.73	40.68	8.97
Pleistocene Slope	62	0.33	3.32	0.92	0.24	0.43	0.63	3.33	6.59	10.41	0.83	1.60	2.48	0.76	9.92	2.53
Pliocene Shelf	474	5.25	58.55	15.66	0.15	0.47	1.16	3.08	8.75	16.63	0.70	2.03	4.12	5.72	67.30	17.70
Pliocene Slope	107	4.34	14.76	6.96	0.79	3.43	6.74	3.38	13.85	27.06	1.40	5.89	11.55	7.77	28.61	12.86
Upper Miocene Shelf	455	6.51	49.83	15.38	0.07	0.52	1.23	1.56	10.47	23.96	0.35	2.38	5.49	7.03	60.30	17.76
Upper Miocene Slope	71	4.21	12.00	6.34	2.42	5.22	8.30	9.02	19.19	30.17	4.02	8.63	13.67	9.42	31.19	14.97
Middle Miocene Shelf	233	0.66	31.23	6.21	0.12	0.39	0.70	5.05	15.53	27.65	1.02	3.15	5.62	1.04	46.76	9.36
Middle Miocene Slope	52	5.42	9.57	7.12	3.83	7.72	12.00	15.62	30.93	48.74	6.61	13.23	20.67	13.14	40.50	20.35
Lower Miocene Shelf	153	0.25	21.77	4.12	0.02	0.20	0.44	1.05	12.74	27.03	0.20	2.46	5.25	0.44	34.52	6.58
Lower Miocene Slope	5	1.58	0.91	1.75	1.38	6.14	12.41	0.89	3.87	7.70	1.54	6.83	13.78	7.72	4.77	8.57
Lower Tertiary Shelf	2	<0.01	0.07	0.01	0.76	1.25	1.77	27.25	45.15	65.74	5.61	9.28	13.46	1.25	45.23	9.30
Lower Tertiary Slope	12	4.20	1.58	4.49	5.86	15.66	29.14	4.78	13.00	24.23	6.71	17.98	33.46	19.87	14.58	22.46
Mesozoic Deep Shelf	0	0.00	0.00	0.00	0.00	<0.01	<0.01	0.00	4.34	18.62	0.00	0.77	3.32	<0.01	4.34	0.77
Mesozoic Slope	0	0.00	0.00	0.00	0.70	1.64	2.85	2.55	5.83	10.20	1.15	2.68	4.67	1.64	5.83	2.68
Tuscaloosa	0	0.00	0.00	0.00	0.00	0.06	0.24	0.00	0.11	0.24	0.00	0.08	0.28	0.06	0.11	0.08
Andrew	1	<0.01	<0.01	<0.01	<0.01	0.04	0.08	0.01	0.11	0.24	0.01	0.06	0.13	0.04	0.11	0.06
James	10	<0.01	0.70	0.12	0.02	0.04	0.08	0.43	0.92	1.52	0.10	0.21	0.35	0.04	1.62	0.33
Sligo	0	0.00	0.00	0.00	0.00	0.03	0.14	0.00	0.25	0.61	0.00	0.08	0.25	0.03	0.25	0.08
Lower Cretaceous Clastic	0	0.00	0.00	0.00	0.00	0.02	0.06	0.00	0.05	0.13	0.00	0.03	0.09	0.02	0.05	0.03
Knowles Carbonate	0	0.00	0.00	0.00	<0.01	<0.01	<0.01	0.07	0.21	0.39	0.01	0.04	0.07	<0.01	0.21	0.04
Basement Clastic	0	0.00	0.00	0.00	0.00	<0.01	0.01	0.00	0.05	0.16	0.00	0.01	0.04	<0.01	0.05	0.01
Buried Hill Stratigraphic	0	0.00	0.00	0.00	0.00	0.49	2.15	0.00	1.46	6.50	0.00	0.75	3.31	0.49	1.46	0.75
Buried Hill Structural	0	0.00	0.00	0.00	0.00	1.23	5.33	0.00	2.07	8.69	0.00	1.60	6.88	1.23	2.07	1.60
Buried Hill Drape	0	0.00	0.00	0.00	0.00	0.54	2.38	0.00	2.47	10.16	0.00	0.98	4.19	0.54	2.47	0.98
Norphlet	15	0.02	3.31	0.61	1.17	2.29	3.71	8.50	13.29	19.34	2.69	4.66	7.15	2.31	16.60	5.27
Smackover	0	0.00	0.00	0.00	0.01	0.02	0.03	0.09	0.19	0.32	0.02	0.05	0.08	0.02	0.19	0.05
Cotton Valley Clastic	0	0.00	0.00	0.00	<0.01	0.05	0.18	0.08	0.36	0.68	0.02	0.11	0.30	0.05	0.36	0.11
Sunniland	0	0.00	0.00	0.00	0.18	0.36	0.58	0.16	0.29	0.44	0.21	0.41	0.66	0.36	0.29	0.41

[1] Total Reserves = Proved Reserves + Unproved Reserves + Reserves Appreciation

[2] Total Endowment = Total Reserves + UTRR

BOEM
Bureau of Ocean Energy Management

2011 Gulf of Mexico OCS Assessment

UTRR and Total Endowment by Water Depth

U.S. DEPARTMENT OF THE INTERIOR
MARCH 3, 1849

Region	Total Reserves[1]				Undiscovered Technically Recoverable Resources (UTRR)									Total Endowment[2]		
Planning Area	No.	Oil	Gas	BOE	Oil (Bbbl)			Gas (Tcf)			BOE (Bbbl)			Oil (Bbbl)	Gas (Tcf)	BOE (Bbbl)
Water Depth	Pools	(Bbbl)	(Tcf)	(Bbbl)	95%	Mean	5%	95%	Mean	5%	95%	Mean	5%	Mean	Mean	Mean
Total Gulf of Mexico OCS	**2,004**	**34.32**	**240.89**	**77.18**	**38.86**	**48.40**	**59.18**	**193.99**	**219.46**	**245.25**	**73.38**	**87.45**	**102.82**	**82.72**	**460.34**	**164.63**
0 - 200m	1,285	9.13	146.13	35.14	2.94	3.67	4.41	86.96	110.13	136.64	18.42	23.26	28.72	12.80	256.26	58.40
200 - 800m	440	5.53	54.87	15.29	3.95	5.19	6.51	13.09	16.34	19.62	6.28	8.10	10.01	10.72	71.22	23.39
800 - 1600m	71	1.38	7.42	2.70	11.95	16.00	20.45	31.30	38.15	45.26	17.52	22.79	28.50	17.39	45.58	25.50
1600 - 2400m	37	1.04	2.57	1.49	8.04	11.37	15.22	19.56	24.08	29.11	11.52	15.66	20.41	12.41	26.64	17.15
> 2400m	171	17.24	29.90	22.56	9.23	12.17	15.60	24.14	30.76	38.03	13.53	17.64	22.37	29.41	60.65	40.20
Western Gulf of Mexico OCS	**479**	**1.99**	**48.08**	**10.55**	**8.58**	**12.38**	**17.15**	**57.39**	**69.45**	**81.94**	**18.79**	**24.74**	**31.73**	**14.37**	**117.53**	**35.29**
0 - 200m	346	0.34	27.94	5.31	0.91	1.27	1.70	33.00	47.14	62.55	6.79	9.66	12.83	1.61	75.08	14.97
200 - 800m	98	0.41	14.91	3.07	1.02	1.56	2.17	2.84	3.73	4.68	1.52	2.23	3.01	1.98	18.64	5.29
800 - 1600m	11	0.10	0.71	0.22	3.69	5.98	8.88	8.66	11.77	15.00	5.23	8.07	11.54	6.08	12.48	8.30
1600 - 2400m	1	<0.01	0.01	0.01	1.42	2.30	3.43	3.23	4.27	5.34	2.00	3.06	4.38	2.31	4.28	3.07
> 2400m	23	1.14	4.51	1.94	0.80	1.26	1.82	1.94	2.55	3.19	1.15	1.72	2.39	2.40	7.05	3.66
Central Gulf of Mexico OCS	**1,523**	**32.33**	**191.99**	**66.49**	**22.54**	**30.93**	**40.69**	**111.77**	**133.90**	**156.62**	**42.43**	**54.76**	**68.55**	**63.26**	**325.89**	**121.25**
0 - 200m	939	8.80	118.19	29.83	1.42	1.98	2.64	42.85	60.58	81.64	9.04	12.76	17.17	10.78	178.77	42.59
200 - 800m	341	5.11	39.24	12.10	2.36	3.45	4.62	7.46	10.33	13.60	3.68	5.28	7.04	8.56	49.57	17.38
800 - 1600m	60	1.28	6.71	2.48	6.85	9.96	13.30	19.46	25.95	33.18	10.31	14.57	19.20	11.24	32.67	17.05
1600 - 2400m	36	1.03	2.55	1.49	5.97	9.04	12.79	15.13	19.73	24.39	8.67	12.55	17.13	10.07	22.28	14.03
> 2400m	147	16.10	25.29	20.60	4.22	6.51	9.43	11.81	17.31	23.60	6.33	9.59	13.63	22.62	42.60	30.20
Eastern Gulf of Mexico OCS	**2**	**<0.01**	**0.82**	**0.15**	**3.46**	**5.07**	**6.95**	**12.34**	**16.08**	**20.68**	**5.66**	**7.93**	**10.63**	**5.07**	**16.91**	**8.08**
0 - 200m	0	0.00	0.00	0.00	0.28	0.40	0.56	1.78	2.39	3.08	0.59	0.83	1.11	0.40	2.39	0.83
200 - 800m	1	0.00	0.73	0.13	0.13	0.18	0.25	1.62	2.28	3.01	0.41	0.58	0.78	0.18	3.00	0.71
800 - 1600m	0	0.00	0.00	0.00	0.04	0.07	0.10	0.32	0.43	0.55	0.10	0.14	0.20	0.07	0.43	0.14
1600 - 2400m	0	0.00	0.00	0.00	0.01	0.03	0.07	0.02	0.08	0.18	0.01	0.05	0.10	0.03	0.08	0.05
> 2400m	1	<0.01	0.10	0.02	2.80	4.39	6.26	7.62	10.90	14.84	4.16	6.33	8.90	4.39	11.00	6.35
Straits of Florida Gulf of Mexico OCS	**0**	**0.00**	**0.00**	**0.00**	**0.01**	**0.02**	**0.03**	**0.01**	**0.02**	**0.03**	**0.01**	**0.02**	**0.03**	**0.02**	**0.02**	**0.02**
0 - 200m	0	0.00	0.00	0.00	0.01	0.01	0.02	0.01	0.01	0.02	0.01	0.01	0.02	0.01	0.01	0.01
200 - 800m	0	0.00	0.00	0.00	<0.01	0.01	0.01	<0.01	0.01	0.01	<0.01	0.01	0.01	0.01	0.01	0.01

[1] Total Reserves = Proved Reserves + Unproved Reserves + Reserves Appreciation

[2] Total Endowment = Total Reserves + UTRR

2011 Gulf of Mexico OCS Assessment

UERR Presented at a Gas Market Value Adjustment of 0.4

Region	Undiscovered Economically Recoverable Oil and Gas Resources (UERR)																							
	$30/bbl						$60/bbl						$90/bbl						$120/bbl					
	$2.14/Mcf						$4.27/Mcf						$6.41/Mcf						$8.54/Mcf					
Planning Area	Oil (Bbbl)			Gas (Tcf)			Oil (Bbbl)			Gas (Tcf)			Oil (Bbbl)			Gas (Tcf)			Oil (Bbbl)			Gas (Tcf)		
Water Depth	**95%**	**Mean**	**5%**	**95%**	**Mean**	**5%**	**95%**	**Mean**	**5%**	**95%**	**Mean**	**5%**	**95%**	**Mean**	**5%**	**95%**	**Mean**	**5%**	**95%**	**Mean**	**5%**	**95%**	**Mean**	**5%**
Total Gulf of Mexico OCS	**25.67**	**32.74**	**40.48**	**113.49**	**129.92**	**146.79**	**31.98**	**40.29**	**49.62**	**150.94**	**172.06**	**193.62**	**34.05**	**42.80**	**52.67**	**163.31**	**185.94**	**209.44**	**35.06**	**43.97**	**54.04**	**169.14**	**192.25**	**216.43**
0 - 200m	1.88	2.50	3.11	52.72	68.94	84.85	2.38	3.07	3.75	73.53	94.36	118.00	2.53	3.23	3.94	79.12	101.31	126.54	2.60	3.31	4.03	81.40	103.94	129.97
200 - 800m	2.50	3.39	4.35	5.94	7.92	9.99	3.12	4.20	5.34	8.08	10.56	13.09	3.35	4.48	5.68	9.10	11.76	14.44	3.46	4.62	5.84	9.62	12.41	15.19
800 - 1600m	7.88	10.76	13.96	16.50	21.02	25.99	9.77	13.25	17.08	21.37	26.95	32.90	10.42	14.11	18.15	23.43	29.44	35.76	10.74	14.51	18.65	24.57	30.77	37.17
1600 - 2400m	5.33	7.67	10.34	10.85	13.97	17.62	6.61	9.46	12.75	13.85	17.62	21.88	7.04	10.07	13.55	15.10	19.10	23.62	7.26	10.35	13.91	15.74	19.87	24.42
> 2400m	6.39	8.42	10.82	13.82	18.07	22.46	7.80	10.31	13.32	17.37	22.56	28.11	8.24	10.92	14.12	18.83	24.33	30.24	8.45	11.20	14.45	19.61	25.26	31.37
Western Gulf of Mexico OCS	**5.63**	**8.28**	**11.58**	**35.52**	**43.72**	**52.81**	**7.05**	**10.29**	**14.32**	**46.97**	**57.44**	**68.56**	**7.54**	**10.96**	**15.23**	**50.46**	**61.46**	**73.02**	**7.77**	**11.28**	**15.67**	**51.93**	**63.20**	**74.99**
0 - 200m	0.68	0.97	1.35	20.97	31.48	43.98	0.82	1.16	1.58	28.67	41.68	56.43	0.87	1.21	1.63	30.66	44.23	59.33	0.88	1.23	1.66	31.38	45.20	60.38
200 - 800m	0.66	1.05	1.49	1.37	2.00	2.65	0.82	1.29	1.82	1.84	2.58	3.36	0.88	1.38	1.93	2.05	2.83	3.67	0.91	1.42	1.99	2.17	2.97	3.83
800 - 1600m	2.33	3.90	5.88	4.46	6.46	8.60	2.95	4.89	7.36	5.84	8.33	11.00	3.17	5.23	7.84	6.44	9.11	11.97	3.28	5.39	8.06	6.75	9.52	12.45
1600 - 2400m	0.91	1.52	2.29	1.67	2.37	3.08	1.15	1.90	2.85	2.20	3.04	3.93	1.24	2.03	3.04	2.43	3.31	4.26	1.27	2.09	3.13	2.55	3.46	4.42
> 2400m	0.51	0.83	1.22	1.01	1.40	1.83	0.65	1.04	1.52	1.32	1.80	2.32	0.70	1.11	1.62	1.47	1.97	2.52	0.72	1.15	1.66	1.54	2.05	2.62
Central Gulf of Mexico OCS	**15.05**	**21.17**	**28.26**	**63.79**	**78.09**	**92.11**	**18.62**	**25.95**	**34.45**	**86.09**	**103.99**	**122.90**	**19.80**	**27.52**	**36.44**	**93.44**	**112.77**	**132.84**	**20.36**	**28.25**	**37.35**	**96.68**	**116.74**	**137.49**
0 - 200m	0.95	1.40	1.95	25.23	36.62	48.86	1.18	1.71	2.31	35.85	51.35	70.34	1.24	1.79	2.41	38.67	55.51	75.41	1.28	1.83	2.45	39.81	57.05	77.55
200 - 800m	1.53	2.30	3.16	3.56	5.27	7.35	1.90	2.83	3.85	4.70	6.91	9.45	2.04	3.02	4.09	5.25	7.64	10.39	2.10	3.11	4.20	5.56	8.04	10.88
800 - 1600m	4.50	6.84	9.37	10.00	14.48	19.50	5.58	8.33	11.28	13.13	18.47	24.44	5.97	8.84	11.92	14.50	20.15	26.42	6.15	9.08	12.22	15.20	21.04	27.54
1600 - 2400m	3.94	6.13	8.75	8.44	11.57	14.86	4.89	7.54	10.74	10.75	14.54	18.55	5.24	8.02	11.43	11.77	15.74	19.94	5.39	8.24	11.73	12.26	16.36	20.67
> 2400m	2.93	4.50	6.44	6.82	10.16	13.90	3.56	5.53	8.02	8.56	12.72	17.39	3.77	5.85	8.53	9.29	13.73	18.74	3.87	6.00	8.74	9.68	14.25	19.43
Eastern Gulf of Mexico OCS	**2.14**	**3.28**	**4.61**	**5.73**	**8.12**	**11.00**	**2.67**	**4.05**	**5.69**	**7.74**	**10.62**	**14.36**	**2.85**	**4.31**	**6.06**	**8.69**	**11.71**	**15.62**	**2.93**	**4.43**	**6.22**	**9.20**	**12.31**	**16.35**
0 - 200m	0.07	0.13	0.19	0.51	0.84	1.20	0.12	0.19	0.29	0.87	1.32	1.81	0.14	0.22	0.32	1.04	1.56	2.13	0.15	0.24	0.34	1.16	1.69	2.29
200 - 800m	0.03	0.04	0.06	0.36	0.65	0.99	0.04	0.07	0.09	0.65	1.07	1.56	0.05	0.08	0.11	0.80	1.28	1.84	0.06	0.09	0.12	0.90	1.41	1.99
800 - 1600m	0.01	0.02	0.04	0.05	0.08	0.12	0.01	0.03	0.06	0.10	0.15	0.20	0.02	0.04	0.06	0.12	0.18	0.25	0.02	0.04	0.07	0.13	0.20	0.28
1600 - 2400m	<0.01	0.01	0.04	<0.01	0.03	0.08	<0.01	0.02	0.05	<0.01	0.04	0.11	<0.01	0.02	0.06	<0.01	0.05	0.12	<0.01	0.02	0.06	0.01	0.05	0.13
> 2400m	1.95	3.08	4.42	4.36	6.52	9.03	2.36	3.74	5.42	5.37	8.04	11.22	2.49	3.95	5.71	5.85	8.64	12.00	2.55	4.05	5.84	6.08	8.96	12.45
Straits of Florida Gulf of Mexico OCS	**<0.01**	**0.01**	**0.01**	**<0.01**	**<0.01**	**0.01**	**<0.01**	**0.01**	**0.02**	**<0.01**	**0.01**	**0.01**	**<0.01**	**0.01**	**0.02**	**<0.01**	**0.01**	**0.01**	**<0.01**	**0.01**	**0.02**	**<0.01**	**0.01**	**0.01**
0 - 200m	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	0.01	0.01	<0.01	<0.01	0.01	<0.01	0.01	0.01	<0.01	<0.01	0.01	<0.01	0.01	0.01	<0.01	0.01	0.01
200 - 800m	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	0.01	<0.01	<0.01	0.01	<0.01	<0.01	0.01

2011 Gulf of Mexico OCS Assessment

UERR Presented at a Gas Market Value Adjustment of 0.6

Region	Undiscovered Economically Recoverable Oil and Gas Resources (UERR)																							
	$30/bbl						$60/bbl						$90/bbl						$120/bbl					
	$3.20/Mcf						$6.41/Mcf						$9.61/Mcf						$12.81/Mcf					
Planning Area	Oil (Bbbl)			Gas (Tcf)			Oil (Bbbl)			Gas (Tcf)			Oil (Bbbl)			Gas (Tcf)			Oil (Bbbl)			Gas (Tcf)		
Water Depth	95%	Mean	5%	95%	Mean	5%	95%	Mean	5%	95%	Mean	5%	95%	Mean	5%	95%	Mean	5%	95%	Mean	5%	95%	Mean	5%
Total Gulf of Mexico OCS	**26.37**	**33.54**	**41.43**	**136.93**	**156.63**	**176.18**	**32.42**	**40.84**	**50.28**	**166.05**	**188.76**	**212.37**	**34.42**	**43.22**	**53.13**	**174.33**	**197.90**	**222.12**	**35.36**	**44.32**	**54.41**	**178.16**	**202.13**	**226.62**
0 - 200m	2.03	2.69	3.34	68.51	88.45	110.69	2.45	3.15	3.85	81.22	103.78	129.79	2.58	3.28	4.00	83.71	106.60	132.80	2.63	3.34	4.07	84.65	107.64	133.95
200 - 800m	2.56	3.47	4.44	7.04	9.25	11.51	3.17	4.26	5.42	9.30	12.00	14.70	3.39	4.53	5.74	10.24	13.08	15.92	3.50	4.66	5.89	10.69	13.63	16.58
800 - 1600m	8.04	10.97	14.22	18.66	23.63	28.89	9.90	13.42	17.28	23.63	29.58	35.76	10.52	14.24	18.31	25.60	31.84	38.31	10.83	14.62	18.79	26.62	32.97	39.61
1600 - 2400m	5.44	7.81	10.52	12.19	15.47	19.26	6.69	9.57	12.88	15.14	19.09	23.48	7.11	10.15	13.65	16.31	20.43	24.99	7.32	10.42	14.00	16.89	21.10	25.79
> 2400m	6.53	8.61	11.11	15.33	19.82	24.51	7.89	10.45	13.50	18.89	24.31	30.11	8.32	11.03	14.26	20.21	25.95	32.21	8.52	11.28	14.56	20.89	26.79	33.15
Western Gulf of Mexico OCS	**5.79**	**8.49**	**11.82**	**43.42**	**53.05**	**63.38**	**7.16**	**10.43**	**14.50**	**51.23**	**62.31**	**73.95**	**7.63**	**11.07**	**15.36**	**53.16**	**64.69**	**76.56**	**7.83**	**11.36**	**15.78**	**54.03**	**65.72**	**77.78**
0 - 200m	0.73	1.05	1.45	26.92	39.44	53.86	0.85	1.19	1.61	31.32	45.12	60.29	0.88	1.23	1.66	32.15	46.14	61.46	0.89	1.25	1.67	32.46	46.49	61.85
200 - 800m	0.67	1.07	1.52	1.59	2.26	2.95	0.83	1.31	1.84	2.08	2.85	3.67	0.89	1.39	1.95	2.27	3.08	3.94	0.92	1.43	2.00	2.37	3.19	4.06
800 - 1600m	2.38	3.97	5.98	5.04	7.19	9.48	2.99	4.95	7.44	6.44	9.08	11.86	3.21	5.28	7.90	7.03	9.80	12.69	3.31	5.43	8.11	7.32	10.16	13.11
1600 - 2400m	0.93	1.55	2.33	1.89	2.62	3.38	1.17	1.92	2.88	2.44	3.30	4.21	1.25	2.05	3.07	2.63	3.55	4.51	1.28	2.10	3.15	2.74	3.68	4.66
> 2400m	0.53	0.85	1.24	1.14	1.55	1.99	0.66	1.06	1.53	1.47	1.96	2.50	0.70	1.12	1.63	1.59	2.11	2.68	0.73	1.16	1.67	1.65	2.19	2.77
Central Gulf of Mexico OCS	**15.47**	**21.68**	**28.85**	**78.23**	**94.17**	**110.84**	**18.89**	**26.30**	**34.87**	**94.80**	**114.47**	**134.72**	**20.02**	**27.79**	**36.75**	**99.75**	**120.25**	**141.17**	**20.55**	**28.47**	**37.61**	**102.07**	**122.95**	**144.25**
0 - 200m	1.02	1.51	2.08	33.34	47.83	64.99	1.21	1.75	2.37	39.78	56.97	77.39	1.26	1.82	2.45	41.12	58.58	79.42	1.29	1.85	2.48	41.61	59.19	80.05
200 - 800m	1.56	2.35	3.23	4.09	6.03	8.34	1.93	2.88	3.90	5.35	7.73	10.50	2.06	3.05	4.13	5.85	8.40	11.32	2.12	3.14	4.24	6.13	8.74	11.72
800 - 1600m	4.61	6.97	9.54	11.51	16.32	21.76	5.66	8.44	11.40	14.60	20.30	26.60	6.04	8.92	12.02	15.87	21.80	28.45	6.21	9.15	12.30	16.52	22.55	29.33
1600 - 2400m	4.02	6.25	8.89	9.48	12.82	16.32	4.96	7.63	10.86	11.80	15.75	19.86	5.29	8.08	11.51	12.67	16.82	21.13	5.43	8.29	11.80	13.10	17.36	21.73
> 2400m	3.00	4.61	6.61	7.62	11.17	15.09	3.61	5.60	8.15	9.34	13.72	18.56	3.81	5.91	8.61	9.99	14.64	19.85	3.90	6.05	8.82	10.32	15.11	20.54
Eastern Gulf of Mexico OCS	**2.19**	**3.36**	**4.73**	**6.88**	**9.40**	**12.69**	**2.70**	**4.11**	**5.76**	**8.98**	**11.97**	**15.85**	**2.88**	**4.35**	**6.11**	**9.78**	**12.95**	**17.05**	**2.96**	**4.47**	**6.27**	**10.18**	**13.45**	**17.60**
0 - 200m	0.08	0.13	0.20	0.77	1.18	1.62	0.12	0.19	0.29	1.14	1.68	2.28	0.14	0.22	0.33	1.30	1.87	2.48	0.16	0.24	0.35	1.39	1.95	2.59
200 - 800m	0.03	0.04	0.06	0.58	0.96	1.40	0.05	0.07	0.09	0.90	1.41	2.00	0.05	0.08	0.11	1.06	1.60	2.22	0.06	0.09	0.13	1.12	1.69	2.35
800 - 1600m	0.01	0.02	0.04	0.08	0.13	0.17	0.02	0.03	0.06	0.13	0.20	0.27	0.02	0.04	0.06	0.16	0.24	0.32	0.02	0.04	0.07	0.17	0.25	0.35
1600 - 2400m	<0.01	0.01	0.04	<0.01	0.03	0.09	<0.01	0.02	0.05	<0.01	0.04	0.12	<0.01	0.02	0.06	0.01	0.05	0.13	<0.01	0.02	0.06	0.01	0.05	0.13
> 2400m	1.99	3.15	4.54	4.77	7.10	9.80	2.39	3.79	5.48	5.86	8.63	11.97	2.52	3.99	5.76	6.30	9.20	12.70	2.58	4.08	5.88	6.51	9.49	13.09
Straits of Florida Gulf of Mexico OCS	**<0.01**	**0.01**	**0.01**	**<0.01**	**<0.01**	**0.01**	**<0.01**	**0.01**	**0.02**	**<0.01**	**0.01**	**0.01**	**<0.01**	**0.01**	**0.02**	**<0.01**	**0.01**	**0.01**	**<0.01**	**0.01**	**0.02**	**<0.01**	**0.01**	**0.02**
0 - 200m	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	0.01	0.01	<0.01	<0.01	0.01	<0.01	0.01	0.01	<0.01	0.01	0.01	<0.01	0.01	0.01	<0.01	0.01	0.01
200 - 800m	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	0.01	<0.01	<0.01	0.01	<0.01	<0.01	0.01

2011 Gulf of Mexico OCS Assessment

UERR Presented at a Gas Market Value Adjustment of 1.0

Region	Undiscovered Economically Recoverable Oil and Gas Resources (UERR)																							
	$30/bbl						$60/bbl						$90/bbl						$120/bbl					
	$5.34/Mcf						$10.68/Mcf						$16.01/Mcf						$21.35/Mcf					
Planning Area	Oil (Bbbl)			Gas (Tcf)			Oil (Bbbl)			Gas (Tcf)			Oil (Bbbl)			Gas (Tcf)			Oil (Bbbl)			Gas (Tcf)		
Water Depth	95%	Mean	5%	95%	Mean	5%	95%	Mean	5%	95%	Mean	5%	95%	Mean	5%	95%	Mean	5%	95%	Mean	5%	95%	Mean	5%
Total Gulf of Mexico OCS	**27.47**	**34.80**	**42.90**	**159.88**	**181.38**	**203.67**	**33.12**	**41.66**	**51.21**	**177.49**	**201.30**	**225.50**	**34.97**	**43.82**	**53.81**	**182.73**	**206.97**	**231.69**	**35.80**	**44.82**	**54.97**	**185.07**	**209.60**	**234.55**
0 - 200m	2.20	2.86	3.52	80.46	102.91	128.83	2.51	3.22	3.93	84.93	107.99	134.32	2.62	3.32	4.05	85.73	108.83	135.25	2.67	3.38	4.11	86.02	109.12	135.56
200 - 800m	2.66	3.60	4.60	8.63	11.17	13.65	3.25	4.36	5.53	10.65	13.56	16.48	3.45	4.60	5.83	11.33	14.34	17.38	3.55	4.72	5.97	11.65	14.73	17.80
800 - 1600m	8.33	11.34	14.65	21.82	27.32	33.01	10.11	13.68	17.60	26.32	32.54	38.99	10.69	14.43	18.54	27.80	34.24	40.91	10.97	14.78	18.98	28.52	35.06	41.83
1600 - 2400m	5.64	8.06	10.84	13.97	17.58	21.54	6.83	9.74	13.09	16.64	20.76	25.36	7.22	10.28	13.81	17.55	21.79	26.51	7.41	10.53	14.13	18.00	22.29	27.07
> 2400m	6.76	8.94	11.53	17.54	22.40	27.57	8.04	10.66	13.78	20.68	26.44	32.70	8.44	11.18	14.44	21.72	27.78	34.43	8.62	11.41	14.72	22.23	28.41	35.18
Western Gulf of Mexico OCS	**6.03**	**8.81**	**12.23**	**49.76**	**60.46**	**71.57**	**7.32**	**10.63**	**14.74**	**53.94**	**65.48**	**77.34**	**7.74**	**11.22**	**15.55**	**55.08**	**66.81**	**78.89**	**7.93**	**11.49**	**15.92**	**55.61**	**67.40**	**79.56**
0 - 200m	0.79	1.11	1.52	31.07	44.81	59.89	0.87	1.22	1.64	32.55	46.61	61.98	0.89	1.24	1.67	32.77	46.87	62.26	0.90	1.26	1.68	32.83	46.95	62.35
200 - 800m	0.70	1.11	1.57	1.91	2.63	3.38	0.86	1.34	1.87	2.35	3.15	4.01	0.91	1.41	1.97	2.50	3.33	4.22	0.93	1.44	2.02	2.57	3.41	4.32
800 - 1600m	2.48	4.11	6.17	5.88	8.26	10.72	3.06	5.04	7.57	7.21	9.96	12.82	3.26	5.35	7.99	7.64	10.52	13.50	3.35	5.49	8.19	7.86	10.79	13.82
1600 - 2400m	0.97	1.60	2.39	2.22	2.99	3.79	1.19	1.96	2.93	2.70	3.61	4.54	1.27	2.07	3.10	2.86	3.82	4.80	1.30	2.12	3.18	2.95	3.91	4.93
> 2400m	0.55	0.88	1.28	1.34	1.78	2.26	0.67	1.08	1.56	1.62	2.15	2.71	0.72	1.14	1.65	1.72	2.27	2.87	0.74	1.17	1.69	1.76	2.33	2.94
Central Gulf of Mexico OCS	**16.14**	**22.50**	**29.88**	**91.13**	**109.69**	**128.82**	**19.32**	**26.82**	**35.50**	**101.74**	**122.40**	**143.33**	**20.34**	**28.18**	**37.24**	**104.95**	**126.06**	**147.72**	**20.81**	**28.79**	**38.00**	**106.39**	**127.76**	**149.65**
0 - 200m	1.10	1.61	2.21	39.40	56.47	76.88	1.24	1.79	2.41	41.81	59.41	80.31	1.28	1.84	2.47	42.22	59.89	80.86	1.30	1.86	2.50	42.36	60.06	81.06
200 - 800m	1.63	2.45	3.35	4.95	7.16	9.73	1.98	2.94	3.99	6.09	8.67	11.62	2.10	3.11	4.20	6.51	9.17	12.23	2.16	3.18	4.30	6.70	9.42	12.53
800 - 1600m	4.79	7.21	9.84	13.50	18.87	24.80	5.80	8.60	11.62	16.36	22.32	29.01	6.13	9.05	12.17	17.31	23.43	30.29	6.29	9.25	12.42	17.76	23.97	30.88
1600 - 2400m	4.16	6.44	9.16	10.92	14.55	18.25	5.08	7.76	11.03	12.95	17.10	21.32	5.36	8.18	11.64	13.59	17.92	22.33	5.50	8.38	11.90	13.93	18.31	22.78
> 2400m	3.11	4.79	6.90	8.71	12.65	16.90	3.69	5.72	8.33	10.23	14.91	20.18	3.86	6.00	8.75	10.73	15.65	21.26	3.94	6.12	8.92	10.94	16.01	21.75
Eastern Gulf of Mexico OCS	**2.27**	**3.48**	**4.90**	**8.47**	**11.22**	**14.80**	**2.76**	**4.19**	**5.88**	**10.18**	**13.40**	**17.46**	**2.93**	**4.42**	**6.20**	**10.73**	**14.10**	**18.35**	**3.00**	**4.53**	**6.34**	**10.98**	**14.43**	**18.76**
0 - 200m	0.08	0.14	0.21	1.11	1.63	2.21	0.13	0.20	0.30	1.41	1.97	2.61	0.15	0.23	0.33	1.49	2.06	2.71	0.16	0.25	0.36	1.53	2.11	2.76
200 - 800m	0.03	0.05	0.06	0.88	1.39	1.96	0.05	0.07	0.10	1.16	1.74	2.40	0.06	0.08	0.12	1.23	1.84	2.51	0.06	0.09	0.13	1.28	1.89	2.58
800 - 1600m	0.01	0.02	0.04	0.13	0.19	0.26	0.02	0.03	0.06	0.17	0.26	0.35	0.02	0.04	0.06	0.19	0.29	0.39	0.02	0.04	0.07	0.21	0.30	0.40
1600 - 2400m	<0.01	0.02	0.04	<0.01	0.04	0.10	<0.01	0.02	0.06	0.01	0.05	0.13	<0.01	0.02	0.06	0.01	0.06	0.14	<0.01	0.02	0.06	0.01	0.06	0.15
> 2400m	2.06	3.26	4.72	5.46	7.97	10.98	2.44	3.86	5.59	6.48	9.38	12.90	2.55	4.04	5.83	6.80	9.85	13.53	2.61	4.12	5.93	7.00	10.07	13.82
Straits of Florida Gulf of Mexico OCS	**<0.01**	**0.01**	**0.01**	**<0.01**	**0.01**	**0.01**	**<0.01**	**0.01**	**0.02**	**<0.01**	**0.01**	**0.01**	**<0.01**	**0.01**	**0.02**	**<0.01**	**0.01**	**0.02**	**0.01**	**0.01**	**0.02**	**0.01**	**0.01**	**0.02**
0 - 200m	<0.01	<0.01	0.01	<0.01	<0.01	0.01	<0.01	0.01	0.01	<0.01	<0.01	0.01	<0.01	0.01	0.01	<0.01	0.01	0.01	<0.01	0.01	0.01	<0.01	0.01	0.01
200 - 800m	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	0.01	<0.01	<0.01	0.01	<0.01	<0.01	0.01	<0.01	<0.01	0.01	<0.01	<0.01	0.01

Appendix B – Assessment Unit/Play Maps

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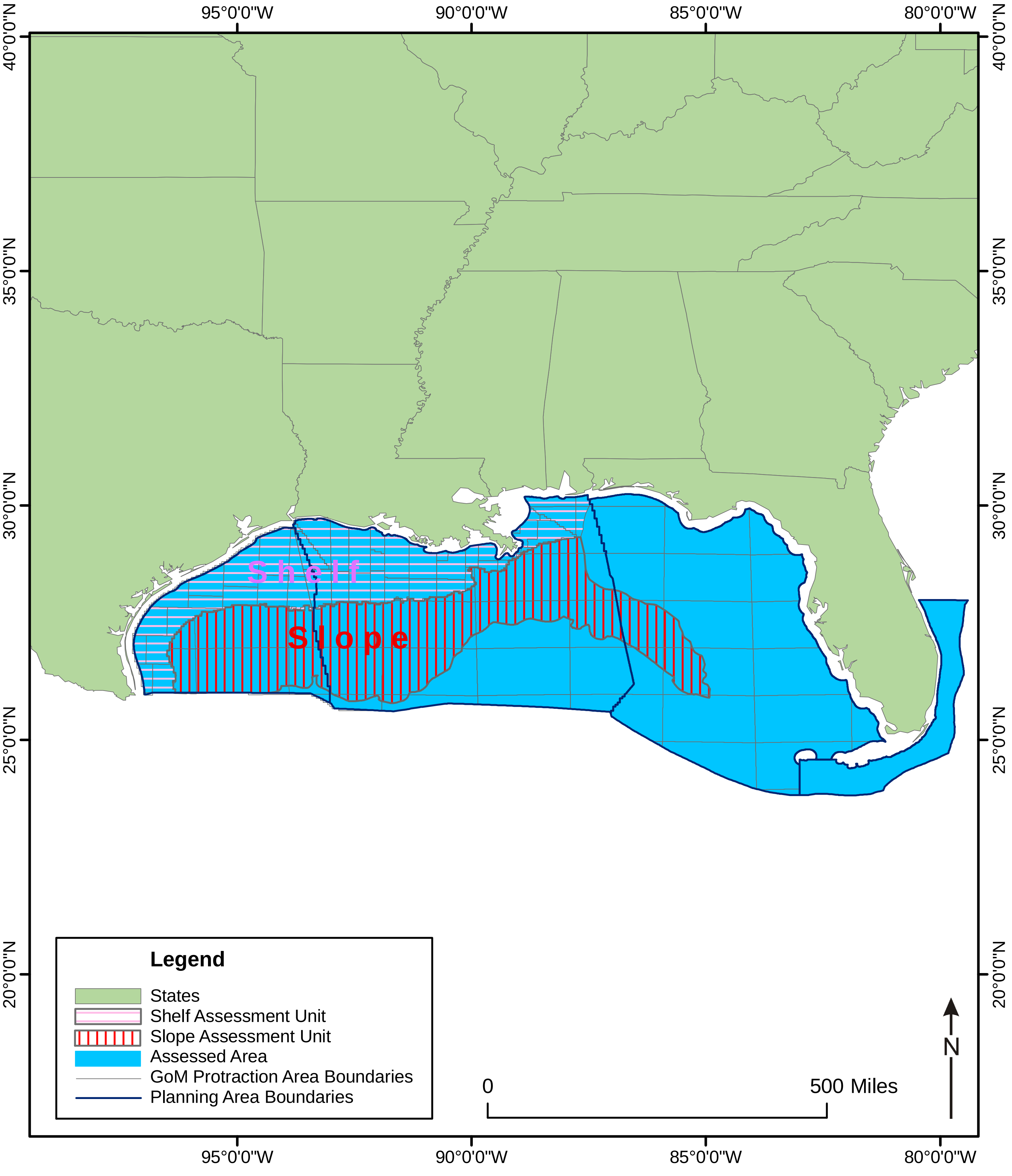

Figure 1. Map of the Gulf of Mexico showing the locations of the shelf and slope assessment units.

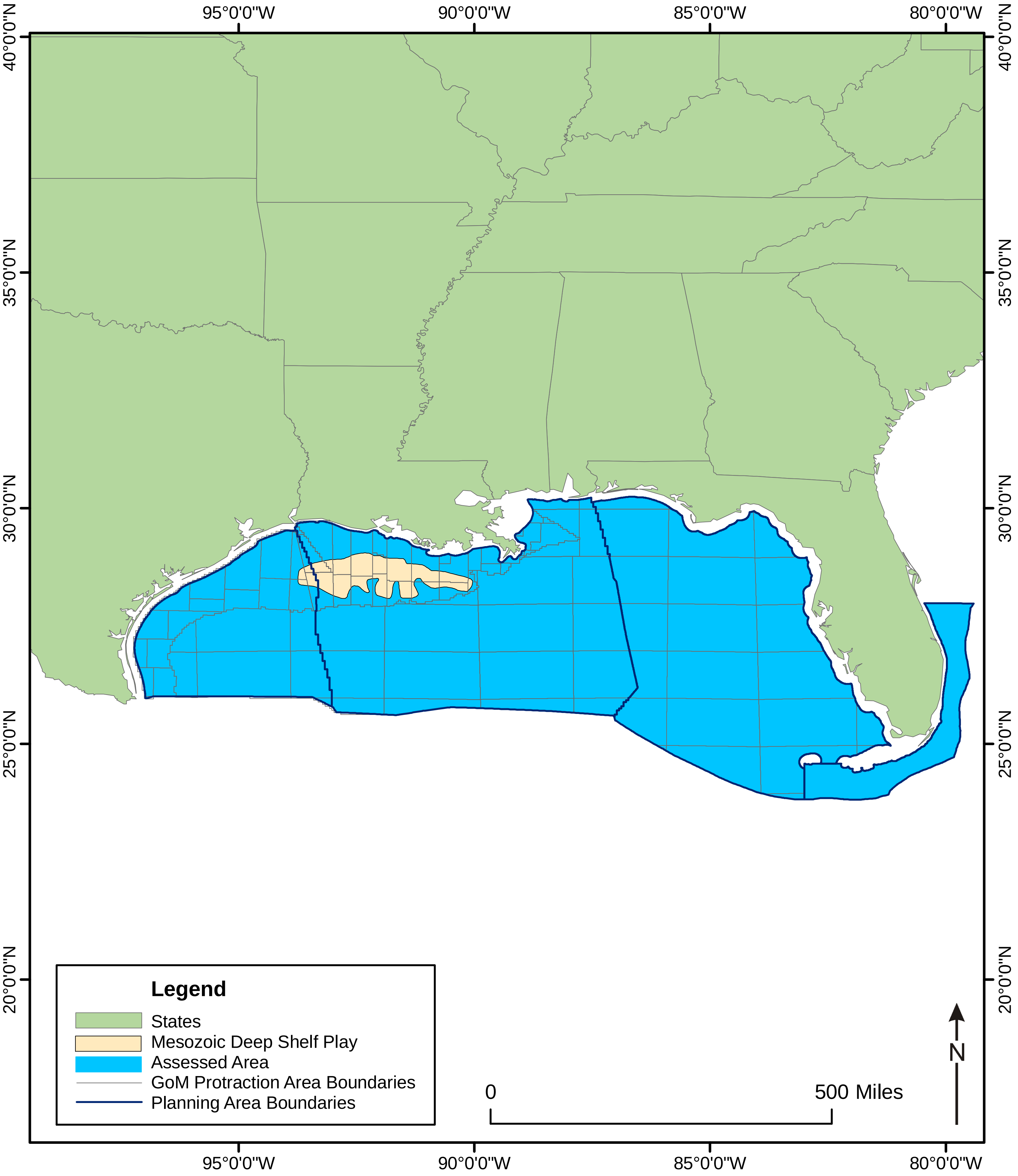

Figure 4. Mesozoic Deep Shelf Play area.

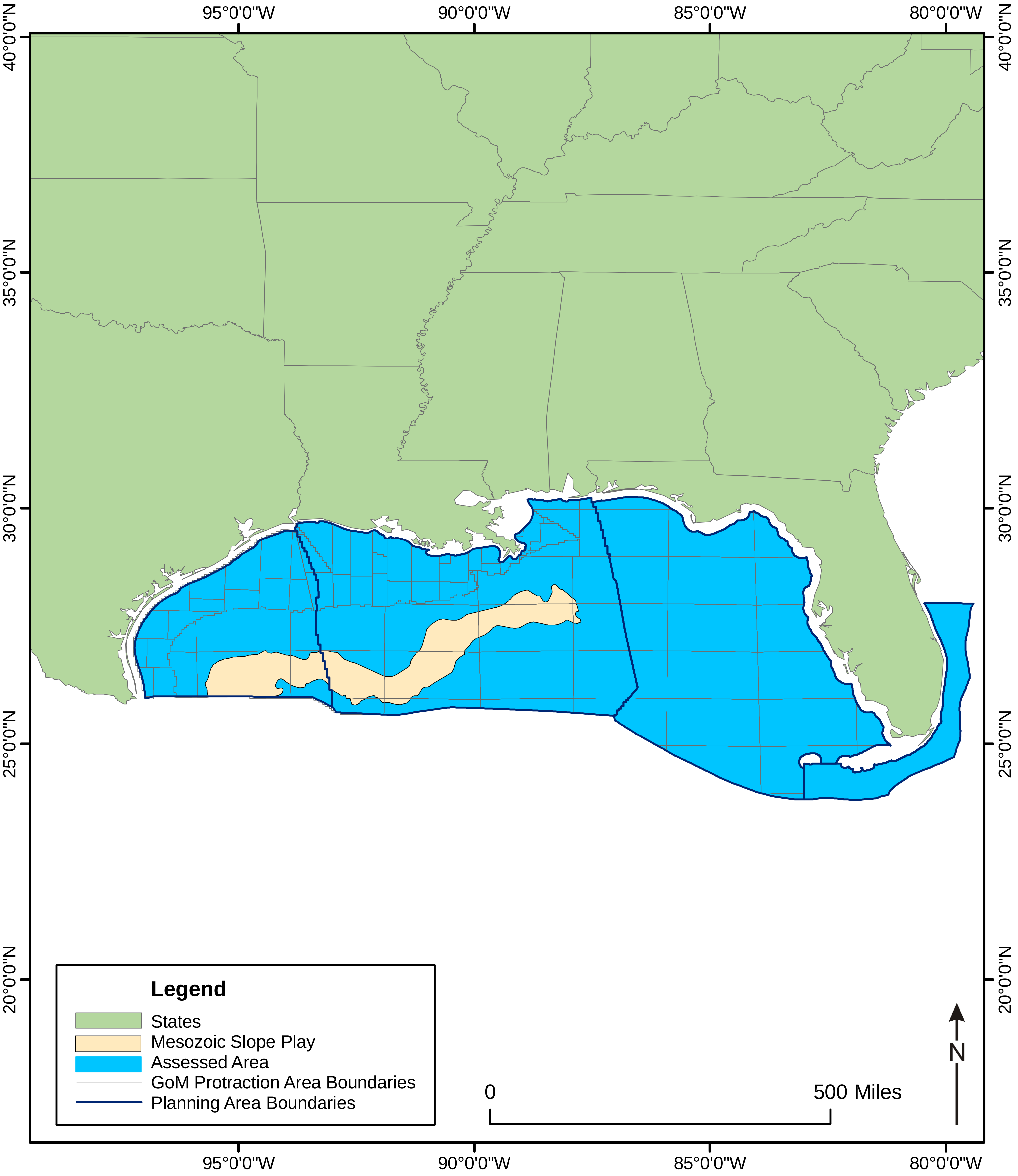

Figure 5. Mesozoic Slope Play area.

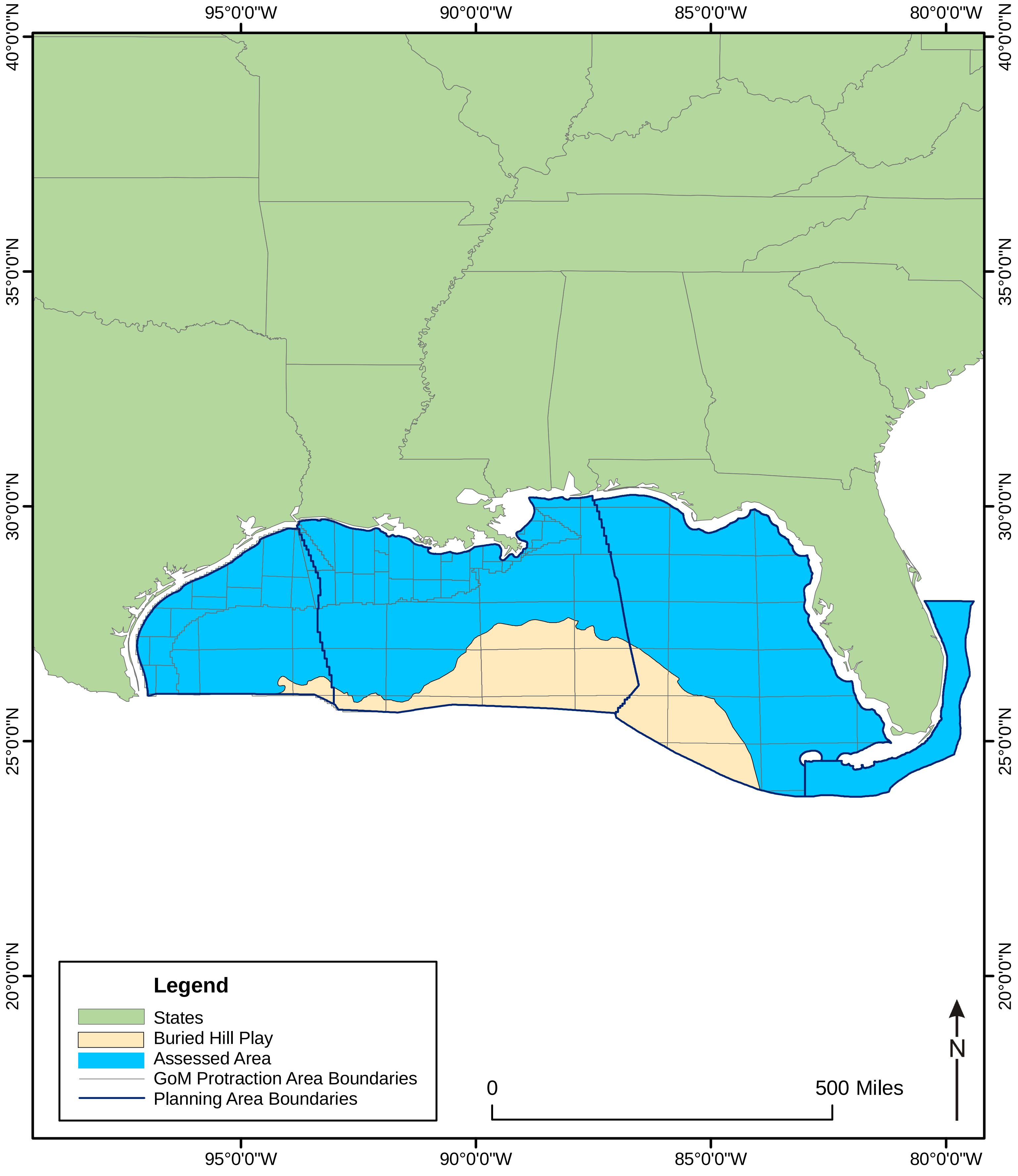

Figure 6. Buried Hill Play area.

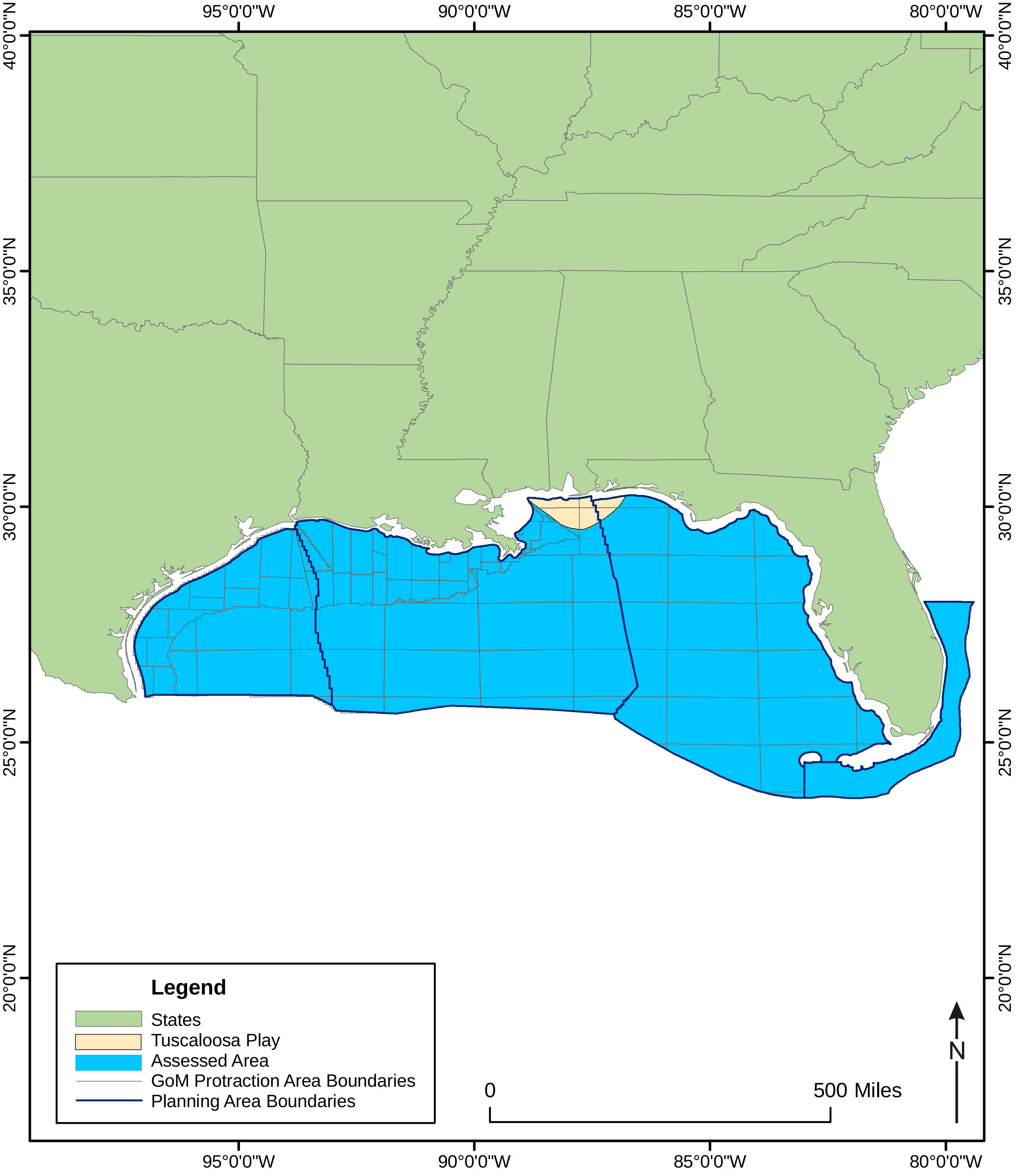

Figure 7. Tuscaloosa Play area.

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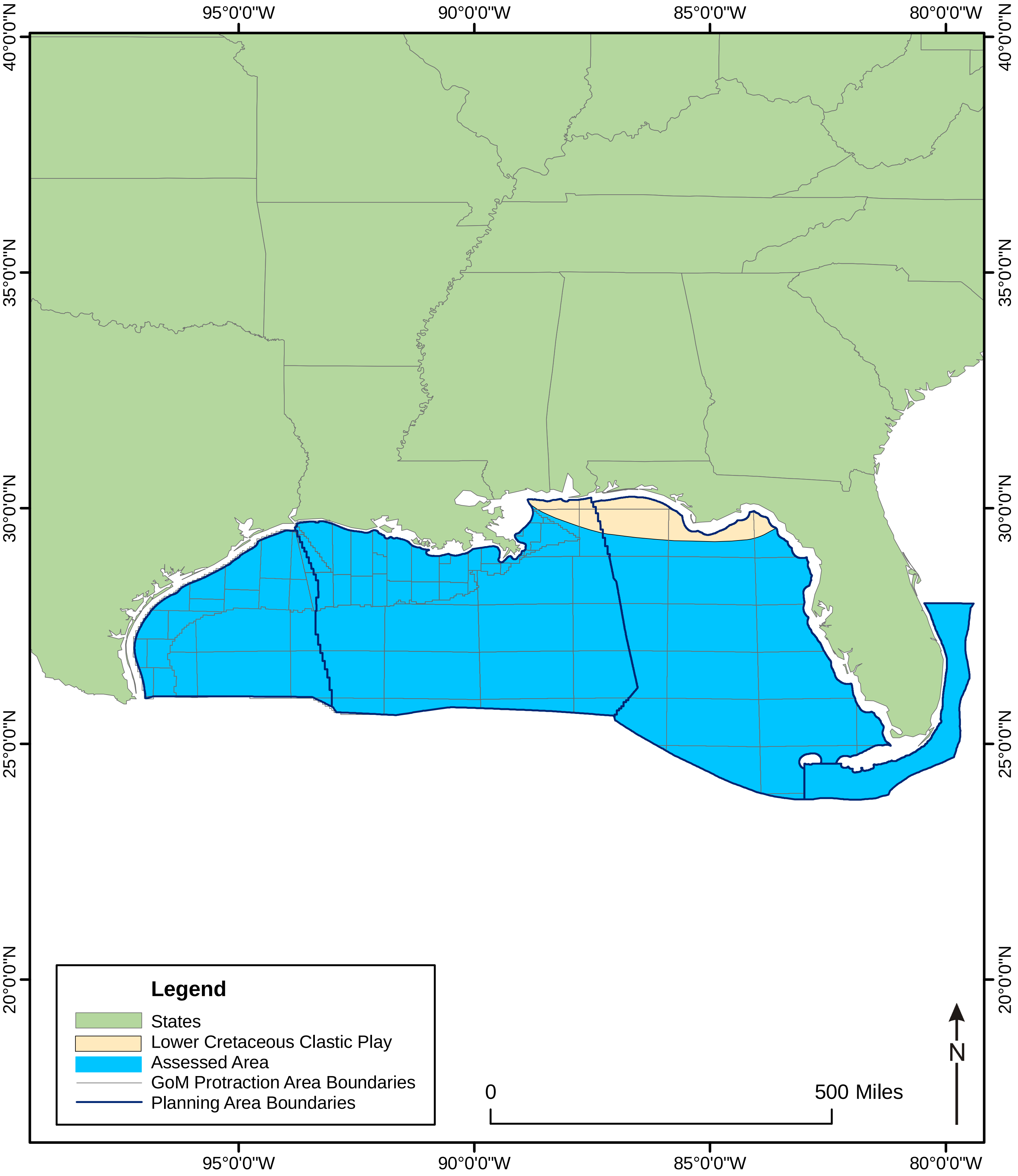

Figure 8. Lower Cretaceous Clastic Play area.

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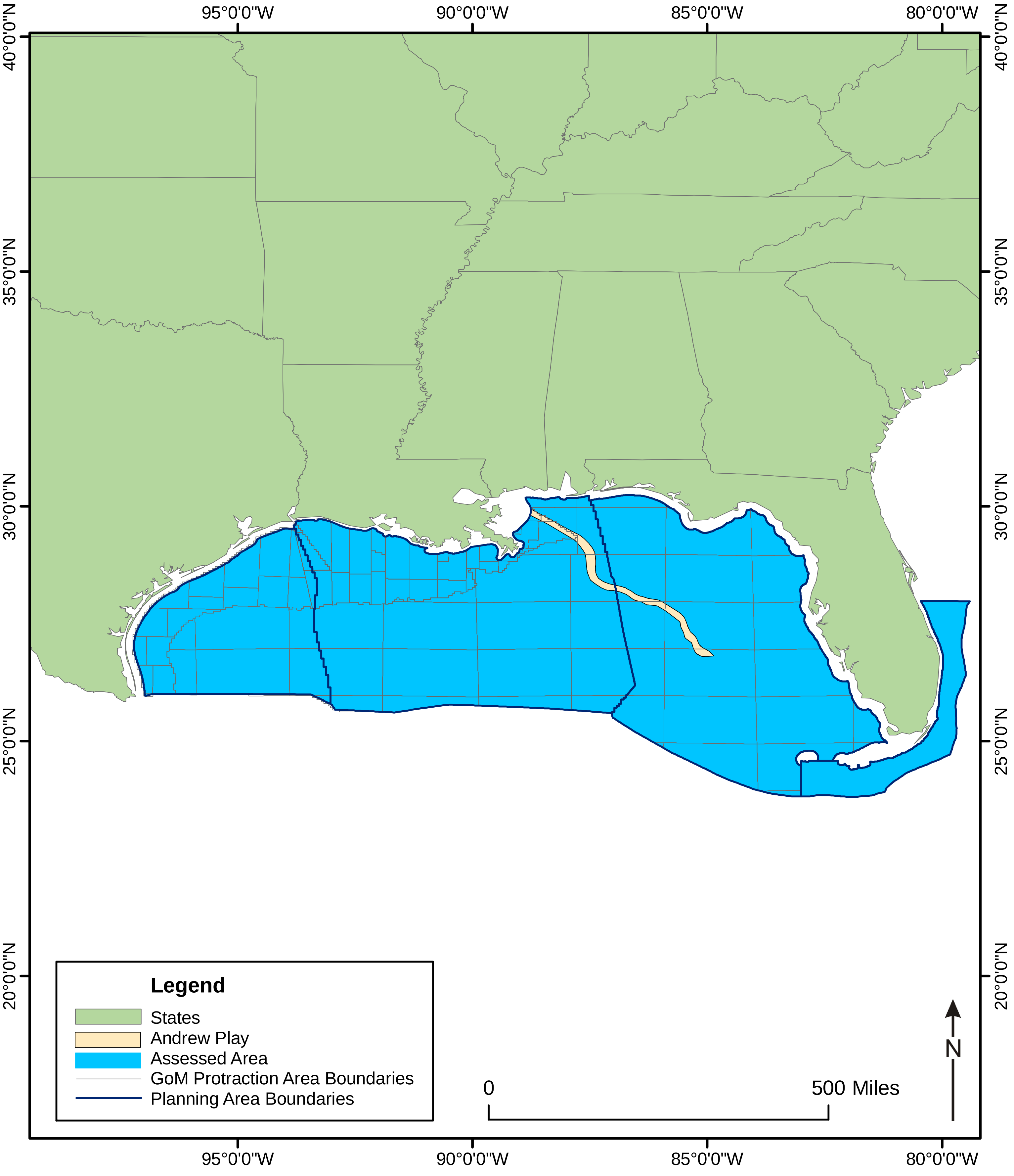

Figure 9. Andrew Play area.

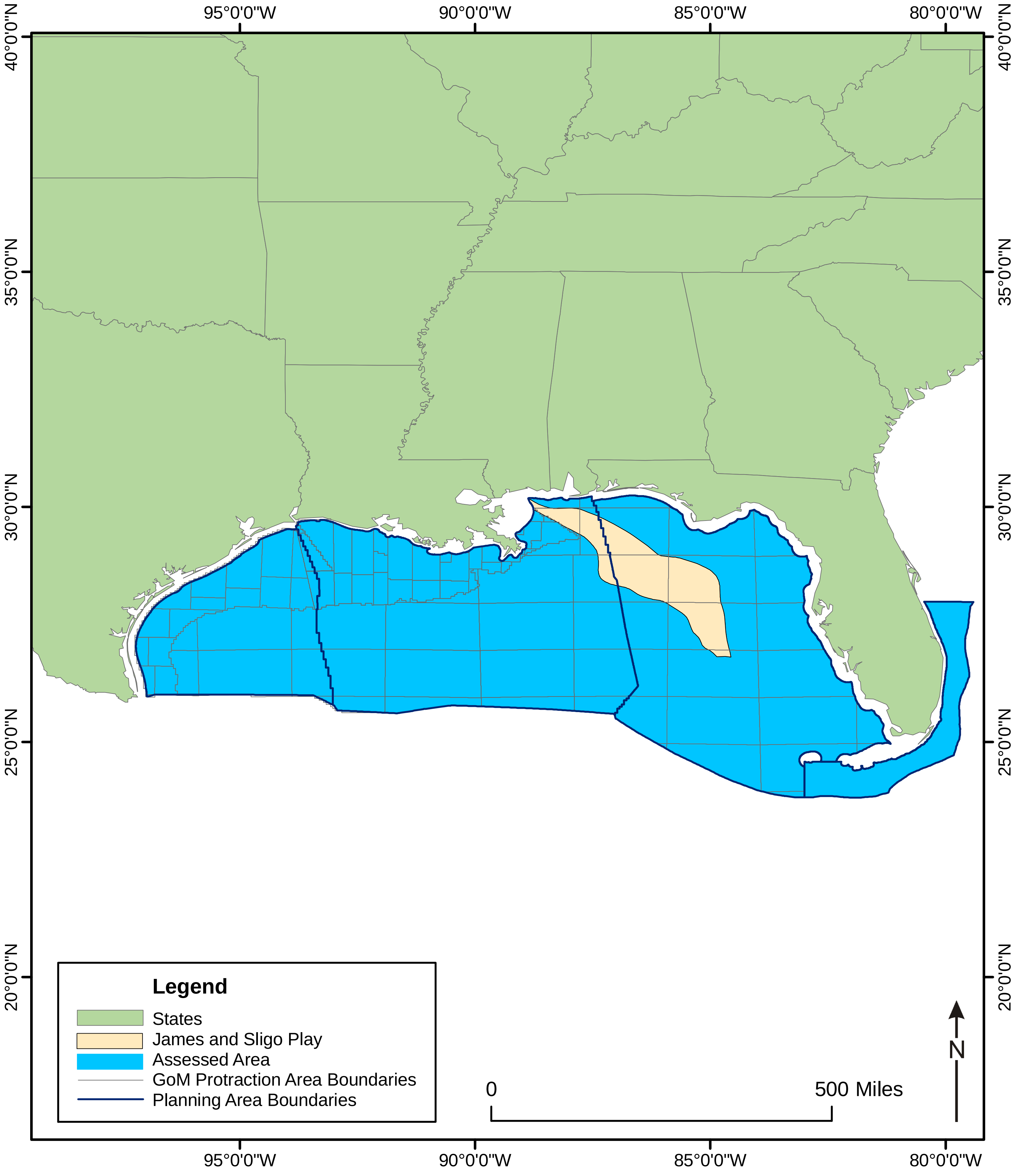

Figure 10. James and Sligo Play area.

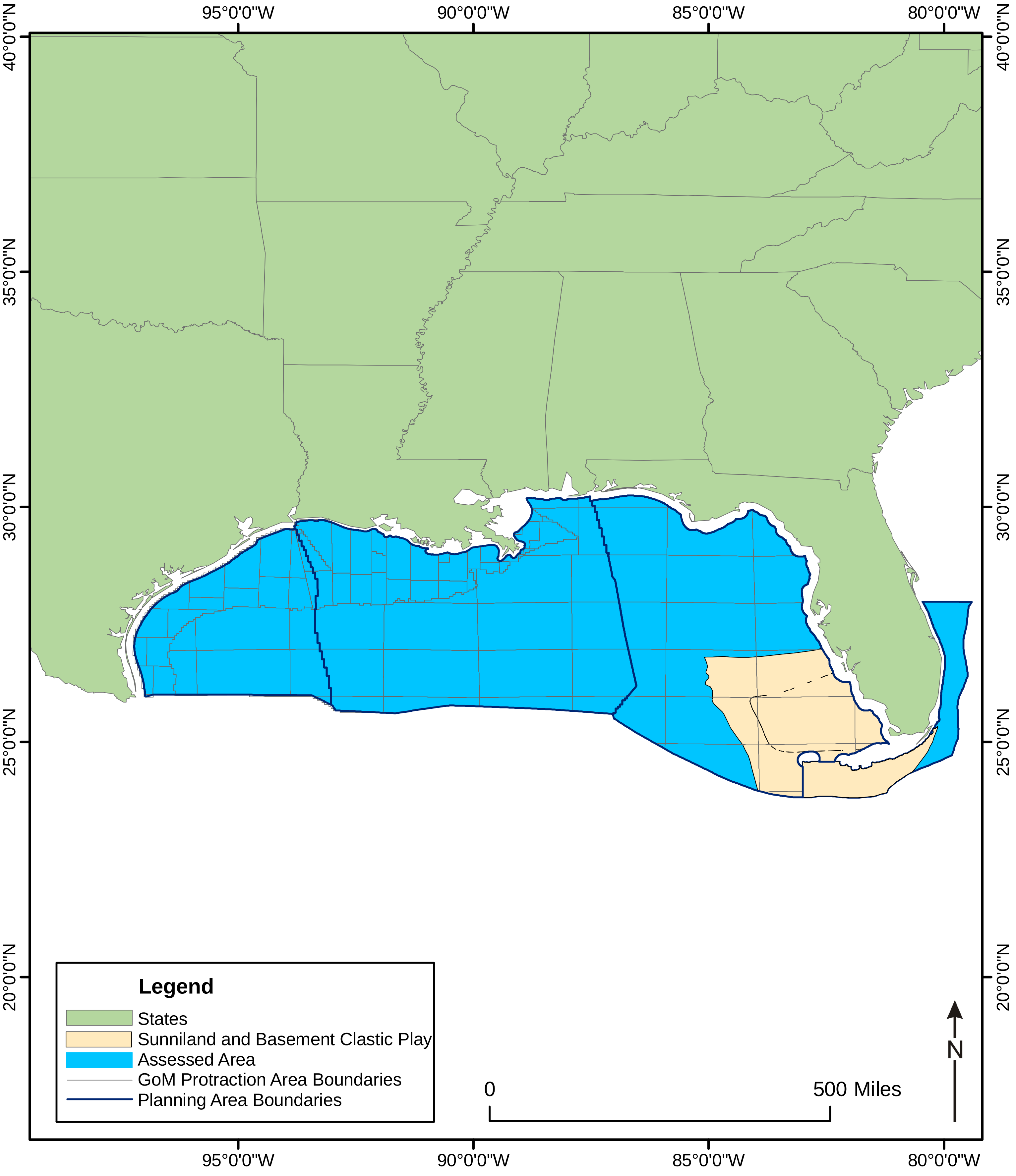

Figure 11. Sunniland and Basement Clastic Play area.

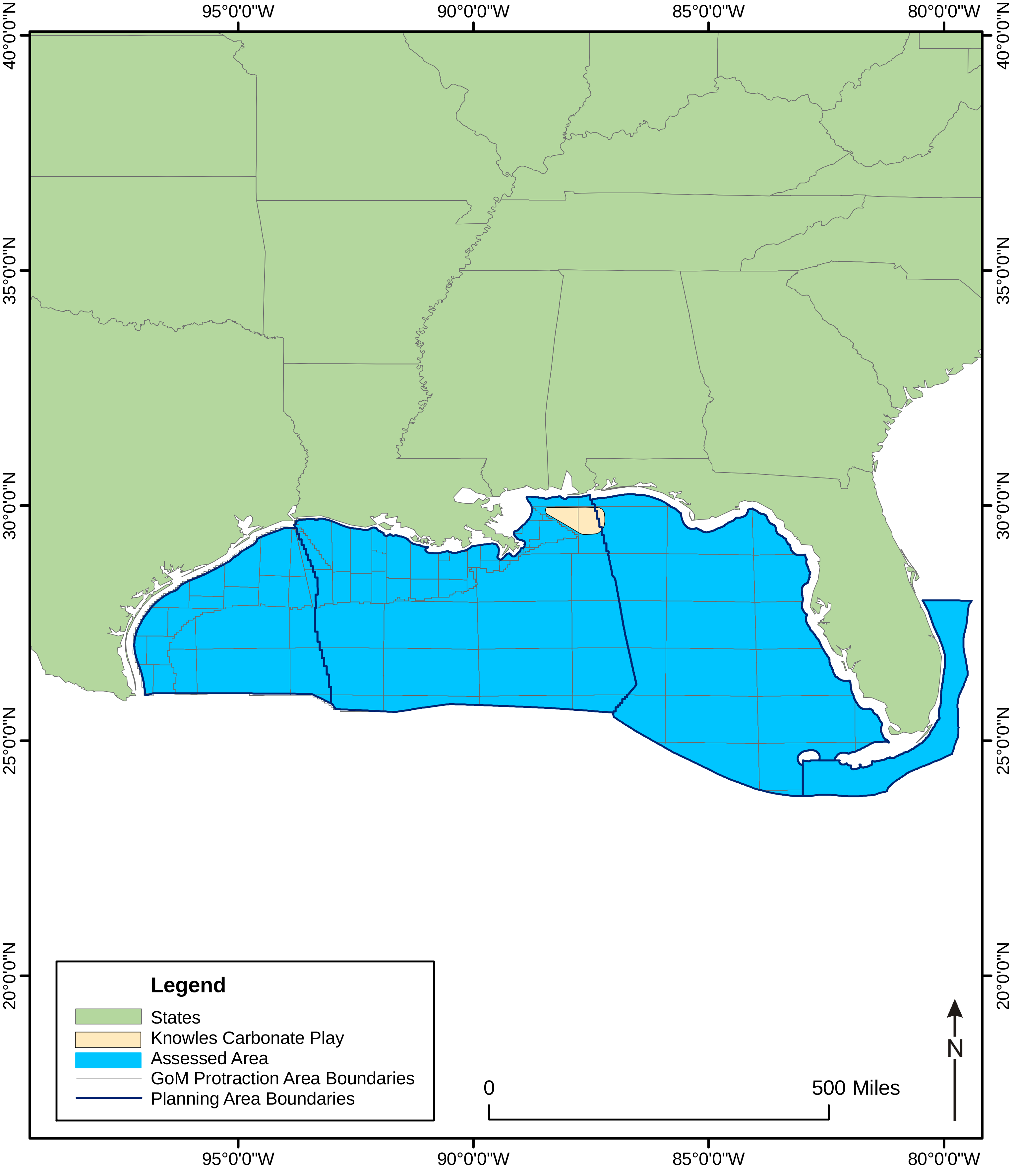

Figure 12. Knowles Carbonate Play area.

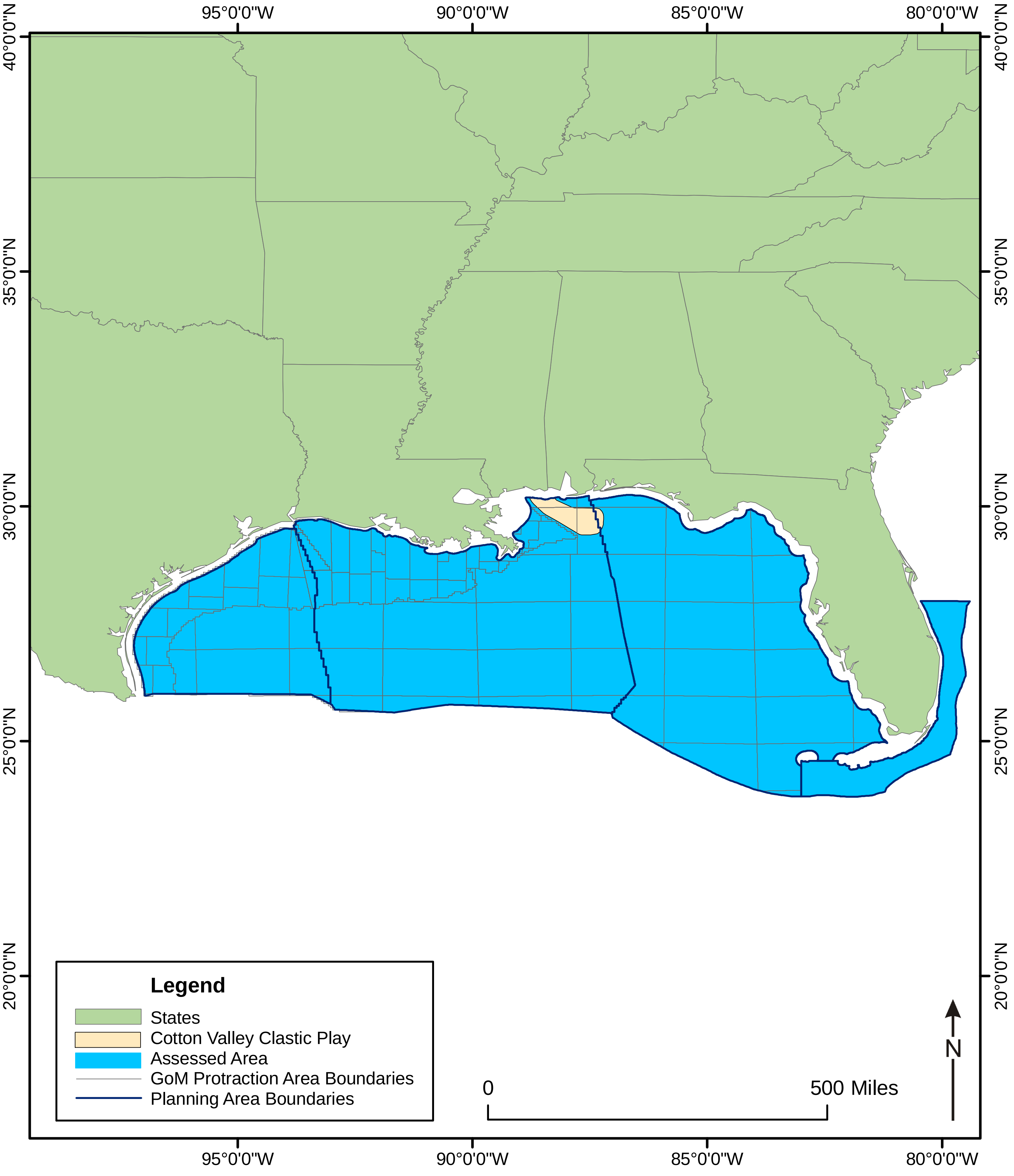

Figure 13. Cotton Valley Clastic Play area.

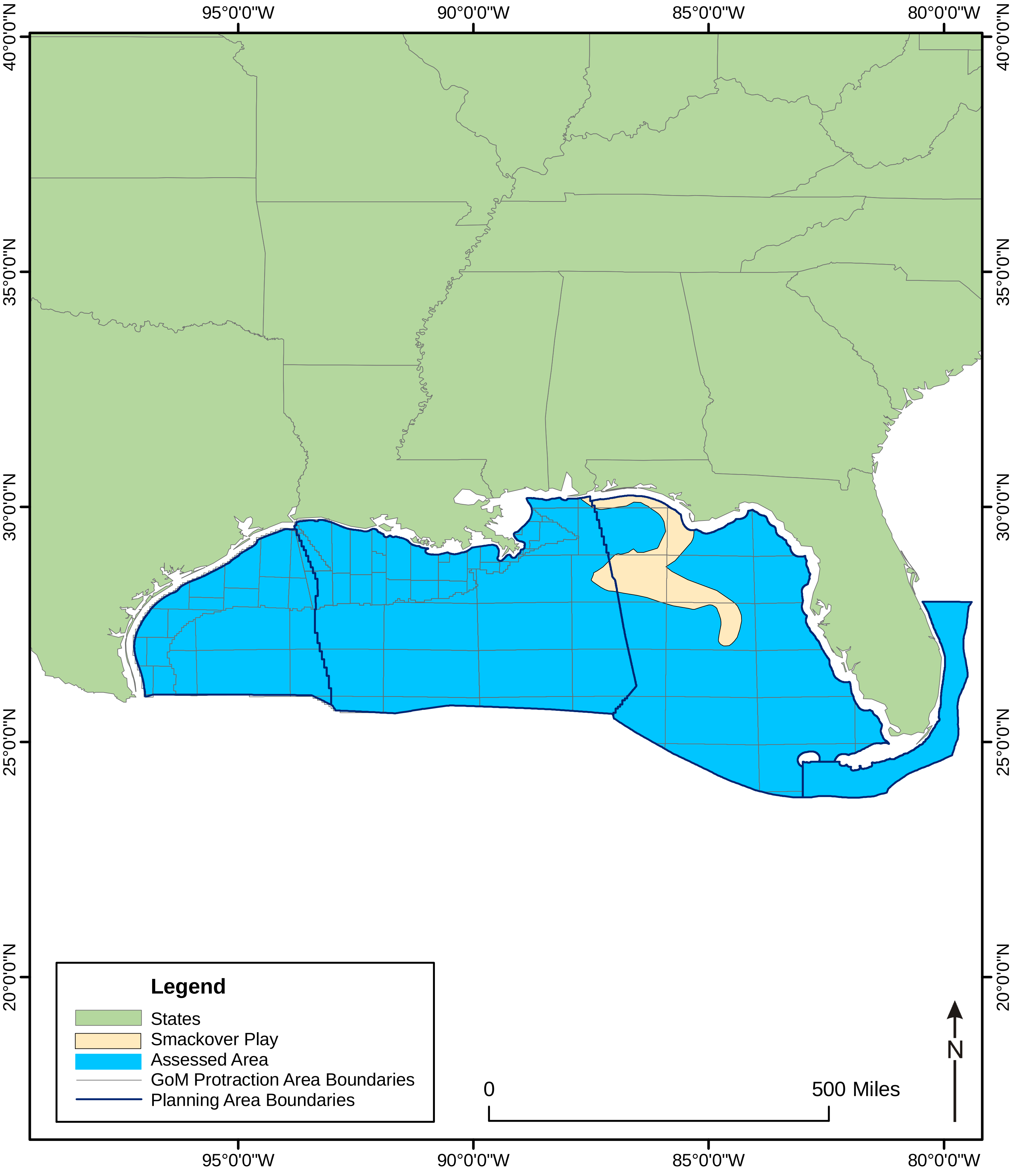

Figure 14. Smackover Play area.

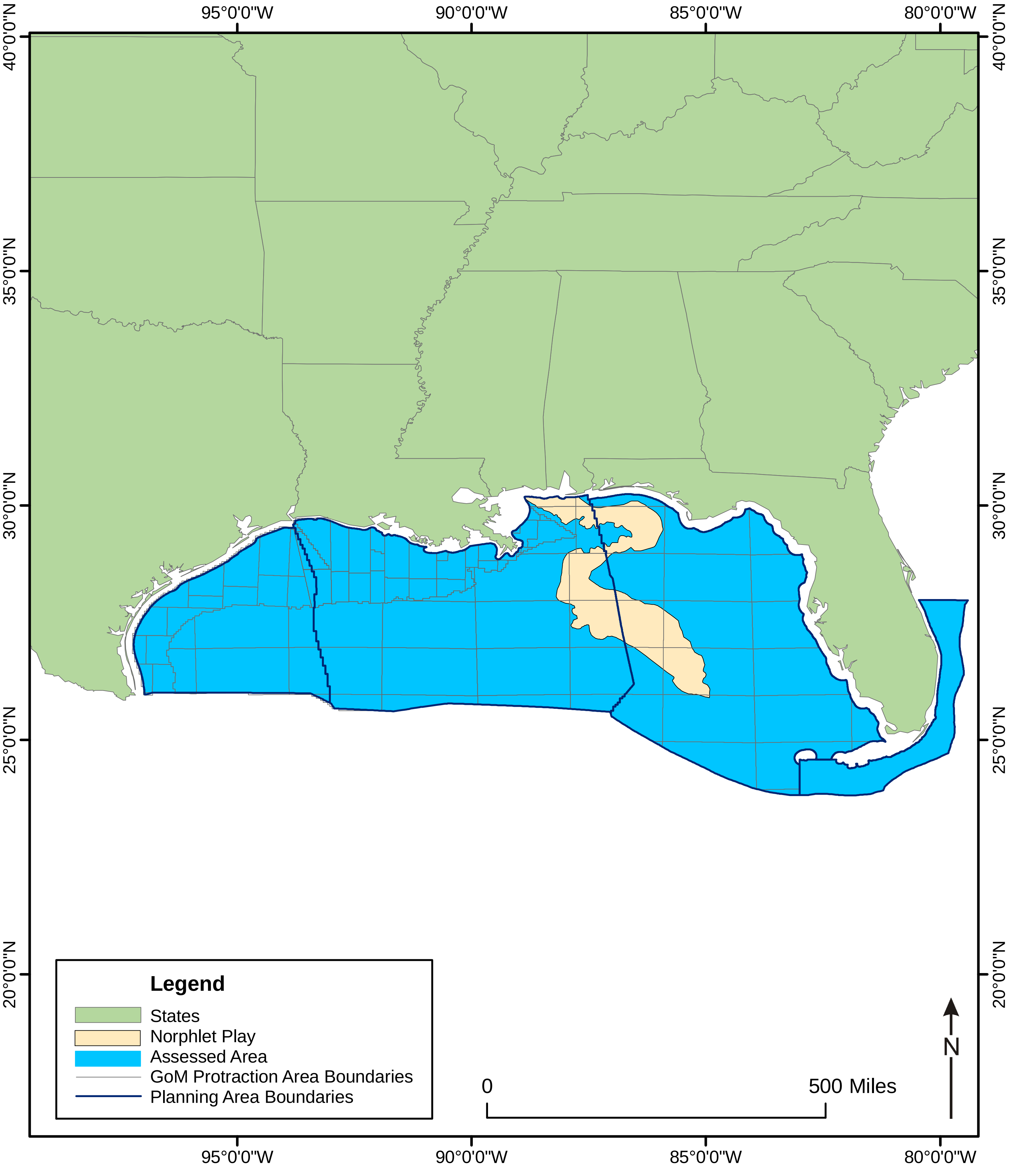

Figure 15. Norphlet Play area.