OCS Report
BOEM 2018-034

Outer Continental Shelf

Estimated Oil and Gas Reserves Gulf of Mexico OCS Region December 31, 2016

U.S. Department of the Interior
Bureau of Ocean Energy Management
Gulf of Mexico OCS Region

ON COVER- In September 2016, Shell announced that crude oil and natural gas production had begun at the Stones project in the Lower Tertiary trend, deepwater U.S. Gulf of Mexico. Photo courtesy spe.org.

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ABBREVIATIONS AND ACRONYMS

AL	Alabama
Bbbl	Billion barrels
Bbl	barrels
BBO	billion barrels of oil
BBOE	billion barrels of oil equivalent
Bcf	billion cubic feet
BOE	barrels of oil equivalent
BOEM	Bureau of Ocean Energy Management
DOI	U.S. Department of the Interior
^{0}F	degrees Fahrenheit
FL	Florida
ft	feet
GOM	Gulf of Mexico
GOMR	Gulf of Mexico Region
GOR	gas oil ratio
LA	Louisiana
MMbbl	million barrels
MMBOE	million barrels of oil equivalent
MMcf	million cubic feet
MMS	Minerals Management Service
MS	Mississippi
N	north
OAP	Offshore Atlas Project
OCS	Outer Continental Shelf
psia	pounds per square inch absolute
P/Z	pressure/gas compressibility factor
RE	Resource Evaluation
SCF/STB	standard cubic feet per stock tank barrel
SPE-PRMS	Society of Petroleum Engineers Petroleum Resources Management System
Tcf	trillion cubic feet
TX	Texas
U.S.	United States
USGS	United States Geological Survey

ABSTRACT

This publication presents the Bureau of Ocean Energy Management (BOEM) estimates of oil and gas reserves in the Gulf of Mexico Outer Continental Shelf. As of December 31, 2016, it is estimated that the *Original Reserves* are 23.73 billion barrels of oil and 194.6 trillion cubic feet of gas from 1,315 fields. *Original Reserves* are the total of the *Cumulative Production* and the *Reserves*. This number includes one new discovery, MC609, and two fields that moved from *Resources* to *Reserves* during 2016, GC599 and VK959. It also includes 785 fields that have produced and expired. C*umulative Production* from all fields accounts for 20.16 billion barrels of oil and 187.8 trillion cubic feet of gas.

Reserves are estimated to be 3.57 billion barrels of oil and 6.8 trillion cubic feet of gas. These reserves are recoverable from 530 active fields. *Reserves* in this report are proved plus probable (2P) reserves estimates. The reserves must be discovered, recoverable, commercial and remaining. *Reserves*, starting with the 2011 report, now include *Reserves Justified for Development.*

The estimates of reserves for this report represent the combined efforts of engineers, geoscientists, paleontologists, petrophysicists, and other personnel of the BOEM Gulf of Mexico Region, Office of Resource Evaluation, in New Orleans, Louisiana. Reserves estimates are derived for individual reservoirs from geologic and engineering calculations. For any field spanning State and Federal waters, reserves are estimated for the Federal portion only.

INTRODUCTION

This report supersedes the *Estimated Oil and Gas Reserves, Gulf of Mexico OCS Region, December 31, 2015* (Kazanis et al., 2016)**.** It presents estimated Original Reserves, Cumulative Production, and Reserves as of December 31, 2016, for the Gulf of Mexico (GOM). **Figure 1** represents the percentages of Cumulative Production and Reserves in the GOM. Contingent and Undiscovered Resources are not included in this report.

As of December 31, 2016, the 1,315 oil and gas fields in the federally regulated part of the Gulf of Mexico Outer Continental Shelf (GOM OCS) contained Original Reserves estimated to be 23.73 billion barrels of oil (BBO) and 194.6 trillion cubic feet (Tcf) of gas. Cumulative Production from the fields accounts for 20.16 BBO and 187.8 Tcf of gas. Reserves are estimated to be 3.57 BBO and 6.8 Tcf of gas for the 530 active fields. Oil Reserves have increased 2.6 percent and the gas Reserves have decreased 6.8 percent since the 2015 report.

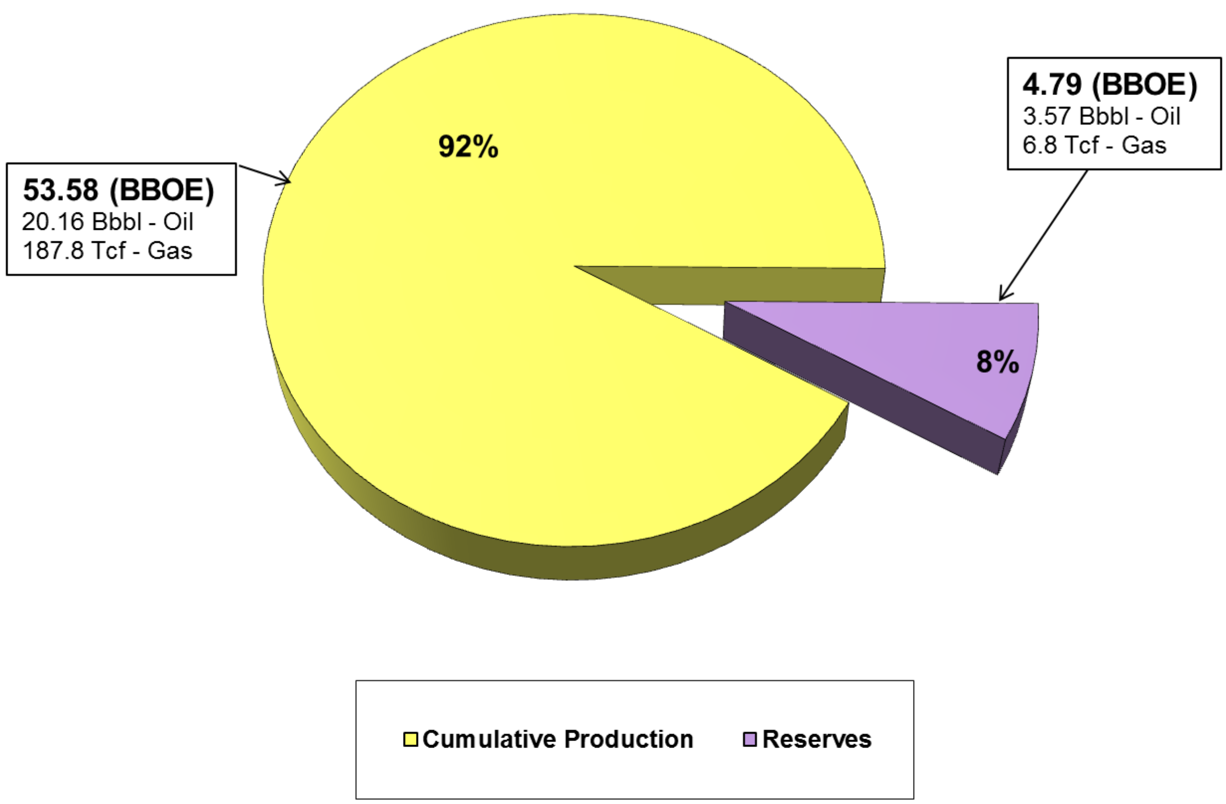

Figure 1. BOEM GOM Production and Reserves

BACKGROUND

Classification of Resources and Reserves

The BOEM resource classification framework is shown in **Figure 2**. Definitions for each resource class are presented in **Appendix A**. At the point in time a discovery is made, the identified accumulation of hydrocarbons is classified as a Contingent Resource, since a development project has not yet been identified. When the lessee makes a formal commitment to develop and produce the accumulation, it is classified as a Reserves Justified for Development. During the period when infrastructure is being constructed and installed, the accumulation is classified as Undeveloped Reserves. After the equipment is in place the accumulation is classified as Developed Non-Producing Reserves, and when production of the accumulation has begun, the status becomes Developed Producing Reserves. If an accumulation goes off production, for a year or more, for any reason, the classification changes back to Developed Non-Producing. *Reserves* in this report are proved plus probable (2P) reserves estimates. The reserves must be discovered, recoverable, commercial and remaining. *Reserves*, starting with the 2011 report, now include *Reserves Justified for Development.* All hydrocarbons produced and sold are included in the Cumulative Production category. Should a project be abandoned, at any phase of development, any estimates of remaining hydrocarbon volumes could be re-classified to Contingent Resources.

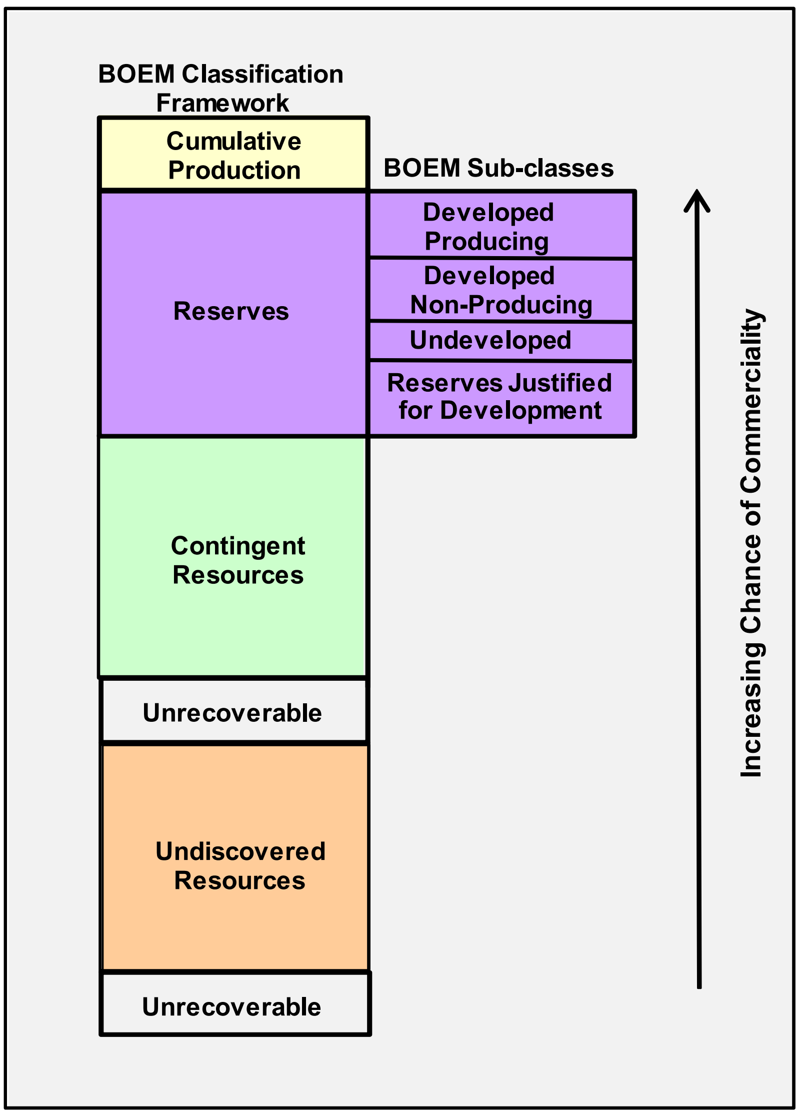

Figure 2. BOEM resource classification framework.

Methods Used for Estimating Reserves

The Reserves inventory component of the Resource Evaluation (RE) Program assigns new producible leases to fields and establishes field limits**.** The RE Program also develops independent estimates of natural gas and oil in previously discovered OCS fields by conducting field reserve studies and reviews of fields, sands, and reservoirs. The Program periodically revises the estimates of natural gas and oil volumes to reflect new discoveries, development, and annual production. This report, *Estimated Oil and Gas Reserves, Gulf of Mexico OCS Region, December 31, 2016*, is based on field studies completed at the reservoir and sand levels. All of the reservoir level data have been linked to the sand, pool, play, chronozone, and series level to support the Offshore Atlas Project (OAP).

Additional reports address GOM reserves and undiscovered resources on the OCS. Minerals Management Service (MMS) OCS Report, *Atlas of Gulf of Mexico Gas and Oil Sands as of January 1, 1999* (Bascle et al., 2001) provides a detailed geologic reporting of oil and gas reserves. A brief summary of the Atlas is available on the BOEM's Web site at http://www.boem.gov/BOEM-Newsroom/Library/Publications/2001/2001-086.aspx. The BOEM Report, *Assessment of Undiscovered Technically Recoverable Oil and Gas Resources of the Nation's Outer Continental Shelf, 2016,* summarizes the results of the Bureau of Ocean Energy Management 2016 assessment of the undiscovered oil and gas resources for the U.S. Outer Continental Shelf. For more information visit BOEM's Web site at https://www.boem.gov/National-Assessment-2016/.

Reserve estimates from geological and engineering analyses have been completed for the 1,315 fields. The accuracy of the reserve estimate improves as additional reservoir data becomes available to geoscientists and engineers. Well logs, well file data, seismic data, and production data are periodically analyzed to improve the accuracy of the reserve estimate. As a field is depleted and/or abandoned, the Original Reserves of productive reservoirs are assigned a value equal to the amount produced and any unrecovered reserve volumes may be converted to Contingent Resources. Currently, there are 785 expired, depleted fields.

Methods used for estimating reserves can be categorized into three groups: analog, volumetric, and performance. Reserve estimates in this report are based primarily on volumetric and performance methods. Reserve estimates are reported deterministically, providing a single "best estimate" based on known geological, engineering, and economic data.

Production data are the metered volumes of raw liquids and gas reported to BOEM (from ONRR, Office of Natural Resources Revenue) by Federal OCS unit and lease operators. Metered volumes from production platforms and/or leases are allocated to individual wells and reservoirs on the basis of periodic well test gauges. These procedures introduce approximations in both production and remaining reserves volumes.

Oil and gas volume measurements and reserves are corrected to reference standard conditions of 60°F and one atmosphere (14.73 pounds per square inch absolute [psia]). Prior to September 1998, gas was reported at 15.025 psia. BOEM has converted all historical gas production volumes to the 14.73 pressure base.

RESERVES AND RELATED DATA BY PLANNING AREA

The GOM OCS is divided into three planning areas for administrative purposes (**Figure 3**). Each planning area is subdivided into protractions, which in turn are divided into numbered blocks. Fields in the GOM are identified by the protraction area name and block number of discovery – for example, East Cameron Block 271 (EC 271) Field. As the field is developed, the limits may expand into adjacent blocks and planning areas. These adjacent blocks are then identified as part of the original field and are added to that field. Statistics in this report are presented as area totals compiled under each field name. For example, all of the data associated with EC 271 Field are included in the East Cameron totals, although part of the field extends into the adjacent area of Vermilion. There are four exceptions: Tiger Shoal and Lighthouse Point, included in South Marsh Island; Coon Point, included in Ship Shoal; and Bay Marchand, included in South Timbalier.

As of December 31, 2016, there were 530 fields active in the federally regulated part of the GOM. A list, updated quarterly, of the active and expired fields can be found in the *OCS Operations Field Directory*. Included are the 785 expired, depleted and/or abandoned fields that produced 21.2 percent barrels oil equivalent (BOE) of the total cumulative GOM oil and gas production. One hundred thirty fields expired, relinquished, or terminated without production. These fields may be included in the *Indicated Hydrocarbon List*. Reserves data are presented as area totals in **Table 1.**

Table 1. Estimated oil and gas reserves by area, December 31, 2016.

Area(s) (Fig. 3)	Number of fields				Original Reserves			Cumulative Production through 2016			Reserves		
	Active prod	Active nonprod	Expired depleted	Expired nonprod	Oil (MMbbl)	Gas (Bcf)	BOE (MMbbl)	Oil (MMbbl)	Gas (Bcf)	BOE (MMbbl)	Oil (MMbbl)	Gas (Bcf)	BOE (MMbbl)
Western Planning Area													
Alaminos Canyon	4	1	0	5	312	540	408	229	390	299	83	150	109
Brazos	3	0	35	3	10	3,748	677	10	3,721	672	0	27	5
East Breaks	11	1	9	5	273	2,223	668	262	2,151	644	11	72	24
Galveston	5	2	43	3	67	2,229	464	65	2,211	459	2	18	5
Garden Banks	1	0	6	2	42	335	101	37	325	94	5	10	7
High Island and Sabine Pass	28	4	97	10	426	15,540	3,190	419	15,452	3,168	7	88	22
Matagorda Island	4	1	24	2	24	5,275	963	24	5,261	960	0	14	3
Mustang Island	2	0	27	5	8	1,795	327	8	1,783	325	0	12	2
N.& S.Padre Island	0	0	19	0	0	625	112	0	625	112	0	0	0
Port Isabel	0	0	0	1	0	0	0	0	0	0	0	0	0
West Cameron and Sabine Pass	4	2	20	1	35	2,923	555	35	2,918	554	0	5	1
Western Planning Area Subtotal	***62***	***11***	***280***	***37***	***1,197***	***35,233***	***7,465***	***1,089***	***34,837***	***7,287***	***108***	***396***	***178***
Central Planning Area													
Atwater Valley	3	0	3	6	48	606	156	37	589	142	11	17	14
Chandeleur	1	0	13	0	0	385	69	0	384	69	0	1	0
Desoto Canyon	3	0	3	4	13	518	106	5	508	96	8	10	10
Destin Dome	0	0	0	1	0	0	0	0	0	0	0	0	0
East Cameron	14	4	49	0	365	11,032	2,329	354	10,957	2,304	11	75	25
Eugene Island	39	2	48	4	1,778	20,565	5,438	1,711	20,237	5,312	67	328	126
Ewing Bank	14	0	4	2	420	860	574	358	697	483	62	163	91
Garden Banks	14	3	15	4	856	4,411	1,641	783	4,134	1,519	73	277	122
Grand Isle	11	0	12	1	1,035	5,246	1,969	999	5,009	1,891	36	237	78
Green Canyon	32	3	11	26	3,495	4,357	4,270	2,281	3,401	2,886	1,214	956	1,384
Keathley Canyon	2	0	0	2	195	577	298	50	240	93	145	337	205
Lloyd Ridge	1	0	3	1	0	330	59	0	330	59	0	0	0
Main Pass and Breton Sound	28	12	52	4	1,199	7,141	2,470	1,172	6,974	2,413	27	167	57
Mississippi Canyon	42	3	15	11	4,352	11,355	6,373	3,153	9,226	4,795	1,199	2,129	1,578
Mobile	8	1	25	2	0	2,425	432	0	2,325	414	0	100	18
Pensacola	0	0	1	0	0	8	1	0	8	1	0	0	0
Ship Shoal	39	3	27	3	1,511	12,960	3,817	1,457	12,626	3,704	54	334	113
South Marsh Island	29	6	16	0	1,000	15,128	3,692	962	14,808	3,597	38	320	95
South Pass	8	0	5	1	1,117	4,588	1,934	1,104	4,516	1,908	13	72	26
South Pelto	6	0	3	0	161	1,192	374	158	1,171	367	3	21	7
South Timbalier	23	2	38	3	1,629	10,437	3,486	1,599	10,295	3,431	30	142	55
Vermilion	29	4	52	1	598	16,855	3,597	580	16,652	3,543	18	203	54
Viosca Knoll	17	1	35	8	664	3,755	1,332	610	3,602	1,251	54	153	81
Walker Ridge	6	1	0	5	466	109	486	87	19	91	379	90	395
West Cameron and Sabine Pass	25	2	67	0	199	18,705	3,527	194	18,496	3,485	5	209	42
West Delta	13	3	8	3	1,436	5,833	2,474	1,420	5,739	2,442	16	94	32
Central Planning Area Subtotal	***407***	***50***	***505***	***92***	***22,537***	***159,378***	***50,904***	***19,074***	***152,943***	***46,296***	***3,463***	***6,435***	***4,608***
Eastern Planning Area													
Destin Dome	0	0	0	1	0	0	0	0	0	0	0	0	0
Eastern Planning Area Subtotal*	***0***	***0***	***0***	***1***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***
GOM Total:	***469***	***61***	***785***	***130***	***23,734***	***194,611***	***58,369***	***20,163***	***187,780***	***53,583***	***3,571***	***6,831***	***4,786***
		1,315											

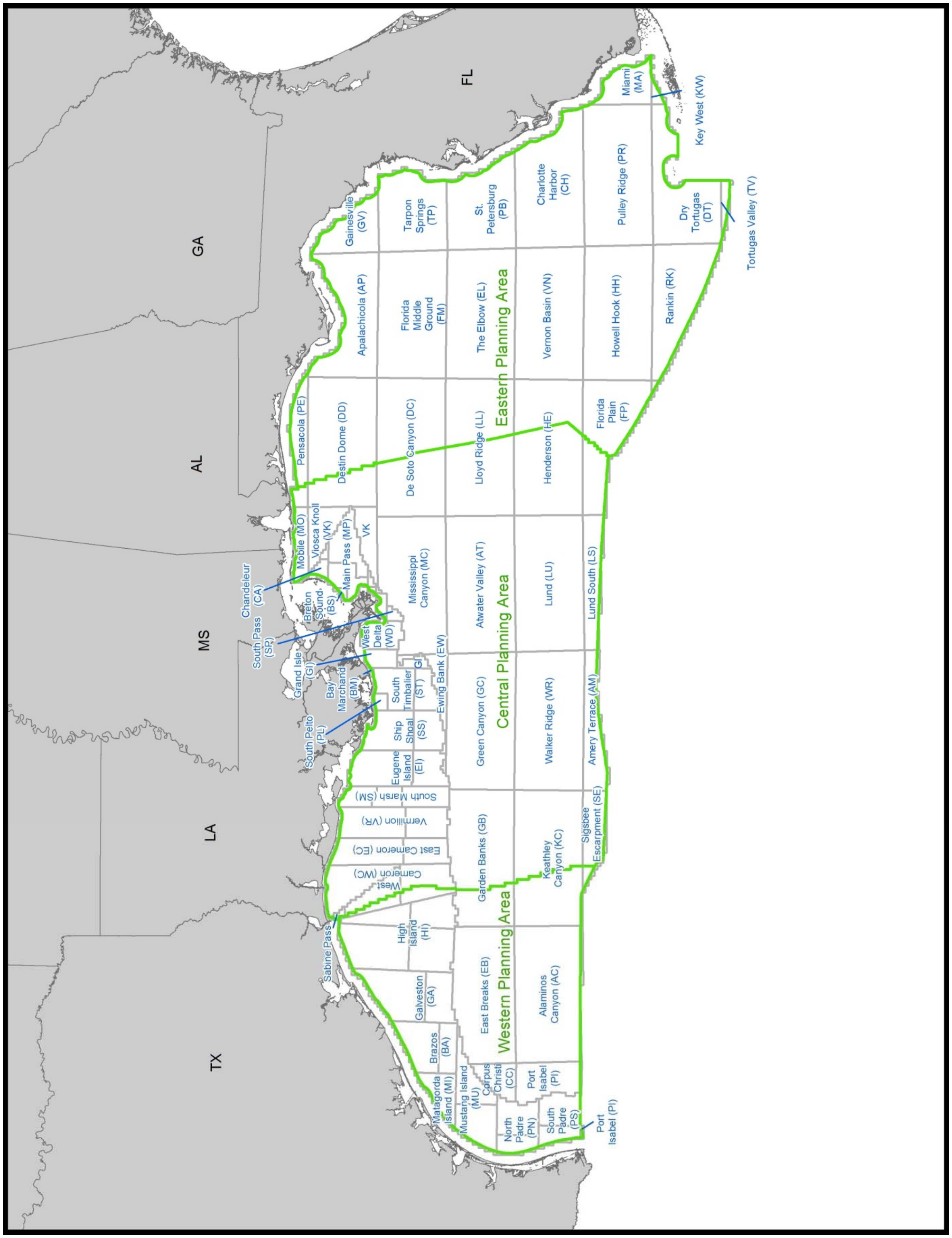

Figure 3. BOEM GOM OCS Planning Areas and Protraction Areas.

FIELD-SIZE DISTRIBUTION

Field Reserve volumes are expressed in terms of BOE. Gas reserves are converted to BOE and added to the liquid reserves for the convenience of comparison. The conversion factor of 5,620 standard cubic feet of gas equals 1 BOE is based on the average heating values of domestic hydrocarbons. A geometric progression, developed by the United States Geological Survey (USGS) (Attanasi, 1998), was selected for field-size (deposit-size) distribution ranges (**Table 2**).

In this report, fields are classified as either oil or gas; some fields do produce both products, making a field type determination difficult. Generally, fields with a gas/oil ratio (GOR) less than 9,700 standard cubic feet per stock tank barrel (SCF/STB) are classified as oil producers.

Table 2. Description of deposit-size classes.

Class	Deposit-size range*	Class	Deposit-size range*	Class	Deposit-size range*
1	0.031 - 0.062	10	16 - 32	18	4,096 - 8,192
2	0.062 - 0.125	11	32 -64	19	8,192 - 16,384
3	0.125 - 0.25	12	64 - 128	20	16,384 - 32,768
4	0.25 - 0.50	13	128 - 256	21	32,768 - 65,536
5	0.50 - 1.00	14	256 - 512	22	65,536 - 131,072
6	1 - 2	15	512 - 1,024	23	131,072 - 262,144
7	2 - 4	16	1,024 - 2,048	24	262,144 - 524,288
8	4 - 8	17	2,048 - 4,096	25	524,288 - 1,048,576
9	8 - 16	*Million Barrels of Oil Equivalent (MMBOE)			

The field-size distribution based on Original Reserves (in BOE) for 1,315 fields is shown in **Figure 4,** along with the planning area distributions. Of the 1,315 oil and gas fields, there are 263 oil fields represented in **Figure 5** and 1,052 gas fields shown in **Figure 6**. These figures also display the planning area distributions.

Analysis of the 1,315 oil and gas fields indicates that the GOM is historically a gas-prone basin. The GOR, based on original reserves of the 263 oil fields, is 2,433 SCF/STB. The yield (condensate divided by gas), based on original reserves for the 1,052 gas fields, is 25.9 barrels (Bbl) of condensate per million cubic feet (MMcf) of gas.

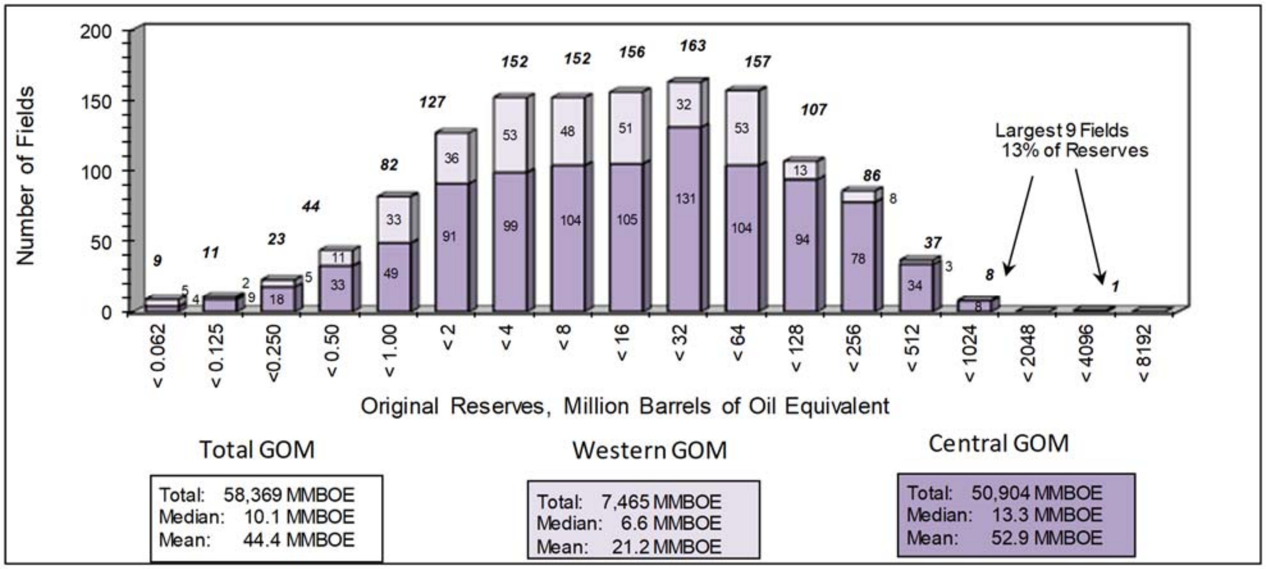

Figure 4. Field-size Distribution of all GOM Fields by Planning Area

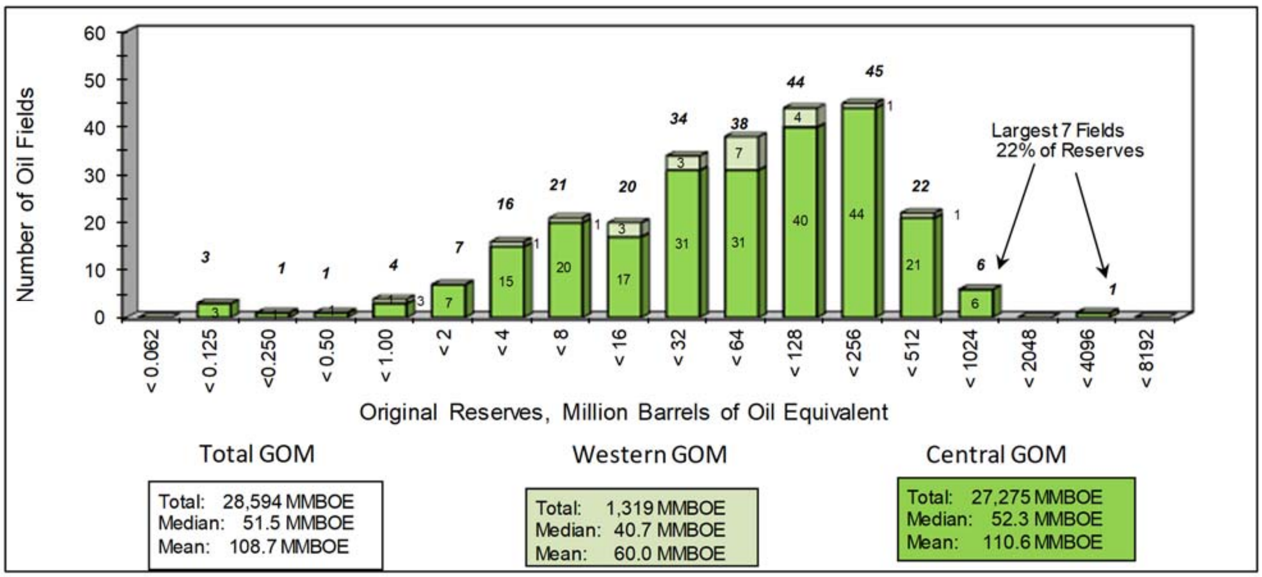

Figure 5. Field-size Distribution of GOM Oil Fields by Planning Area

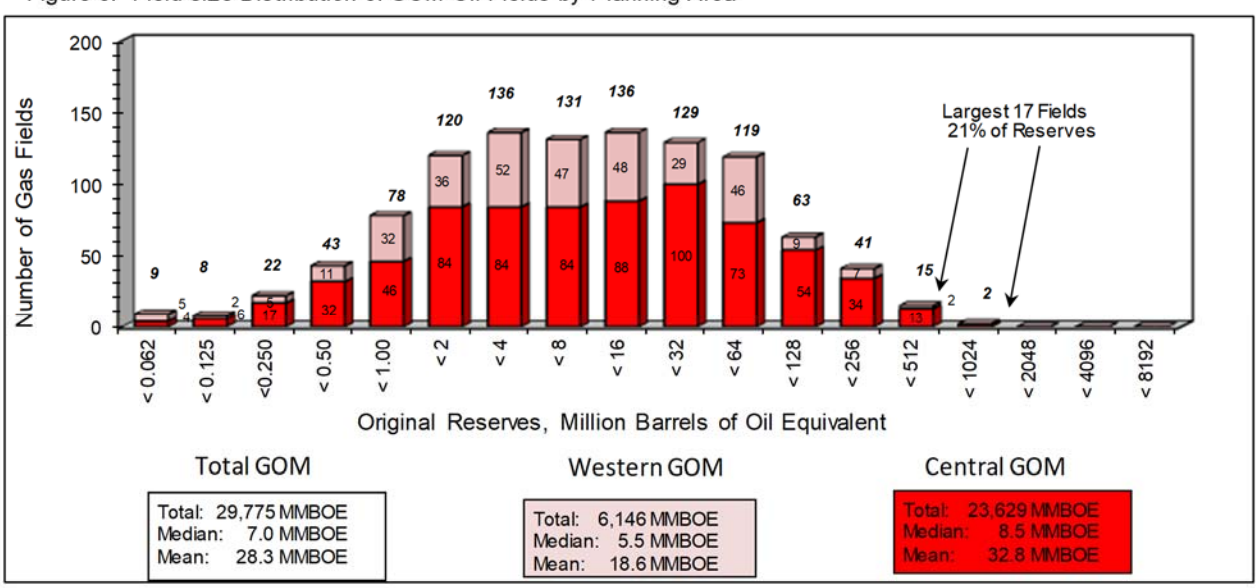

Figure 6. Field-size Distribution of GOM Gas Fields by Planning Area

Figure 7 shows the cumulative percent distribution of Original Reserves in billion barrels of oil equivalent (BBOE), by field size rank. All 1,315 fields in the GOM OCS are included in this figure. A phenomenon often observed in hydrocarbon-producing basins is a rapid drop-off in size from that of largest known field to smallest. Twenty-five percent of the Original Reserves are contained in the 28 largest fields. Fifty percent of the Original Reserves are contained in the 93 largest fields. Ninety percent of the Original Reserves are contained in the 438 largest fields.

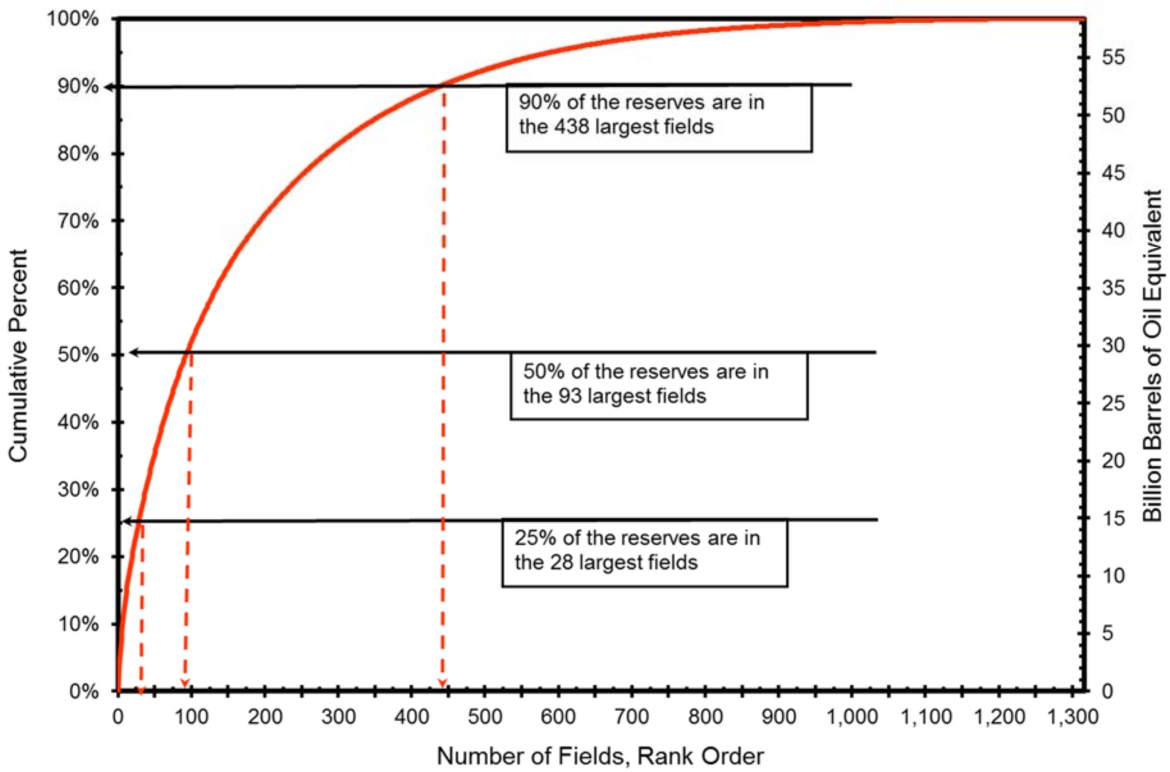

Figure 7. Cumulative percent total reserves versus rank order of field size.

Table 3 shows the distribution of the number of fields and reserves by water depth. A field's water depth is determined by averaging the water depth where the wells are drilled in the field. Reserves and production, reported in MMBOE, are associated with the 1,315 fields. Reserves located in greater than or equal to 1,500 ft of water accounts for 80 percent of the total GOM Reserves.

Table 3. Field and reserves distribution by water depth.

Water Depth Range (Feet)	Number of Fields	Cumulative Production (MMBOE)	Reserves (MMBOE)
< 500	1,082	41,484	782
500 - 999	54	1,268	64
1,000 - 1,499	26	1,415	91
1,500 - 4,999	99	6,739	2,304
5,000 - 7,499	36	2,135	1,323
>= 7,500	18	542	222
Totals:	1,315	53,583	4,786

Figure 8 shows the largest 20 fields ranked in order by Reserves. All 20 of the fields lie in water depths of greater than or equal to 1,500 ft and account for 58.3 percent of the Reserves in the GOM. Of the 233 fields in water depths greater than 500 ft, 141 are producing, 88 are depleted or expired, and 4 have yet to produce.

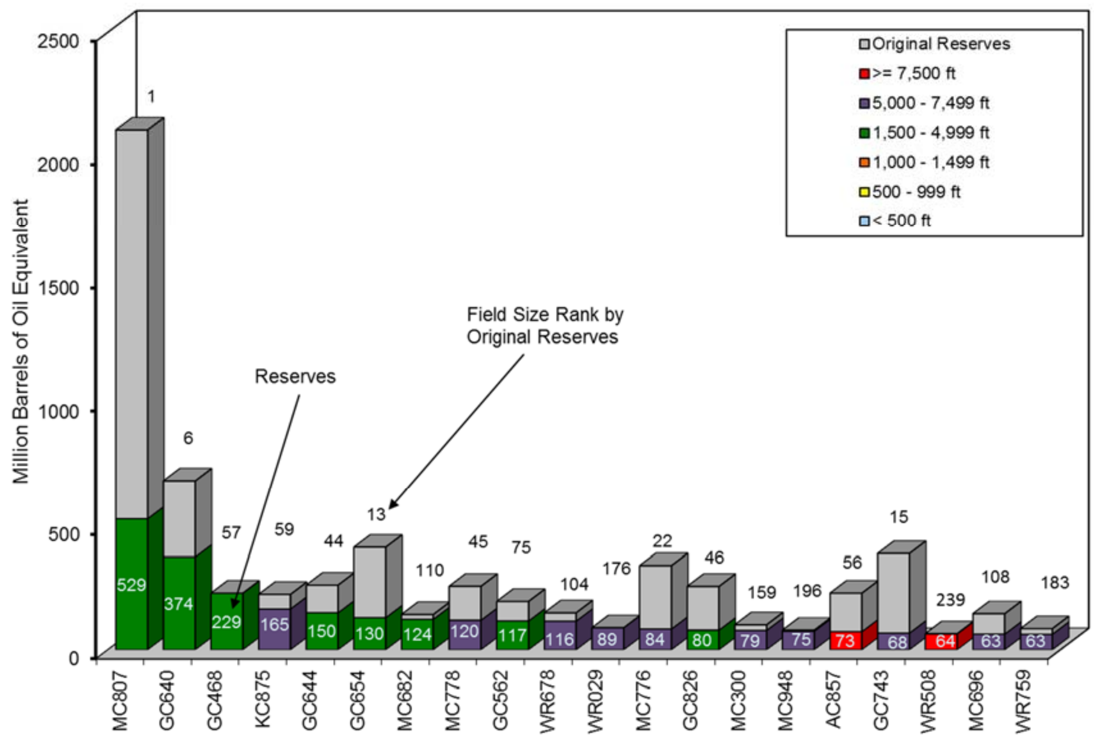

Figure 8. Largest 20 fields, with associated water depths, ranked by Reserves and compared to Original Reserves.

Table 4 ranks the 50 largest fields based on Original Reserves expressed in BOE. Rank, field name, field nickname, discovery year, water depth, field classification, field type, field GOR, Original Reserves, cumulative production through 2016, and Reserves are presented. A complete listing of all 1,315 fields is available on the BOEM Web site at: https://www.data.boem.gov/Main/HtmlPage.aspx?page=estimated2016.

Table 4. Fields by rank order, based on Original BOE reserves, top 50 fields

Table 4. A listing of Gulf of Mexico fields by rank order, based on Original BOE reserves, top 50 fields.

Field class: P (PDP - Developed Producing, PDN - Developed Non-Producing and PU - Undeveloped) ; J (RJD- Reserves Justified for Development)

Field type: O - Oil; G - Gas

Rank	Field name	Field Nickname	Disc year	Water depth (feet)	Field class	Field type	Field GOR (SCF/STB)	Original Reserves Oil (MMbbl)	Original Reserves Gas (Bcf)	Original Reserves BOE (MMbbl)	Cumulative Production through 2016 Oil (MMbbl)	Cumulative Production through 2016 Gas (Bcf)	Cumulative Production through 2016 BOE (MMbbl)	Reserves Oil (MMbbl)	Reserves Gas (Bcf)	Reserves BOE (MMbbl)
1	MC807	MARS-URSA	1989	3,343	P	O	1,351	1696.6	2291.9	2104.4	1282.5	1648.3	1575.8	414.1	643.6	528.6
2	EI330		1971	248	P	O	4,090	466.1	1903.4	804.8	452.6	1885.0	788.0	13.5	18.4	16.8
3	WD030		1949	48	P	O	1,660	593.5	987.5	769.2	589.3	970.6	762.0	4.2	16.9	7.2
4	GI043		1956	140	P	O	4,368	401.6	1743.4	711.9	378.3	1651.8	672.2	23.3	91.6	39.7
5	TS000		1958	13	P	G	78,976	47.2	3727.8	710.5	45.0	3613.2	687.9	2.2	114.6	22.6
6	GC640	TAHITI/CAESAR/TONGA	2002	4,342	P	O	605	616.3	372.6	682.7	276.9	176.2	308.3	339.4	196.4	374.4
7	BM002		1949	50	P	O	1,058	546.8	578.3	649.7	543.0	573.7	645.1	3.8	4.6	4.6
8	VR014		1956	26	P	G	65,255	47.9	3126.5	604.2	47.9	3126.5	604.2	0	0.0	0
9	MP041		1956	43	P	O	5,747	271.7	1561.1	549.4	270.1	1552.0	546.2	1.6	9.1	3.2
10	VR039		1948	38	P	G	79,958	32.6	2606.9	496.5	32.1	2603.7	495.4	0.5	3.2	1.1
11	SS208		1960	102	P	O	6,119	233.6	1433.7	488.7	225.5	1396.5	474.0	8.1	37.2	14.7
12	GB426	AUGER	1987	2,847	P	O	3,470	278.4	966.1	450.3	261.9	922.4	426.0	16.5	43.7	24.3
13	GC654	SHENZI	2002	4,303	P	O	396	386.4	153.1	413.5	265.1	105.0	283.7	121.3	48.1	129.8
14	WD073		1962	177	P	O	2,506	277.8	701.0	402.5	275.8	685.8	397.8	2.0	15.2	4.7
15	GC743	ATLANTIS	1998	6,304	P	O	749	342.9	256.7	388.6	287.7	187.0	321.0	55.2	69.7	67.6
16	EI238		1964	147	P	G	15,804	102.6	1582.2	384.1	94.3	1529.9	366.5	8.3	52.3	17.6
17	GI016		1948	54	P	O	1,298	309.4	401.3	380.9	306.8	395.6	377.2	2.6	5.7	3.7
18	SP061		1967	220	P	O	1,932	275.6	532.5	370.5	271.7	529.1	365.9	3.9	3.4	4.6
19	SP089		1969	421	P	O	4,432	197.4	875.0	353.2	196.0	872.7	351.3	1.4	2.3	1.9
20	ST172		1962	98	P	G	158,376	12.0	1898.9	349.9	12.0	1898.9	349.9	0.0	0.0	0.0
21	WC180		1961	48	P	G	139,651	13.2	1845.8	341.7	13.2	1845.8	341.7	0.0	0.0	0.0
22	MC776	N.THUNDER HORSE	2000	5,672	P	O	964	290.0	279.7	339.7	218.6	209.1	255.8	71.4	70.6	83.9
23	ST021		1957	46	P	O	1,651	259.6	428.5	335.8	258.4	426.1	334.2	1.2	2.4	1.6
24	SS169		1960	63	P	O	5,285	172.2	910.0	334.1	168	896	327	4.3	14.0	6.8
25	MC084	KING/HORN MT.	1993	5,306	P	O	1,095	265.2	321.8	322.5	227.9	251.9	272.7	37.3	69.9	49.8
26	MC194	COGNAC	1975	1,022	P	O	4,180	184.8	772.2	322.1	181.2	759.6	316.3	3.6	12.6	5.8
27	ST176		1963	127	P	G	13,922	92.4	1286.6	321.3	89.6	1269.5	315.5	2.8	17.1	5.8
28	EI292		1964	214	P	G	63,407	26.1	1657.3	321.0	23.6	1649.8	317.2	2.5	7.5	3.8
29	EC064		1957	50	P	G	55,518	29.1	1613.5	316.2	27.4	1605.7	313.1	1.7	7.8	3.1
30	EC271		1971	172	P	G	17,801	75.8	1349.3	315.9	72.0	1343.6	311.1	3.8	5.7	4.8
31	SM048		1961	100	P	G	51,549	30.4	1566.3	309.1	29.2	1558.4	306.5	1.2	7.9	2.6
32	SS176		1956	101	P	G	19,159	69.5	1332.0	306.6	68.3	1316.4	302.6	1.2	15.6	4.0
33	WC587		1971	210	P	G	118,356	13.4	1581.1	294.7	13.4	1581.1	294.7	0.0	0.0	0.0
34	SP027	EAST BAY	1954	64	P	O	5,170	152.9	791.2	293.6	152.1	783.7	291.5	0.8	7.5	2.1
35	ST135		1956	129	P	O	3,693	171.9	634.9	284.8	169.4	625.4	280.7	2.5	9.5	4.1
36	WD079		1966	123	P	O	3,890	168.4	651.8	284.3	165.1	639.1	278.8	3.3	12.7	5.5
37	EI296		1971	214	P	G	71,230	20.6	1464.0	281.1	20.6	1464.0	281.1	0.0	0.0	0.0
38	WC192		1954	57	P	G	60,168	23.6	1420.4	276.4	23.3	1416.1	275.3	0.3	4.3	1.1
39	GB171	SALSA	1984	1,212	P	G	3,961	161.5	639.7	275.3	138.7	555.1	237.4	22.8	84.6	37.9
40	HI573A		1973	341	P	O	7,444	118.3	880.6	274.9	115.8	876.6	271.7	2.5	4.0	3.2
41	MI623		1980	83	P	G	102,244	13.9	1412.2	265.1	13.8	1409.7	264.6	0.1	2.5	0.5
42	GI047		1955	88	P	O	3,829	157.2	603.6	264.6	153.6	591.9	258.9	3.6	11.7	5.7
43	VK956	RAM-POWELL	1985	3,238	P	O	9,096	100.1	910.8	262.2	97.7	896.8	257.3	2.4	14.0	4.9
44	GC644	HOLSTEIN	1999	4,341	P	O	1,182	216.2	255.6	261.7	95.3	93.3	111.9	120.9	162.3	149.8
45	MC778	THUNDER HORSE	1999	6,095	P	O	777	225.6	175.2	256.8	120.8	92.7	137.3	104.8	82.5	119.5
46	GC826	MAD DOG	1998	4,788	P	O	507	234.9	119.2	256.2	167.7	50.0	176.6	67.2	69.2	79.6
47	SP078		1972	202	P	G	11,075	84.5	936.0	251.0	82.3	928.6	247.5	2.2	7.4	3.5
48	GC244	TROIKA	1994	2,795	P	O	1,906	180.4	344.0	241.7	179.7	343.0	240.8	0.7	1.0	0.9
49	SM023		1960	82	P	G	39,519	29.8	1176.3	239.1	29.8	1176.3	239.1	0.0	0.0	0.0
50	VR076		1949	31	P	G	124,674	10.2	1278.8	237.8	9.2	1245.3	230.8	1.0	33.5	7.0

RESERVOIR-SIZE DISTRIBUTION

The size distributions of the reservoirs are shown in **Figures 9, 10, and 11**. The size ranges are based on Original Reserves and are presented on a geometrically progressing horizontal scale. These sizes correspond with the USGS deposit-size ranges shown in **Table 2,** with a modification to subdivide small reservoirs into finer distributions. In **Figure 9**, the Original Reserves are presented in million barrels of Oil Equivalent (MMBOE). For the combination reservoirs (saturated oil rims with associated gas caps), shown in **Figure 9**, gas is converted to BOE and added to the liquid reserves. **Figures 10 and 11** are presented in million barrels of Oil (MMBbl) and billion cubic feet (Bcf), respectively. The number of reservoirs in each size grouping, shown as percentages of the total, is presented on a linear vertical scale.

Figure 9 shows the reservoir-size distribution, on the basis of Original BOE, for 2,367 combination reservoirs. The median is 0.9 MMBOE and the mean is 3.0 MMBOE. The GOR, based on Original Reserves, for the oil portion of the reservoirs is 1,216 SCF/STB, and the yield, based on Original Reserves, for the gas cap is 20.4 Bbl of condensate per MMcf of gas.

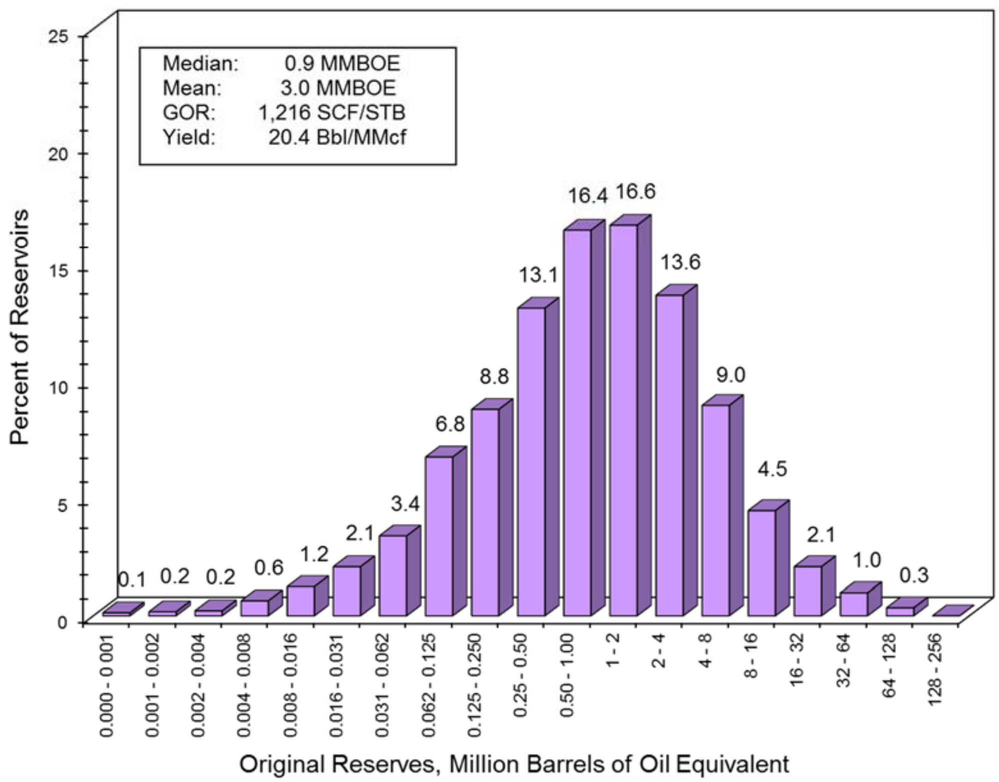

Figure 9. Reservoir-size distribution, combination reservoirs.

Figure 10 shows the reservoir-size distribution, on the basis of Original Oil reserves, for 8,924 undersaturated oil reservoirs. The median is 0.3 MMbbl, the mean is 2.0 MMbbl, and the GOR, based on Original Oil reserves, is 1,208 SCF/STB. **Figure 11** shows the reservoir-size distribution, on the basis of Original Gas reserves, for 18,731 gas reservoirs. The median is 2.0 Bcf of gas, the mean is 8.3 Bcf, and the yield, based on Original Reserves, is 12.4 Bbl of condensate per MMcf of gas.

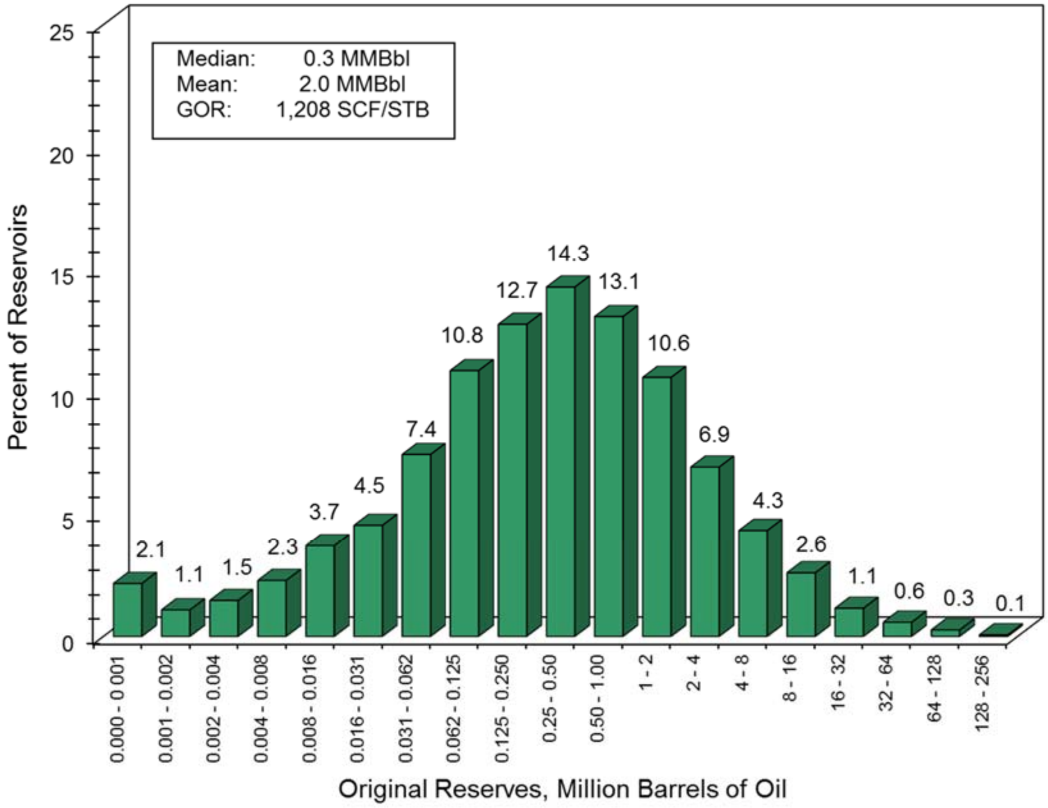

Figure 10. Reservoir-size distribution, oil reservoirs.

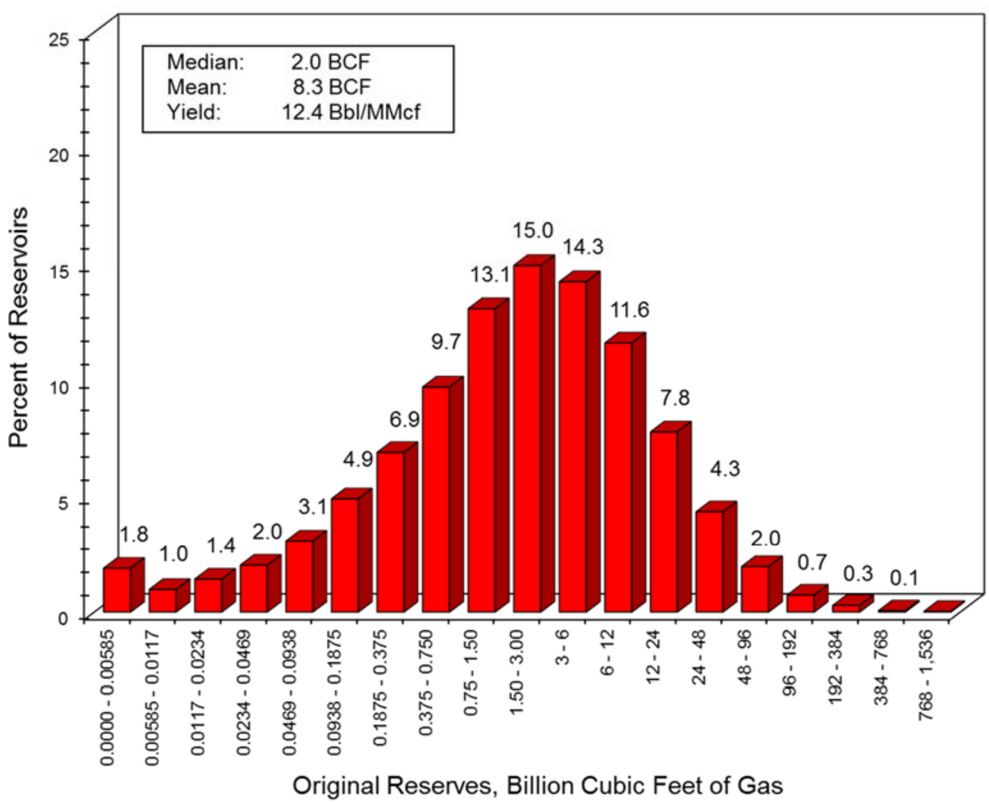

Figure 11. Reservoir-size distribution, gas reservoirs.

DRILLING AND PRODUCTION TRENDS

Figure 12 presents the number of exploratory wells drilled each year by water depth category. The total footage drilled in 2016 was 2.03 million feet, compared to 2.44 million feet in 2015.

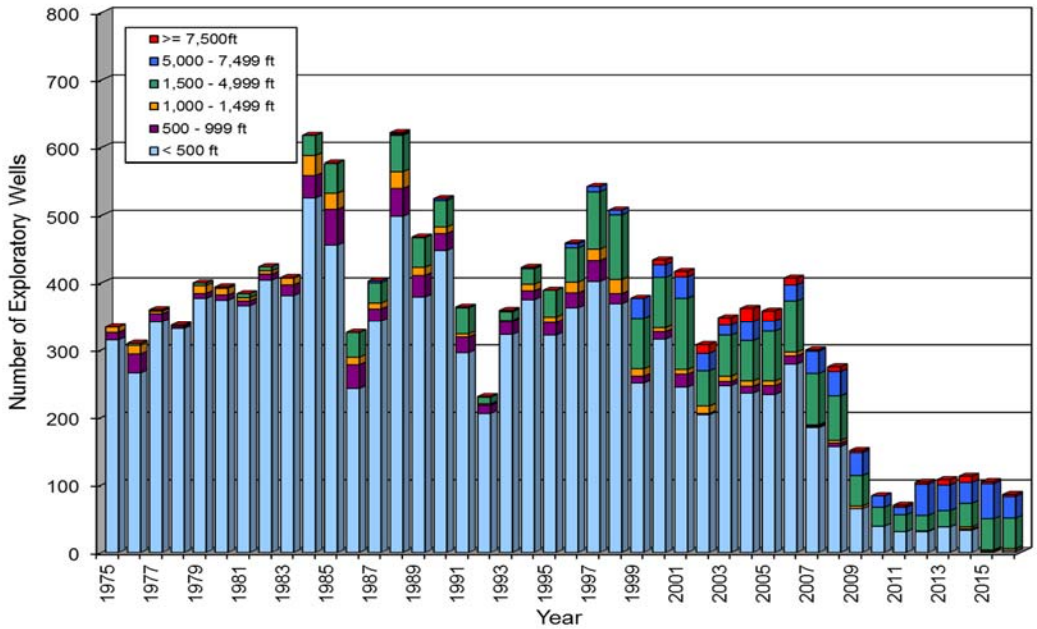

Figure 12. Number of exploratory wells drilled by water depth.

Figure 13 presents the number of development wells drilled each year by water depth category. The total footage drilled in 2016 was 0.89 million feet, compared to 1.81 million feet in 2015.

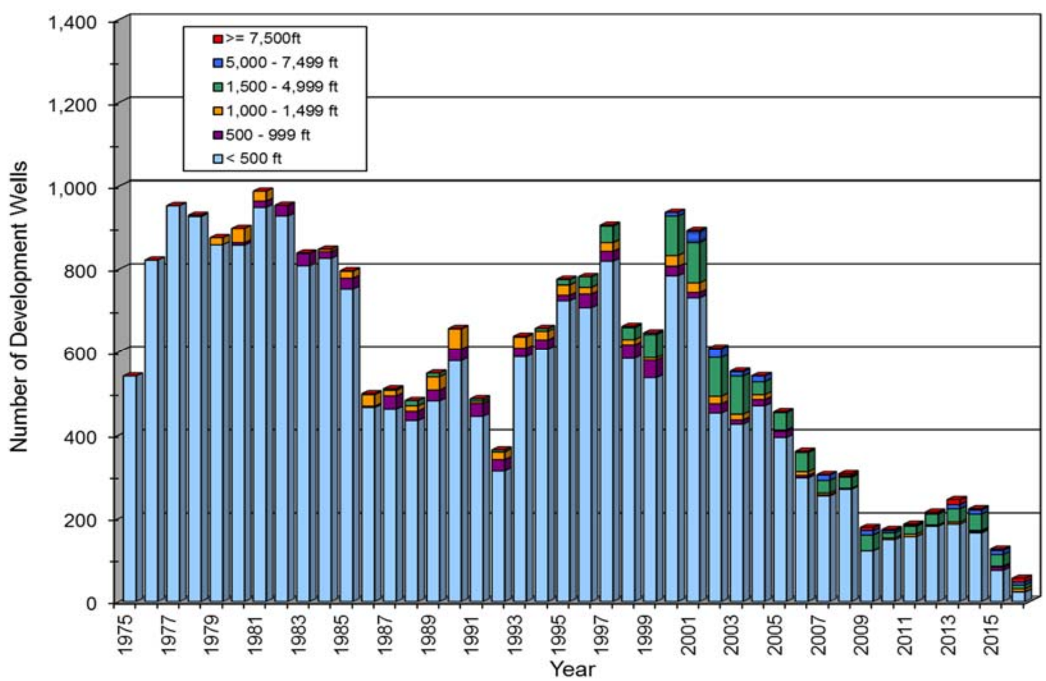

Figure 13. Number of development wells drilled by water depth.

Original Reserves in BBOE for water depth categories by reservoir discovery year are presented in **Figure 14**.

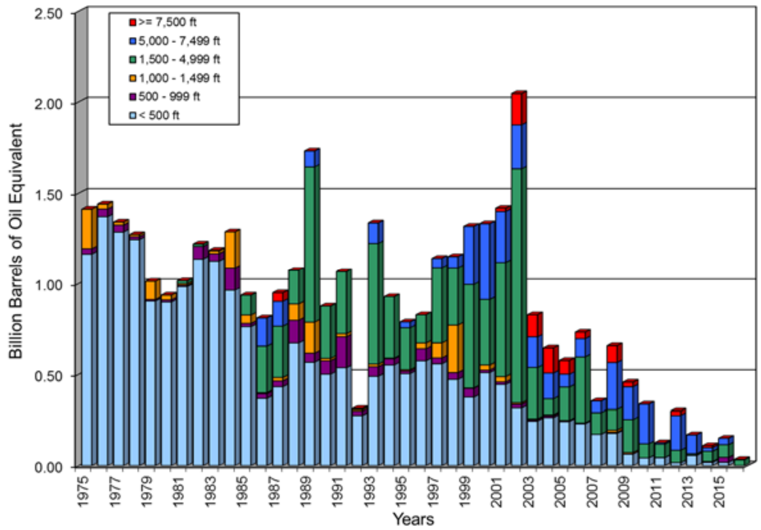

Figure 14. Original Reserves categorized by water depth and reservoir discovery year.

Annual production in the GOM is shown in **Figure 15**. The oil plot includes condensate and the gas plot includes casinghead gas. Annual production for oil and gas is presented as a total, in shallow water (less than 1,000 ft), and in deepwater (greater than 1,000 ft). From 2015 to 2016, annual oil production increased 5.6 percent to 584 MMbbl and annual gas production decreased 6.8 percent to 1.2 Tcf. The mean daily production in the GOM during 2016 was 1.50 MMbbl of crude oil, 0.10 MMbbl of gas condensate, 1.71 Bcf of casinghead gas, and 1.62 Bcf of gas-well gas. The mean GOR of oil wells was 1,142 SCF/STB, and the mean yield from gas wells was 60.2 Bbl of condensate per MMcf of gas.

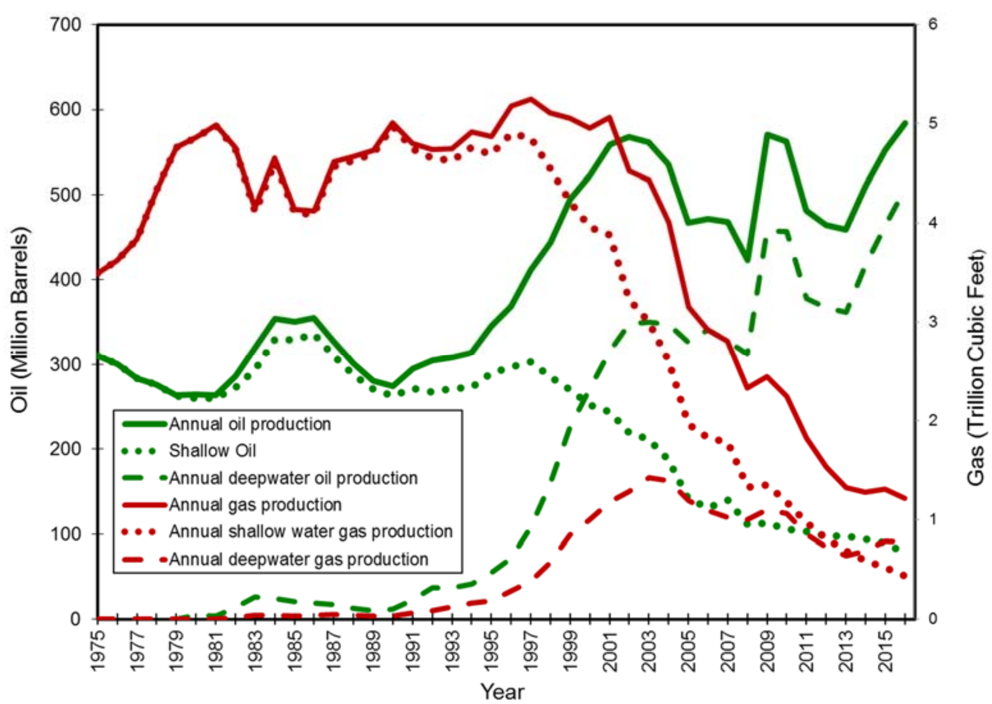

Figure 15. Annual oil and gas production.

DEVELOPMENT BY ASSESSMENT UNIT

Graphical displays of reservoir and production data within assessment units are provided in this section. These assessment units represent a group of geologically related hydrocarbon accumulations that share a common history of hydrocarbon generation and accumulation; the term Assessment Unit can refer to chronozone or geologic play. The data from each reservoir within a unit were combined to create graphs displaying: the total reserves volume discovered each year, the number of reservoirs discovered within the unit, the production from the reservoirs in the unit, and the average size of each reservoir in that unit.

Assessment units are divided into two broad categories: Cenozoic and Mesozoic. Cenozoic assessment units are based on geographical setting and geologic age of Cenozoic sediments in the U.S. Gulf of Mexico OCS. Using these criteria, Cenozoic sediments are further divided into 12 assessment units as shown below; however, only 11 of these units have figures associated with them since the Lower Tertiary shelf unit lacks reserves or production.

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

Unlike the aggregated assessment units of Cenozoic sediments, the Mesozoic sediments of the U.S. Gulf of Mexico OCS were differentiated by specific rock units or plays. Although 19 Mesozoic assessment units were identified in, *Assessment of Technically and Economically Recoverable Hydrocarbon Resources of the Gulf of Mexico Outer Continental Shelf as of January 1, 2014*, only 2 are included in this report: the James Limestone Play and the Norphlet Formation Play. These 2 plays are included because there are reserves and production associated with them.

Figures 16 through 23 depict reservoir and production data for the 13 assessment units described above (11 Cenozoic, 2 Mesozoic). These data exhibit the lag time from reserves discovery to production, and show exploration and development moving from shallow-water to deepwater. Shallow-water Cenozoic data exhibit significant production decline rates; however, discoveries in deepwater Cenozoic sediments have offset these declines.

In Mesozoic sediments, reserves and production data exist for only 2 assessment units. These data show production rates declining in both the James Limestone Play and the Norphlet Formation Play (figures 22 and 23); however, additional opportunities are expected in these plays and in other Mesozoic assessment units. Expected ranges of resources to be discovered in these, and other GOM assessment units, are reported in *Assessment of Technically and Economically Recoverable Hydrocarbon Resources of the Gulf of Mexico Outer Continental Shelf as of January 1, 2014*.

Figures 16A and 16B show the decline in volume of reserves discovered, number of reservoirs discovered, and production for the shallow-water and deepwater Pleistocene assessment units. The largest total reserves discovered (MMBOE) to date in the Pleistocene occurred in 2000, which included a single reservoir in the GB783 Field in deepwater, containing 33 MMbbl. The Pleistocene assessment units exhibit the greatest decline in production rates among 13 units displayed in this section. The data indicate this is associated with significant decreases in reserves discovered in both shallow-water and deepwater.

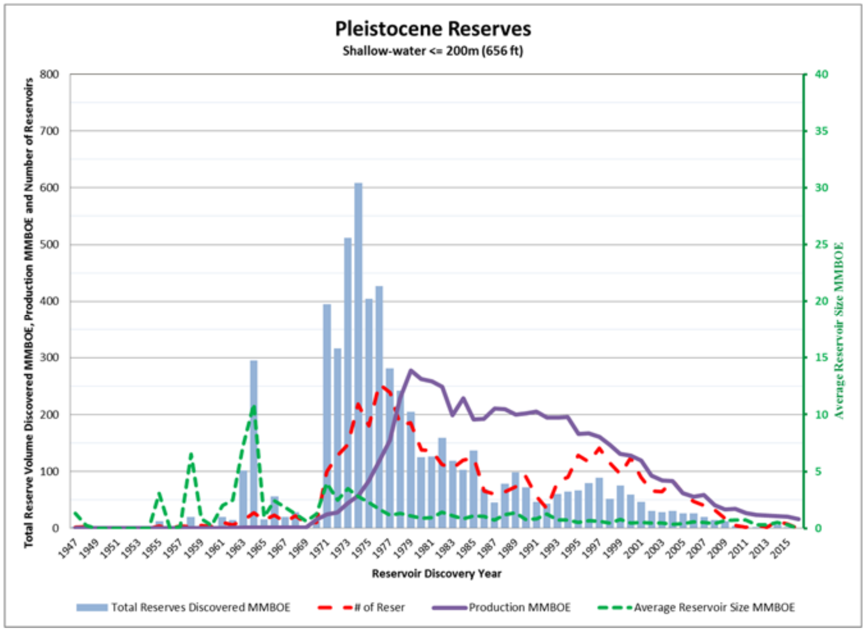

Figure 16A. Development by Chronozone – Pleistocene shallow-water

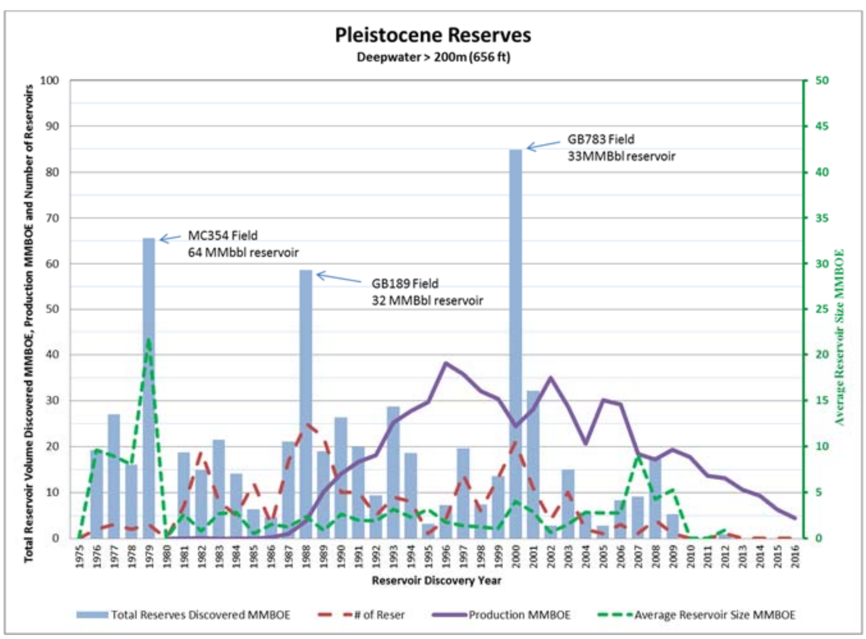

Figure 16B. Development by Chronozone – Pleistocene Deepwater

Over the last two decades, the shallow-water Pliocene assessment unit, while maintaining a consistent average reservoir size, has seen an overall decline in total reserves discovered, number of reservoirs discovered, and production (figure 17A). In deepwater, Pliocene production rates have been considerably higher than in shallow-water (figure 17B). In spite of a decreasing production trend over the last decade, deepwater rates have begun to increase in the last two years; this can be attributed to production from the KC875 Field.

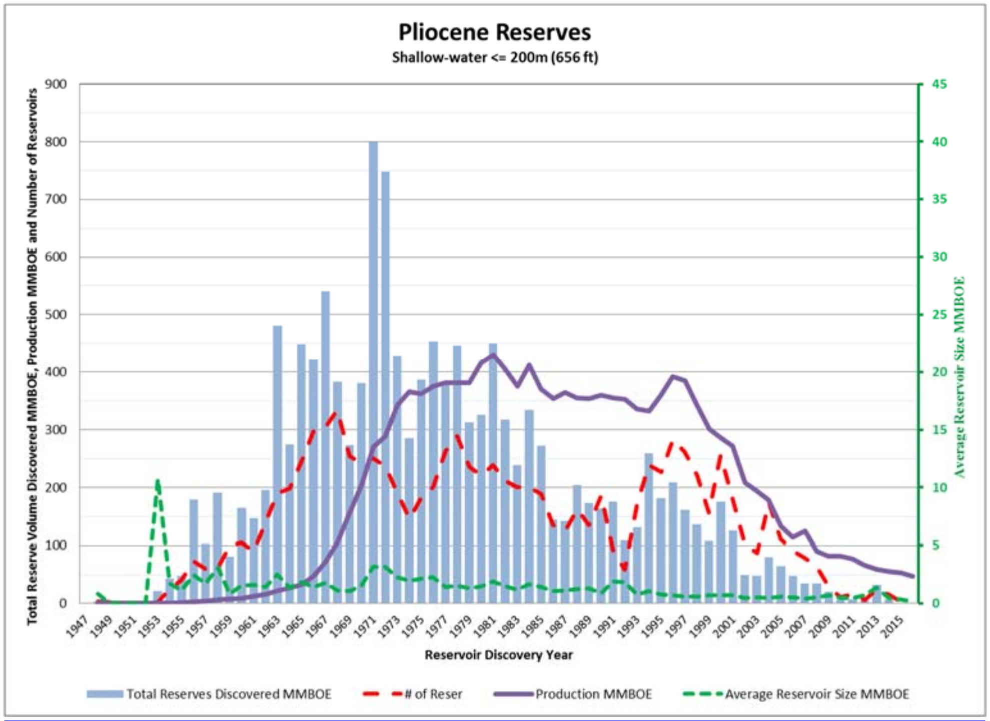

Figure 17A. Development by Chronozone – Pliocene shallow-water

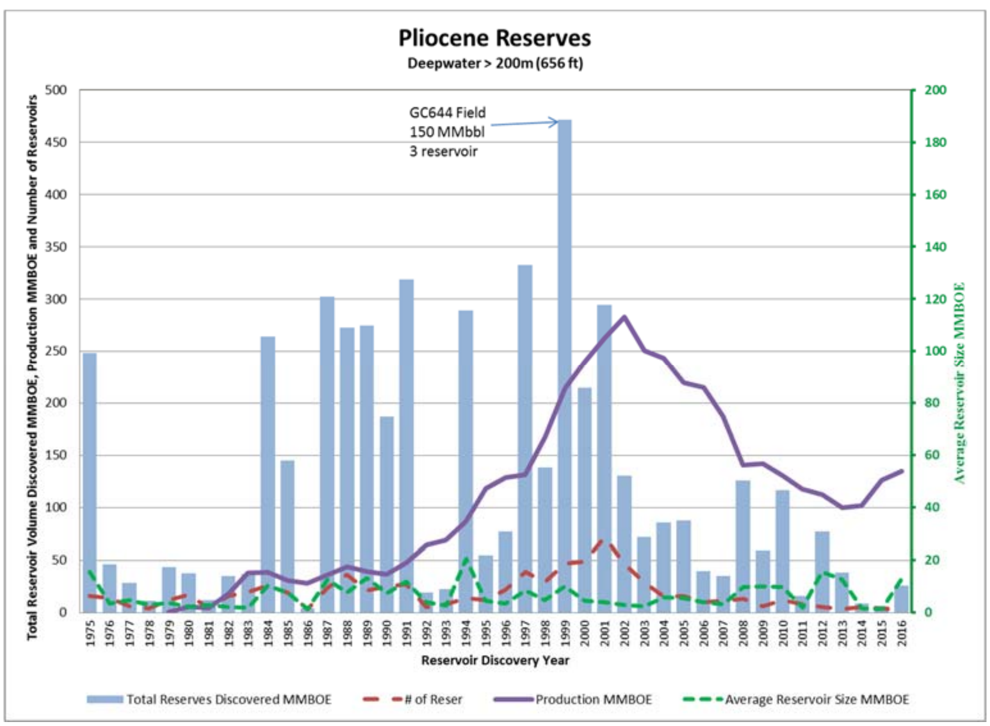

Figure 17B. Development by Chronozone – Pliocene Deepwater

For the Upper Miocene in shallow-water, both the production and number of reservoirs discovered have decreased since the turn of the century (figure 18A). With the exception of an increase in average reservoir size in 2015 due to the discovery of three reservoirs in the EW910 Field, the average reservoir size has remained consistently small. In deepwater, the average reservoir size and number of reservoirs discovered have remained consistent; however; production has been decreasing slightly over the last decade (figure 18B).

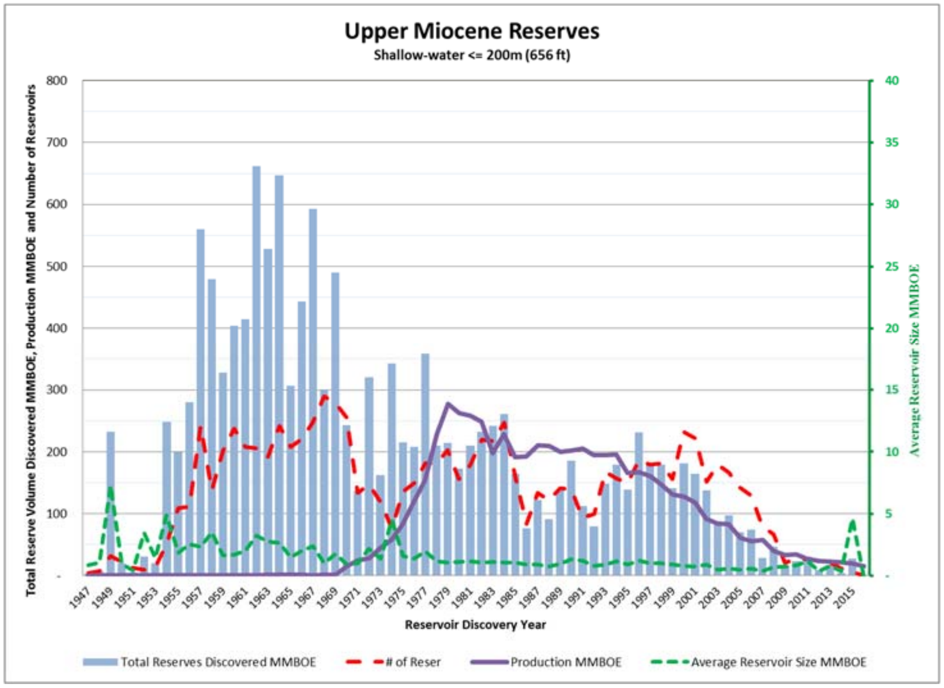

Figure 18A. Development by Chronozone – Upper Miocene shallow-water

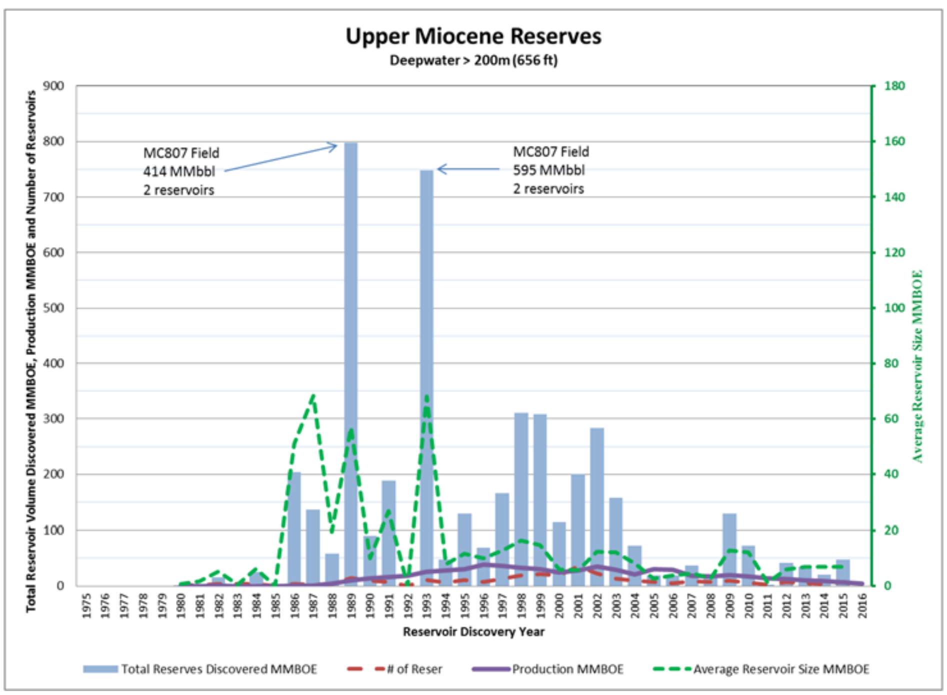

Figure 18B. Development by Chronozone – Upper Miocene Deepwater

Other than an increase in the average reservoir size in 2015, the total reserves discovered (MMBOE), as well as average reservoir size and production in the shallow-water Middle Miocene have all remained consistently low over the last decade (figure 19A). In contrast, the Middle Miocene in deepwater, while seeing its maximum total reserves discovered in 2002 with the addition of 498 MMbbl in the GC640 Field, has experienced a renewed rise in production since 2013 (figure 19B).

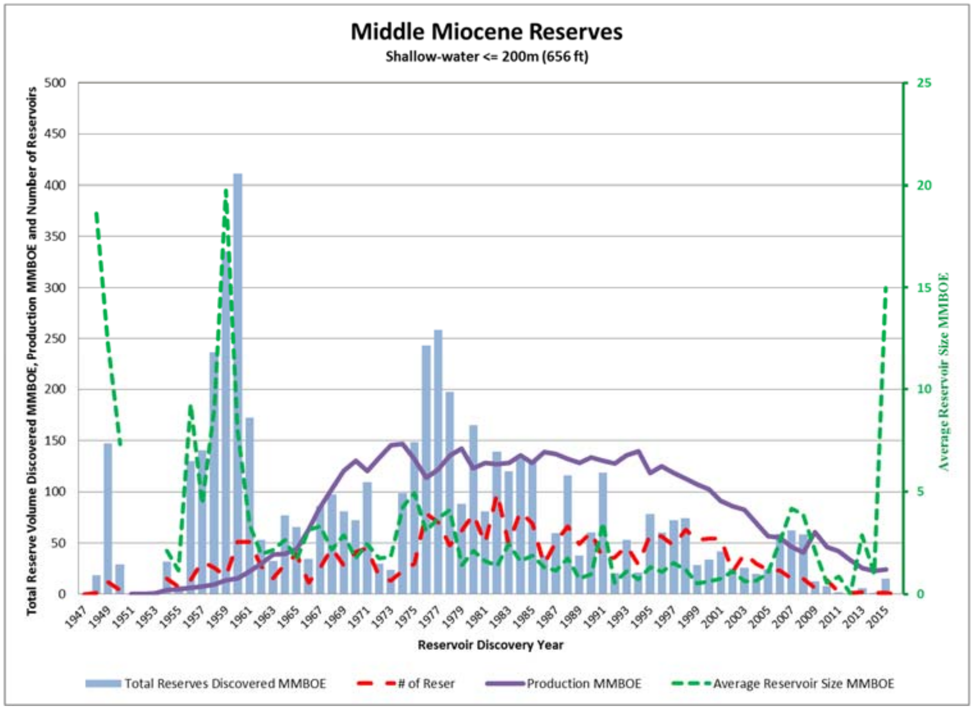

Figure 19A. Development by Chronozone – Middle Miocene shallow-water

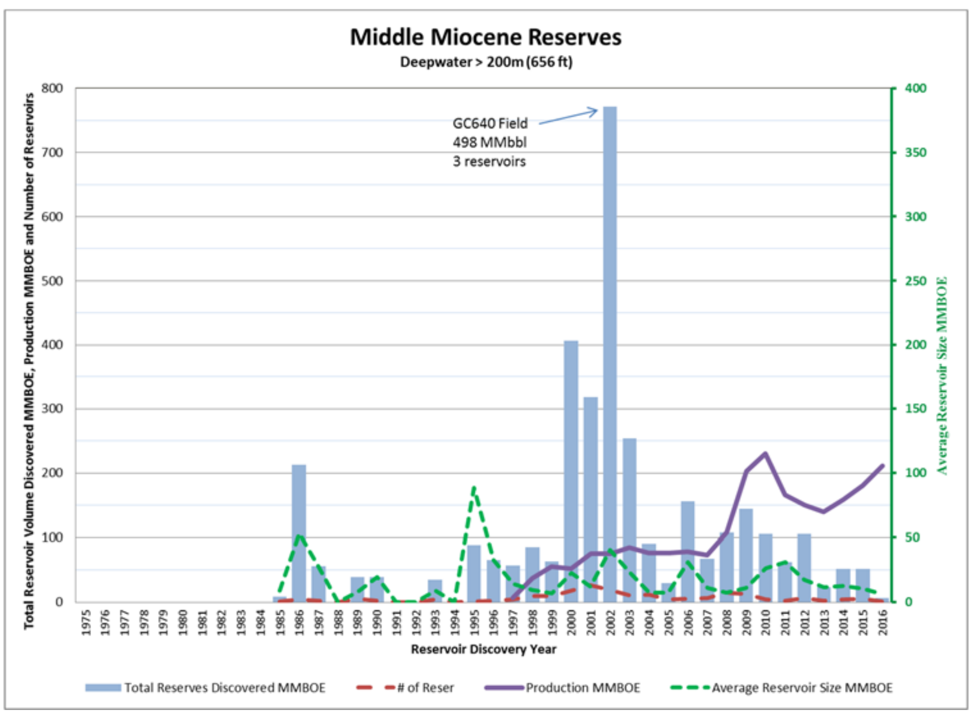

Figure 19B. Development by Chronozone – Middle Miocene Deepwater

The shallow-water Lower Miocene's reserves discovered (MMBOE) peaked in 1982 and 1983 (figure 20A). A peak in production occurred around 1990, followed by an overall decline to date.

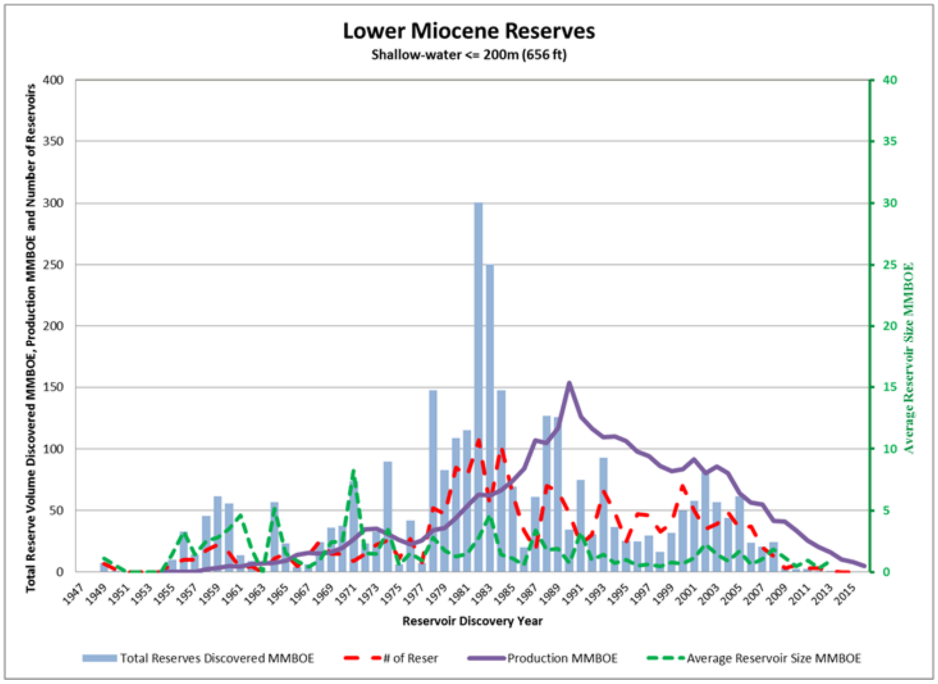

Figure 20A. Development by Chronozone – Lower Miocene shallow-water

The initial discovery of deepwater Lower Miocene reserves in 1998 yielded both the second greatest average reservoir size and second largest total reserves discovered in a single year for the assessment unit (figure 20B). The year 2001 saw the largest average reservoir size, just over 120 MMBOE. In 2002, the greatest total reserves for this play were discovered, including 311 MMbbl in a single reservoir, in the GC654 Field. While production for the Lower Miocene peaked in 2009, and had a slight decline in the two years that followed, it has remained fairly consistent since 2011.

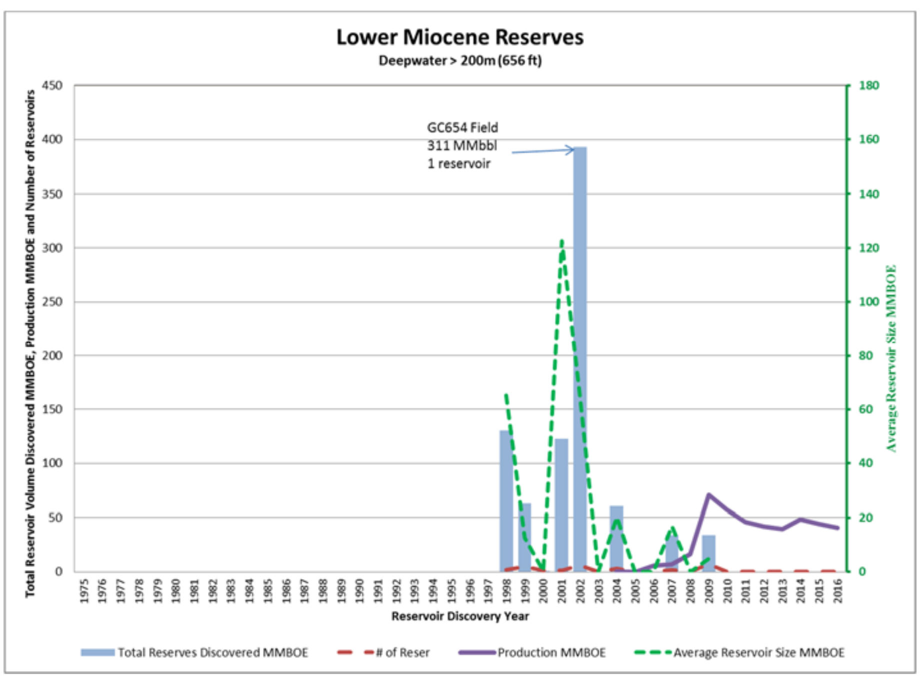

Figure 20B. Development by Chronozone – Lower Miocene Deepwater

The Lower Tertiary deepwater play was discovered in 2002. This included discovery of a 136 MMbbl reservoir in the AC857 Field, the largest average reservoir size (MMBOE) in the play (figure 21). The discovery of the largest total reserves in a single year for the Lower Tertiary occurred in 2008, which included the addition of 89 MMbbl from two reservoirs in the WR678 Field. Production in this play began in 2010 and has been increasing steadily to date.

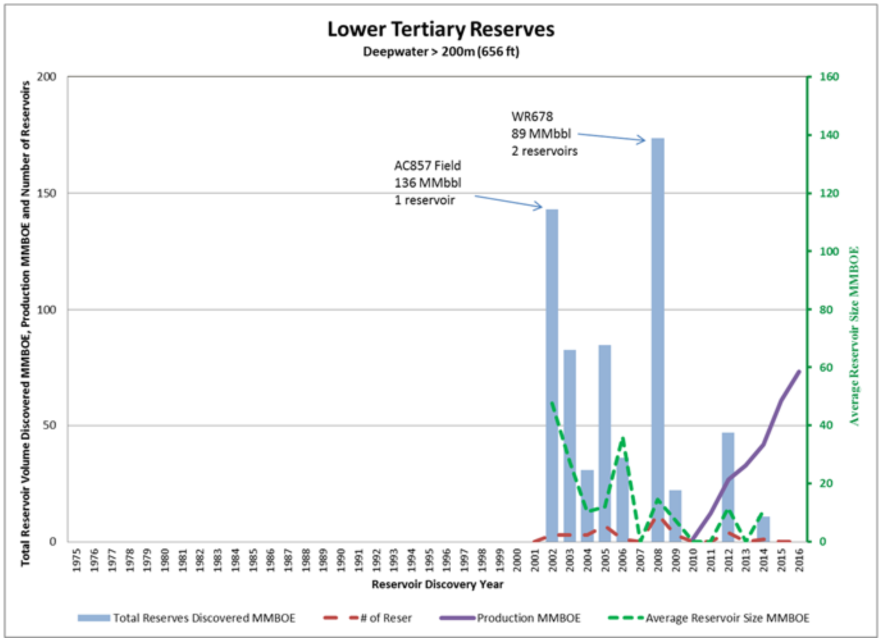

Figure 21. Development by Play – Lower Tertiary Deepwater

The first discovery in the James shallow-water play came in 1993. In 1997, four fields yielded the largest number of reservoirs, as well as the greatest total reserves discovered (MMBOE) for the James (figure 22). The year 2001 yielded the largest average reservoir size as well as the maximum production (MMBOE) seen in this play to date, however, production began to decline two years later.

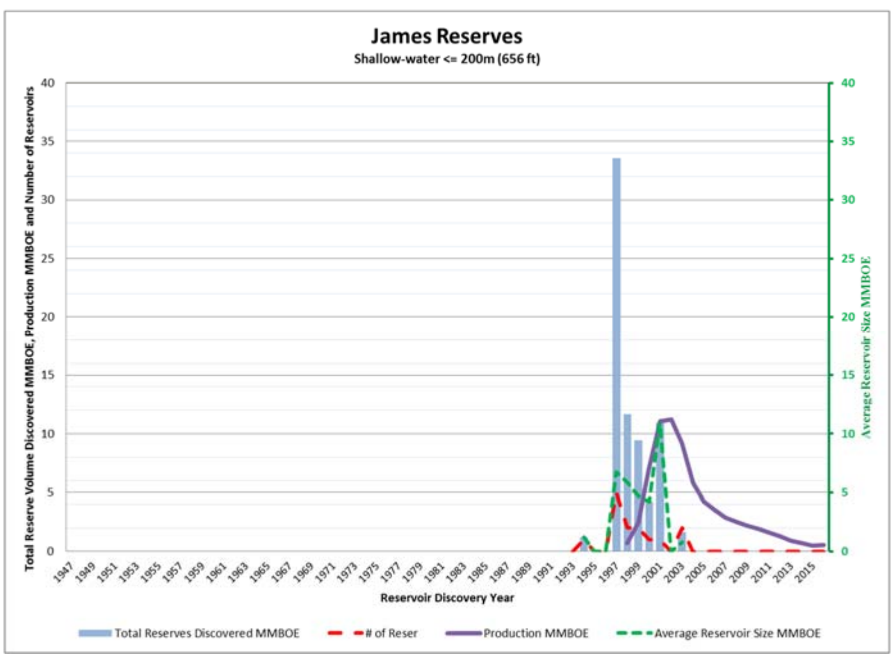

Figure 22. Development by Play – James Limestone Play shallow-water

The initial shallow-water Norphlet discovery in the MO823 Field in 1983 resulted in the greatest total reserves discovered for this play, along with the largest single reservoir size (figure 23). First production began in 1991 with discoveries continuing through the mid-nineties. Peak production in this play was reached around 1997 and, while declining through the first decade of the century, has remained relatively steady to date.

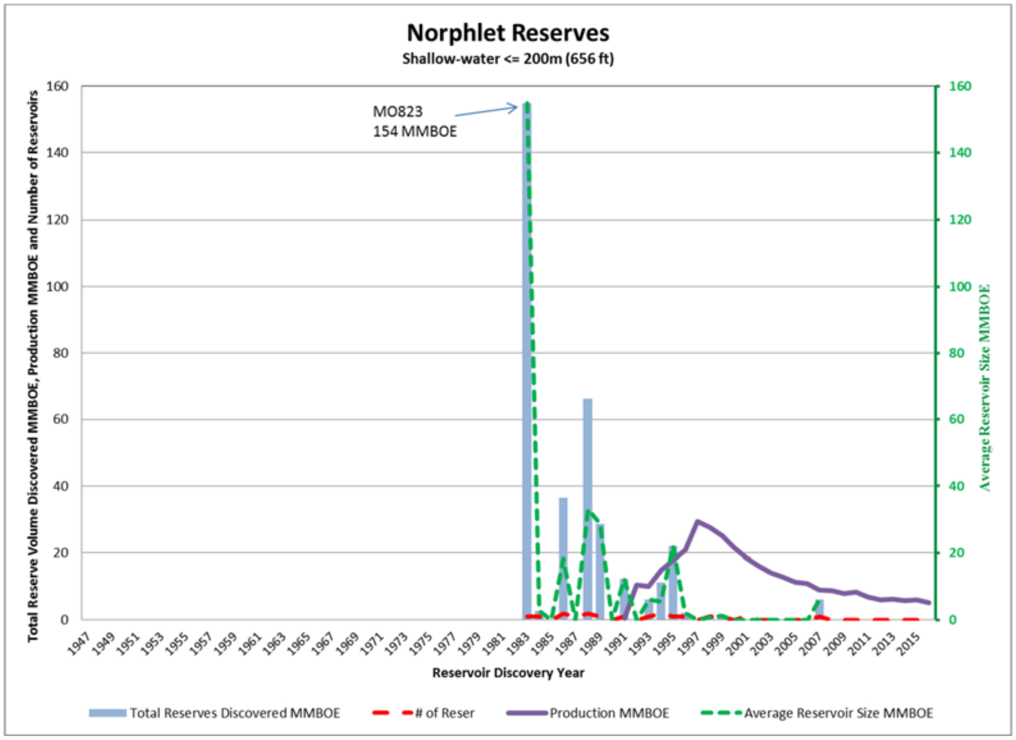

Figure 23. Development by Play – Norphlet Formation Play shallow-water

SUMMARY AND CONCLUSIONS

A summary of the Reserve estimates for 2016 and a comparison with estimates from the previous year's report (December 31, 2015) are shown in **Table 5**. Three oil fields were added for this report, which are tabulated and summarized as increases to Original Reserves. One of the fields added was discovered in 2016 (MC609), one in 2015 (VK959) and one, discovered in 2006, was a re-activation of an expired field (GC599).

Comparison of Reserves

A net change in the Original Reserve estimates is a result of combining the discoveries and the revisions. Reserve estimates may increase or decrease with additional information (e.g., additional wells are drilled, leases are added or expire, and/or reservoirs are depleted). Re-evaluations of existing field studies are conducted using field development and/or production history to capture the changes in reserve estimates. Revisions of Original Reserves are presented as changes in **Table 5**. Based on periodic reviews and revisions of field studies conducted since the 2015 report, the reserves revisions have resulted in a slight increase in Original Reserves.

The table also demonstrates that the volumes from fields added in 2016 and the field revisions slightly exceeded production, resulting in a slight increase in Reserves. The Reserves increased 2.6 percent for oil and decreased 6.8 percent for gas, since the 2015 report.

Table 5. Summary and comparison of GOM oil and gas reserves as of December 31, 2015 and December 31, 2016.

	Oil (Bbbl)	Gas (Tcf)	BOE (Bbbl)
Original Reserves:			
Previous estimate, as of 12/31/2015*	**23.06**	**193.8**	**57.56**
Fields Added in 2016	0.03	0.0	0.04
Revisions	0.64	0.8	0.77
Estimate, as of 12/31/2016 (this report)	**23.73**	**194.6**	**58.37**
Cumulative production:			
Previous estimate, as of 12/31/2015*	**19.58**	**186.5**	**52.78**
Revisions	0.00	0.1	0.01
Production during 2016	0.58	1.2	0.79
Estimate, as of 12/31/2016 (this report)	**20.16**	**187.8**	**53.58**
Reserves:			
Previous estimate, as of 12/31/2015*	**3.48**	**7.3**	**4.78**
Fields Added in 2016	0.03	0.0	0.04
Revisions	0.64	0.7	0.76
Production during 2016	-0.58	-1.2	-0.79
Estimate, as of 12/31/2016 (this report)	**3.57**	**6.8**	**4.79**

Table 6 presents all previous reserve estimates by year. Because of adjustments and corrections to production data submitted by Gulf of Mexico OCS operators, the difference between historical cumulative production for successive years does not always equal the annual production for the latter year.

Table 6. Oil and gas reserves and cumulative production at end of year, 1975-2016.

"Oil" includes crude oil and condensate; "gas" includes associated and nonassociated gas. Reserves estimated as of December 31 each year.

Year	Number of fields included	Original Reserves			Historical Cumulative Production			Reserves		
		Oil (Bbbl)	Gas (Tcf)	BOE (Bbbl)	Oil (Bbbl)	Gas (Tcf)	BOE (Bbbl)	Oil (Bbbl)	Gas (Tcf)	BOE (Bbbl)
1975	255	6.61	59.9	17.27	3.82	27.2	8.66	2.79	32.7	8.61
1976	306	6.86	65.5	18.51	4.12	30.8	9.60	2.74	34.7	8.91
1977	334	7.18	69.2	19.49	4.47	35.0	10.70	2.71	34.2	8.80
1978	385	7.52	76.2	21.08	4.76	39.0	11.70	2.76	37.2	9.38
1979 (1)	417	7.71	82.2	22.34	4.83	44.2	12.69	2.88	38.0	9.64
1980	435	8.04	88.9	23.86	4.99	48.7	13.66	3.05	40.2	10.20
1981	461	8.17	93.4	24.79	5.27	53.6	14.81	2.90	39.8	9.98
1982	484	8.56	98.1	26.02	5.58	58.3	15.95	2.98	39.8	10.06
1983	521	9.31	106.2	28.21	5.90	62.5	17.02	3.41	43.7	11.19
1984	551	9.91	111.6	29.77	6.24	67.1	18.18	3.67	44.5	11.59
1985	575	10.63	116.7	31.40	6.58	71.1	19.23	4.05	45.6	12.16
1986	645	10.81	121.0	32.34	6.93	75.2	20.31	3.88	45.8	12.03
1987	704	10.76	122.1	32.49	7.26	79.7	21.44	3.50	42.4	11.04
1988 (2)	678	10.95	126.7	33.49	7.56	84.3	22.56	3.39	42.4	10.93
1989	739	10.87	129.1	33.84	7.84	88.9	23.66	3.03	40.2	10.18
1990	782	10.64	129.9	33.75	8.11	93.8	24.80	2.53	36.1	8.95
1991	819	10.74	130.5	33.96	8.41	98.5	25.94	2.33	32.0	8.02
1992	835	11.08	132.7	34.69	8.71	103.2	27.07	2.37	29.5	7.62
1993	849	11.15	136.8	35.49	9.01	107.7	28.17	2.14	29.1	7.32
1994	876	11.86	141.9	37.11	9.34	112.6	29.38	2.52	29.3	7.73
1995	899	12.01	144.9	37.79	9.68	117.4	30.57	2.33	27.5	7.22
1996	920	12.79	151.9	39.82	10.05	122.5	31.85	2.74	29.4	7.97
1997	957	13.67	158.4	41.86	10.46	127.6	33.17	3.21	30.8	8.69
1998	984	14.27	162.7	43.22	10.91	132.7	34.52	3.36	30.0	8.70
1999	1,003	14.38	161.3	43.08	11.40	137.7	35.90	2.98	23.6	7.18
2000	1,050	14.93	167.3	44.70	11.93	142.7	37.32	3.00	24.6	7.38
2001	1,086	16.51	172.0	47.11	12.48	147.7	38.77	4.03	24.3	8.35
2002	1,112	18.75	176.8	50.21	13.05	152.3	40.15	5.71	24.6	10.09
2003	1,141	18.48	178.2	50.19	13.61	156.7	41.49	4.87	21.5	8.70
2004	1,172	18.96	178.4	50.70	14.14	160.7	42.73	4.82	17.7	7.97
2005	1,196	19.80	181.8	52.15	14.61	163.9	43.77	5.19	17.9	8.38
2006	1,229	20.30	183.6	52.97	15.08	166.7	44.74	5.22	16.9	8.23
2007	1,251	20.43	184.6	53.28	15.55	169.5	45.71	4.88	15.1	7.57
2008	1,270	21.24	188.4	54.76	15.96	171.8	46.53	5.28	16.6	8.23
2009 (3)	1,278	21.20	190.2	55.03	16.53	176.8	47.99	4.67	13.3	7.04
2010	1,282	21.50	191.1	55.50	17.11	179.3	49.01	4.39	11.8	6.49
2011 (4)	1,292	21.91	192.4	56.15	17.59	181.1	49.81	4.32	11.3	6.34
2012	1,297	22.11	193.0	56.46	18.06	182.6	50.56	4.05	10.4	5.90
2013	1,300	22.19	193.0	56.53	18.52	184.0	51.25	3.67	9.0	5.28
2014	1,306	22.37	193.4	56.79	19.03	185.2	51.99	3.34	8.2	4.80
2015	1,312	23.06	193.8	57.56	19.58	186.5	52.78	3.48	7.3	4.78
2016	1,315	23.73	194.6	58.37	20.16	187.8	53.58	3.57	6.8	4.79

(1) Gas plant liquids dropped from system

(2) Basis of reserves changed from demonstrated to SPE proved.

(3) Conversion of historical gas production to 14.73 pressure base.

(4) Includes Reserves Justified for Development

Conclusions

As of December 31, 2016, the 1,315 oil and gas fields in the federally regulated part of the Gulf of Mexico Outer Continental Shelf (GOM OCS) contained Original Reserves estimated to be 23.73 billion barrels of oil (BBO) and 194.6 trillion cubic feet (Tcf) of gas. Cumulative Production from the fields accounts for 20.16 BBO and 187.8 Tcf of gas. Reserves are estimated to be 3.57 BBO and 6.8 Tcf of gas for the 530 active fields. Oil Reserves have increased 2.6 percent and the gas Reserves have decreased 6.8 percent since the 2015 report.

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APPENDIX A: Definitions of Field, Resource and Reserves Terms

The following definitions as used in this report have been modified from SPE-PRMS and other sources where necessary to conform to requirements of the BOEM Reserves Inventory Program.

Field

A *Field* is an area consisting of a single reservoir or multiple reservoirs all grouped on, or related to, the same general geologic structural feature and/or stratigraphic trapping condition. There may be two or more reservoirs in a field that are separated vertically by impervious strata, laterally by local geologic barriers, or by both. The area may include one OCS lease, a portion of an OCS lease, or a group of OCS leases with one or more wells that have been approved as producible by BOEM (see New Producible Lease). A field is usually named after the area and block on which the discovery well is located. Field names and/or field boundaries may be changed when additional geologic and/or production data initiate such a change. Using geological criteria, BOEM designates a new producible lease as a new field or assigns it to an existing field. http://www.boem.gov/BOEM-Newsroom/Offshore-Stats-and-Facts/Gulf-of-Mexico-Region/Field-Naming-Handbook---March-1996.aspx.

New Producible Lease

A lease that contains at least one well which an operator has requested a well producibility determination, and BOEM has determined that well meets the criteria of producible hydrocarbons defined by 30 CFR 550.115 or 30 CFR 550.116, or a lease that has begun producing.

Project

A *Project* represents the link between the petroleum accumulation and the decision-making process, including budget allocation. A project, for BOEM's classification of Resources and Reserves, is the Field (see also Field).

Resources

Resources encompass all quantities of petroleum (recoverable and unrecoverable) naturally occurring on or within the Earth's crust, discovered and undiscovered, plus those quantities already produced. Further, it includes all types of petroleum whether currently considered conventional or unconventional.

Undiscovered Resources

Resources postulated, on the basis of geologic knowledge and theory, to exist outside of known fields or accumulations. Included also are resources from undiscovered pools within known fields to the extent that they occur within separate plays. BOEM assesses two types of undiscovered resources, *Undiscovered Technically Recoverable Resources (UTRR)* and *Undiscovered Economically Recoverable Resources (UERR).*

Discovered Resources

Hydrocarbons whose location and quantity are known or estimated from specific geologic evidence are *Discovered Resources*. Included are *Contingent Resources* and *Reserves* depending upon economic, technical, contractual, or regulatory criteria.

Contingent Resources

Those quantities of petroleum estimated, as of a given date, to be potentially recoverable from known accumulations by application of development projects but which are not currently considered to be commercially recoverable due to one or more contingencies.

Reserves

Reserves are those quantities of petroleum anticipated to be commercially recoverable by application of development projects to known accumulations from a given date forward under defined conditions. *Reserves* must further satisfy four criteria: They must be discovered, recoverable, commercial, and remaining (as of a given date) based on the development project(s) applied. *Reserves* are further sub-classified based on economic certainty.

Original Reserves: *Original Reserves* are the total of the *Cumulative Production* and *Reserves*, as of a specified date.

Proved plus Probable Reserves (2P): The sum of the estimated proved reserves and any additional probable reserves (2P). *Proved Reserves* are commonly defined as those quantities of petroleum which, by analysis of geoscience and engineering data, can be estimated with reasonable certainty to be commercially recoverable, from a given date forward, from known reservoirs and under defined economic conditions, operating methods, and government regulations. *Probable Reserves* are commonly defined as those additional reserves which analysis of geoscience and engineering data indicate are less likely to be recovered than proved reserves but more certain to be recovered than possible reserves.

Reserves Justified for Development: The lowest level of reserves certainty. Implementation of the development project is justified on the basis of reasonable forecast commercial conditions at the time of reporting and that there are reasonable expectations that all necessary approvals/contracts will be obtained.

Undeveloped Reserves: *Undeveloped Reserves* are those *Reserves* that are expected to be recovered from future wells and facilities, including future improved recovery projects which are anticipated with a high degree of certainty in reservoirs which have previously shown favorable response to improved recovery projects.

Developed Reserves: *Developed Reserves* can be expected to be recovered through existing wells and facilities and by existing operating methods. Improved recovery reserves can be considered as *Developed Reserves* only after an improved recovery project has been installed and favorable response has occurred or is expected with a reasonable degree of certainty. Developed reserves are expected to be recovered from existing wells, including reserves behind pipe. Improved recovery reserves are considered developed only after the necessary equipment has been installed, or when the costs to do so are relatively minor. *Proved Developed Reserves* may be sub-categorized as *Producing* or *Non-producing*.

Developed Non-producing Reserves: *Developed Non-producing Reserves* are precluded from producing due to being *shut-in* or *behind-pipe*. *Shut-in* includes (1) completion intervals which are open at the time of the estimate, but which have not started producing, (2) wells which were shut-in for market conditions or pipeline connections, or (3) wells not capable of production for mechanical reasons. *Behind-pipe* refers to zones in existing wells which will require additional completion work or future re-completion prior to the start of production. In both cases, production can be initiated or restored with relatively low expenditure compared to the cost of drilling a new well.

Developed Producing Reserves: *Developed Producing Reserves* are expected to be recovered from completion intervals that are open and producing at the time of the estimate. Improved recovery reserves are considered producing only after the improved recovery project is in operation.

Cumulative Production: *Cumulative Production* is the sum of all produced volumes of oil and gas prior to a specified date.

Un-recoverable: The portion of discovered or undiscovered petroleum-initially-in-place quantities which are estimated, as of a given date, not to be recoverable. A portion of these quantities may become recoverable in the future as commercial circumstances change, technological developments occur, or additional data are acquired.

BOEM Chronozone	A body of rock formed during the same time span, bounded by biostratigraphic or correlative seismic markers. Definition taken from BOEM Biostratigraphic Chart of the Gulf of Mexico Region
Assessment Unit	Assessment units represent a group of geologically related hydrocarbon accumulations that share a common history of hydrocarbon generation and accumulation. Definition adapted from 2016 National Assessment of Undiscovered Oil and Gas Resources of the U.S. Outer Continental Shelf
Play	A group of pools that share a common history of hydrocarbon generation, migration, reservoir development, and entrapment. Definition from 2016 National Assessment of Undiscovered Oil and Gas Resources of the U.S. Outer Continental Shelf

Notice

This report, *Estimated Oil and Gas Reserves, Gulf of Mexico OCS Region, December 31, 2016,* has undergone numerous changes over the last few years. We are continually striving to provide meaningful information to the users of this document. Suggested changes, additions, or deletions to our data or statistical presentations are encouraged so that we can publish the most useful report possible. Please contact the Reserves Section Chief, Grant L. Burgess, at (504) 736-2948 at the Bureau of Ocean Energy Management, 1201 Elmwood Park Boulevard, MS GM773E, New Orleans, Louisiana 70123-2394, to communicate your ideas for consideration in our next report. An overview of the Reserves Inventory Program is available on BOEM's Website.

For free publication and digital data, visit the Gulf of Mexico Web site. The report can be accessed as an Acrobat .pdf (portable document format) file, which allows you to view, print, navigate, and search the document with the free downloadable Acrobat Reader. Digital data used to create the tables and figures presented in the document are also accessible as Excel 2010 spreadsheet files (.xlsx; using Microsoft's Excel spreadsheet viewer, a free file viewer for users without access to Excel). These files are made available in a zipped format, which can be unzipped with the downloadable WinZip program.

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The Department of the Interior Mission

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife and biological diversity; preserving the environmental and cultural values of our national parks and historical places; and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The Department also has a major responsibility for American Indian reservation communities and for people who live in island communities.

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The Bureau of Ocean Energy Management (BOEM) works to manage the exploration and development of the nation's offshore resources in a way that appropriately balances economic development, energy independence, and environmental protection through oil and gas leases, renewable energy development and environmental reviews and studies.