# APPENDICES

# APPENDIX A

# PHYSICAL AND ENVIRONMENTAL SETTINGS

# A. PHYSICAL AND ENVIRONMENTAL SETTINGS

## A.1. GEOGRAPHY AND GEOLOGY

### General Description

The present day GOM is a small ocean basin with a water-surface area of more than 1.5 million $km^2$. The greatest water depth is approximately 3,700 m. It is almost completely surrounded by land, opening to the Atlantic Ocean through the Straits of Florida and to the Caribbean Sea through the Yucatan Channel. Underlying the present GOM and the adjacent coast is a large geologic basin that began forming during Triassic time (approximately 240 million years ago (Mya)).

The proposed lease sale area is located along the western boundary of the EPA, within the DeSoto Canyon and Lloyd Ridge Areas. It is located 70 mi from Louisiana, 98 mi from Mississippi, 93 mi from Alabama, and 100 mi from Florida. The area is made up of 256 lease blocks, and covers approximately 1.5 million ac (6,000 $km^2$). Water depths range from about 1,600 m to 3,000 m.

### Regional Geology

There are two major sedimentary provinces in the Gulf Coast region: Cenozoic (the western and central part of the GOM) and Mesozoic (the eastern GOM). The Cenozoic Province is a clastic regime, characterized by thick deposits of sand and shale of Paleocene to Recent age (65 Mya to present) underlain by carbonate rocks (limestone, chalk, reefs) of Jurassic and Cretaceous age (205-65 Mya). The proposed lease sale area is in the Mesozoic Province. The Mesozoic Province is a largely carbonate (limestone and reefs) area that extends eastward from the Cretaceous Shelf Edge off the coast of Mississippi, Alabama, and Florida towards the coastline of Florida. Fewer than 400 wells have been drilled in the Mesozoic Province of the Federal offshore, and less is known about the subsurface geology and its natural gas and oil resource potential. Over the last 65 million years, the Cenozoic Era, clastic sediments, (sands, silts, and clays) from the interior North American continent, have entered the GOM Basin from the north and west (Apps et al., 1994). The Cenozoic Era is commonly divided into 2 geologic periods – Tertiary and Quaternary. The Tertiary Period (65-1.77 Mya) comprises almost all of the Cenozoic. The most recent part is the Quaternary Period (1.77 Mya-Recent). Geologists also divide the Cenozoic into time periods (Series) of variable duration; from oldest, Paleocene, Eocene, Oligocene, Miocene, Pliocene, Pleistocene, and Holocene. The centers of thick sediment deposition shifted progressively eastward and southward through time in response to changes in the source of sediment supply. In Early Tertiary (65-24 Mya), the Rio Grande River and a system of smaller rivers (Brazos, Colorado, Nueces, etc.) draining the Texas coastal plain were the main source of sediment supply, resulting in a thick sediment accumulation in the WPA of the GOM. In Late Tertiary (24-1.77 Mya), the center of sediment deposition shifted eastward as the Mississippi River became the major source of sediments entering the GOM. The modern Mississippi River delta complex is the present day reflection of a depositional system that has been periodically shifting positions due to the sediment loading and up-building of the delta since early Miocene time (approximately 24 Mya). Each sedimentary layer is different, reflecting the source of the material, the climate, and the geologic processes occurring during deposition. It is estimated that greater than 15 km of sediments have been deposited locally beneath Texas-Louisiana continental shelf in deep basins.

Upper Jurassic deposits are considered the major source rocks for gas and oil generation in the GOM. Other source rocks that have been identified in the GOM which may have generated hydrocarbons are as young as Pleistocene (approximately 2 Mya).

### Cenozoic Province

The Cenozoic Province extends from offshore Texas eastward across the north-central GOM to the edge of the Cretaceous Shelf Edge (commonly called the Florida Escarpment) offshore Mississippi, Alabama and Florida. It incorporates all of the WPA, a large portion of the CPA, and the southwestern portion of the EPA. To date, all of the hydrocarbon production on the OCS in the Cenozoic Province is from sands ranging in age from Oligocene to Pleistocene (approximately 34-0.2 Mya).

Two major events laid the template for the structural tectonics and stratigraphy of the Western GOM: the rifting and drifting of the North American Plate to form the GOM, and the periodic breaching of the land mass to the west, which allowed marine waters into the young basin. The arid climate during the Jurassic inhibited the transport of most clastic materials to the GOM Basin, allowing for the predominance of carbonate deposition. These two events still influence the depositional patterns of the sediments within the GOM.

Major faulting during the ocean spreading stage created a horst (high block) and graben (low block) system in the GOM Basin that was surrounded by higher more stable land mass (Salvador, 1991). During the Upper Jurassic emergent highs were exposed and subjected to erosion, while adjacent lows filled with sediment. Due to the arid conditions, shallow waters, and the isolated lows formed within the horst and graben system, the eroded sediments were transported only a short distance to the adjacent lows. Repeated flooding and evaporation of the shallow saline waters that filled the basin resulted in a thick, widespread, salt bed (Louann Salt) that was often deposited directly onto basement rocks. Through time the basin cooled, subsided, and was gradually filled with deeper water in which more carbonates (limestone, chalk, and reefs) were deposited. At the end of the Mesozoic era, the climate became more temperate which facilitated the erosion of the surrounding mountains. During the last 65 million years (Cenozoic era), several river systems brought the eroded material (clastic) into the GOM.

Because salt is less dense than sand, silt, or clay, it tends to become mobilized as denser sediments are deposited on it. The movement of salt upward pierces overlying rocks and sediment forming structures that have trapped the prolific hydrocarbon resources in the GOM. The updip sediment loading on the shelf and the upward movement of salt during the Tertiary has formed a vast canopy of mobilized salt over most of the outer continental shelf and slope sediments. Individual, isolated salt bodies are called diapirs. Sands in proximity to salt structures have the greatest potential for hydrocarbon accumulation because it is the optimum zone for the successful cross strata migration and accumulation of oil and gas. First, salt structures create pathways for migration of hydrocarbon from Upper Jurassic, Lower Cretaceous, and/or Lower Tertiary source beds to the reservoir sands. Second, thick sands deposited in deltas or in deep sea fans with good porosity (pore space between the sand grains where oil and gas can accumulate) and permeability (connections between the pore spaces through which oil and gas can flow) provide reservoir space. Third, impermeable shales, salt, and/or faults serve as seals for trapping of oil and gas in the pore spaces of the reservoir rocks.

The hydrocarbon-producing horizons on the continental shelf and slope of the Cenozoic Province are mainly Miocene, Pliocene, and Pleistocene, and production generally comes from progressively younger sands in the seaward direction. These Cenozoic productive intervals become thinner and younger with less hydrocarbon potential eastward in the direction of the Cretaceous shelf edge (Mesozoic Province). The Mesozoic section has been penetrated by only a few wells in the Cenozoic Province with no commercial hydrocarbons being identified to date.

## Mesozoic Province

The Mesozoic Province in the OCS extends eastward from the Cretaceous Shelf Edge off the coast of Mississippi, Alabama, and Florida towards the coastline of Florida. Although this area has experienced limited drilling and most control points are on the shelf, some general statements can be made concerning resources. This province is dominated by carbonate rocks with some Cenozoic clastic sediments. The geologic age of the sediments above basement rock ranges from the Jurassic to Recent marine sediments at the seafloor. The hydrocarbon potential has been realized throughout the entire geologic interval- from the very shallow, young portion of the Tertiary Pleistocene (1,500-4,000 ft; 450-1,200 m)), to the intermediate Cretaceous James (14,000-16,000 ft; 4,250-4,900 m) and the deep, older Jurassic Norphlet (15,000-24,000 ft; 4,575-7,300 m). Approximately two dozen fields in the Mesozoic Province produce gas from the shallow Cenozoic. In the area offshore of the Florida Panhandle (Pensacola and Destin Dome), a total of 31 wells have been drilled, with 18 of the wells penetrating the Norphlet Formation. The depths at which the Norphlet Formation is found in the Gulf Coast region varies from less than 5,000 ft (1,525 m) onshore to more than 24,000 ft (7,300 m) subsea offshore Mississippi and 15,000 ft (4,575 m) subsea in Apalachicola Embayment.

This province has several potential Mesozoic hydrocarbon plays that are downdip equivalents of onshore productive fields. Carbonate rocks often require favorable diagenesis (physical and chemical alterations to the sediments after deposition), faulting, fracturing, and stratigraphy to enhance the low

porosity and permeability. The variability of the porosity and permeability within a carbonate rock increases the risk in the determination of potential drainage area, production rates, and resource volume when hydrocarbons are discovered.

## Drilling Activity in the Proposed Lease Sale Area

As of April 1, 2003, four leases (DeSoto Canyon Blocks 133, 177, and 927; and Lloyd Ridge 360) have been drilled in the proposed lease sale area (**Figure 1-3**). Three exploratory wells have been drilled (one each in 1993, 1997, and 2003), one of which was sidetracked to a new bottom hole location. Three development wells have been drilled (two in 2001 and one in 2003); gas production began in August 2002 at the subsea well in DeSoto Canyon Block 133.

## Geologic Hazards

The seafloor geology of the GOM reflects the interplay between episodes of diapirism, mass sediment movement, and sea-level fluctuations. The main hazards in this area are faulting, shallow-gas pockets, and buried channels. Deepwater regions in the GOM have complex regional salt movement, both horizontal and vertical, which make it a unique ocean basin. This movement greatly alters the seafloor topography forming sediment uplifts, mini-basins, and canyons. Salt moves horizontally like a glacier and can be extruded to form salt tongues, pillows, and canopies below an ever-increasing weight of sediment. Vertical salt forms range from symmetric bulb-shaped stocks to walls. While salt creates traps that are essential to petroleum accumulation, salt movement can cause potential hazards such as seafloor fault scarps, slumping from steep unstable slopes, shallow gas pockets, seeps and vents, and rocky or hard bottom areas.

Gas hydrates (gas trapped in ice crystals) have been found in the GOM in localized deepwater areas of very cold temperature and high pressure at or near the seafloor. Gas hydrates can rapidly dissociate when heated or otherwise disturbed (for example, by an anchor) and cause sediment instability. Although the GOM has had no drilling incident associated with hydrates, they are a problem in other parts of the world.

The Mississippi River delta presents a unique set of geologic hazards because of high sedimentation rates, which cause very unconsolidated, high-water-content, and low-strength sediments. Under these conditions, the sediments can be unstable, and slope failure or mass transport of sediments can result. These failures can be triggered by cyclic leading associated with hurricanes, overloading, or oversteepening of the slope sediments, or uplift associated with movement of salt. These failures can form mudflow gullies, overlapping mudflow lobes, collapse depressions, slumps, and slides. Small, buried, river channels can result in differential sediment compaction and pose a hazard to jack-up rigs.

Over-pressure conditions in sedimentary section can result from loading by rapid deposition, sand collapse, in-leaking gas, or salt tectonics. Drilling through an over-pressured shallow-gas pocket can cause loss of mud circulation or a blowout (a blowout occurs when improperly balanced well pressure results in sudden uncontrolled release of fluids from a well bore or well head). A shallow water flow can cause similar drilling problems. Over-pressured conditions can develop in deepwater when a "water sand" is trapped by a shale seal. Over-pressured formation water may escape around or through the wellbore to the seafloor and wash out the well foundation. No shallow water flow event in the GOM has resulted in an oil spill.

Deep drilling may encounter abnormally high geopressures. Deep drilling may also encounter hydrogen sulfide, which can occur near salt domes overlain by caprock and is the product of sulfate reducing microbes.

## Potential Mitigation Measures

The best mitigation for most hazards is avoidance after detection by a geophysical survey. Leaseholders are required to run geophysical surveys before drilling in order to locate potential geologic or man-made hazards (CFR 250.203). In deepwater, most companies do a ROV inspection of the seafloor for a pre-spud location. Companies are also required to take and analyze sediment borings for platform sites. Areas of hydrogen sulfide occurrences can be predicted and sensors installed on drilling rigs to warn operators. Certain leases also require archaeological surveys and live-bottom surveys to protect

sensitive areas. Every application for permit to drill a well in the GOM is reviewed by MMS geologists, geophysicists, and engineers to ensure compliance with standard drilling practices and MMS regulations. All rigs and platforms are inspected by MMS on a regular basis to ensure all equipment and procedures comply with Federal regulations for safety and environmental protection.

| Geologic Condition | Hazard | Mitigations |
|---|---|---|
| Fault | Bend/shear casing<br>Lost circulation<br>Gas conduit | Stronger casing/heavier cement |
| Shallow Gas | Lost circulation<br><br>Blowout<br>Crater | Kill mud<br>Pilot hole<br>Circulate mud/drill slower<br>Blow-out preventer/diverter<br>Pressure while drilling log |
| Buried Channel | Jack-up leg punch through | Pre-load rig<br>Mat support<br>All rig legs in same type of sediment |
| Slump | Bend/shear casing | Thicker casing<br>Coil/flexible pipeline |
| Water Flow | Erosion/washout<br>Lost circulation | Kill mud, foam cement<br>Pilot hole<br>Pressure while drilling |

## A.2. PHYSICAL OCEANOGRAPHY

The GOM is a semienclosed basin connecting with the Caribbean Sea through the Yucatan Channel and the Straits of Florida. The northeastern GOM encompasses a variety of features found in this subtropical sea, including a continental shelf, DeSoto Canyon, a continental slope and rise, and an abyssal plain. Among topics addressed by recent and/or ongoing MMS-sponsored studies in the northeastern GOM region are watermasses, circulation, seasonal hydrography, scales of variability, heat and salt budgets, forcing functions, the Loop Current, eddy monitoring, remote sensing, interaction between shelf and deeper offshore waters, river inflow, regional meteorology, and DeSoto Canyon circulation and influence (Jochens and Nowlin, 1998; Muller-Karger et al., 1998; Yocke et al., 1998; SAIC, 1999; Jochens and Nowlin, 1999).

The most prominent source of mesoscale variability in the eastern GOM is the Loop Current. Caribbean waters entering the GOM through the Yucatan Channel are constrained by its 1,820-m effective sill depth. Once free of the Yucatan Channel, flow from the Yucatan Current proceeds northward into the GOM becoming the Loop Current. This current, which transports an estimated volume of 30 million $m^3/s$ seawater, gradually turns clockwise through the eastern GOM and eventually loops back to the south and east. The Loop Current exits the GOM via the Straits of Florida, where the effective sill depth is 820 m, and proceeds into the Atlantic where it continues as the Gulf Stream (Sturges et al., 1993). Loop Current waters are relatively salty and warm, having core salinity at or above 36.65 and temperature of around $22.5^oC$ at 125-150 m depth. The Loop Current varies seasonally and annually in areal extent, and the Loop Current from 1993-1999 had a mean area of 142,000 $km^2$ and a mean volume of $2.17 \times 10^{13}$ $m^3$ (Hamilton et al., 2000). The frequency of occurrence of Loop Current water varies from about 20 percent in the southern portion of the Lease Sale 181 region to less than 5 percent on the shelf. The Loop Current influences the northeastern GOM both directly due to intrusion of the Loop Current itself and indirectly by means of elongated filaments of Loop Current water that extend outward from the Loop Current front, as well as by clockwise-rotating closed rings called Loop Current eddies (LCE) that the Loop Current spawns. Intrusion of Loop Current waters is chaotic in occurrence, but intrusions are an important physical oceanographic influence in the region because of the frequency of occurrence, the marked contrast in water mass properties, and the large areas affected. Examination of 24 years of data (1976-1999) showed the Loop Current and associated warm water penetrated as far as $27.5^o$ N about two events every three years, and $28^o$ N about two events every five years, with cross-shelf exchange associated with cold core rings. At times Loop Current waters flow onto the continental shelf in

the northeastern GOM region. No penetration to 29° N was detected during this 24-year period (Muller-Karger et al., 2001), but the location of this current has been documented as far north as the continental slope just south of Mobile, Alabama, at 29.75° N. Such northward extension, although rare, appears to be linearly related to the areal coverage of the Loop Current (SAIC, 1989; Huh et al., 1981). Loop Current filaments have been observed on the shelf and intruding into the DeSoto Canyon. Thirty percent of Mississippi River water moves eastward from the river mouth. Eddies and filaments generated by the Loop Current, which subsequently spin eastward along the Mississippi/Alabama outer shelf, can entrap parcels of Mississippi River water (Brooks, 1991). The Loop Current extends vertically to roughly 1,000-m depth, below which there is evidence of opposing currents and vortex-like features of weaker velocity. The Loop Current and LCE's may have surface speeds as high as 150-200 cm/sec or more, which decrease with depth. Speeds at 500-m depth are commonly around 10 cm/s (Cooper et al., 1990). Near the bottom of the Loop Current, velocities are low and fairly uniform in the vertical although with bottom intensification, a characteristic of topographic Rossby waves (TRW). This indicates that the Loop Current is in fact a source of the TRW's, which are a major component of deep circulation below 1,000 m in this part of the GOM (Sturges et al., 1993; SAIC, 1989; Hamilton, 1990 and 2001).

Large anticyclonic (clockwise rotating) eddies pinch off and gradually separate from the Loop Current at irregular intervals of roughly 6-18 months. These LCE's are also called warm core eddies since they surround a central core of warm Loop Current water. The average diameter of warm core eddies is about 200 km, and they may be as large as 400 km in diameter. After separation from the Loop Current, these eddies often translate westward across the GOM at a speed of about 5 km/day. Some LCE's move into the northeastern GOM as well, contributing energetic anticyclonic flow to circulation in this region. The GOM warm core eddies can have a life span of a year or more (Elliott, 1982), and their effects can persist at one location for weeks or even months (Nowlin et al., 1998). Small LCE's have been observed to move northward into the DeSoto Canyon, where they eventually dissipate (Muller-Karger et al., 1998). Warm eddy water is present over 15 percent or less of the approximately 1.5 million $km^2$ total surface area of the GOM (SAIC, 1989).

Cold-core cyclonic (counter-clockwise rotating) eddies have been observed in the study region as well, and surface waters within these cyclones are cooler and fresher than adjacent waters. Cyclonic circulation is associated with upwelling, which brings cooler, deeper water towards the surface. Small cyclonic eddies around 50-100 km in diameter have been observed over the continental slope off both Louisiana (Hamilton, 1992) and the Florida Panhandle (Jochens and Nowlin, 1998). These eddies can persist for six months or longer and are relatively stationary.

Cold core and warm core eddies contribute substantially to the deepwater circulation patterns of the continental slope and rise, abyssal plain, and DeSoto Canyon (Muller-Karger et al., 2001). The Sturges et al. (1993) model suggests a surprisingly complex circulation pattern beneath the anticyclone, with vortex-like and wavelike features that interact with the bottom topography (Welsh and Inoue, 2000). These model findings are consistent with Hamilton's (1990) interpretation of observations.

Abyssal currents in the GOM have been directly measured by current meters at instrument depths of up to 3,175 m. The major low-frequency velocity fluctuations in the bottom 1,000-2,000 m of the water column have the characteristics of TRW's. These are long waves of wavelength 150-250 km having periods greater than 10 days and group velocity estimated at 9 km/day, and they are characterized by columnar motions that are bottom intensified. They move westward at higher group velocities than the typical anticyclonic eddy translation velocity of 3-6 km/day. The Loop Current and LCE's are thought to be major sources of these westward propagating TRW's (Hamilton, 1990).

In general, past current observations in the deepwater GOM have revealed decreases in current speed with depth. During late 1999, a limited number of high-speed current events, at times approaching 2 kn, were observed at depths exceeding 1,500 m in the northern GOM (Hamilton and Lugo-Fernandez, 2001). Mega-furrows on the seafloor apparently resulting from the erosional effects of high-speed currents have also been discovered in the northern GOM. No thermohaline forcing of consequence or watermass formation are known to occur in the deepwater region of the GOM (Nowlin et al., 2001).

Low salinity waters have been observed at the head of DeSoto Canyon, and these are thought to originate either from Mississippi River waters transported there by deeper cyclonic flow or else from various Alabama or Florida rivers. Downwelling and upwelling are both known to occur in the DeSoto Canyon region. Summer upwelling of cold water into regions having a seafloor depth of less than 100 m at the head of the canyon has been observed and is enhanced by canyon topography. Cross-shelf spatial

scales of 3-13 km and alongshore spatial scales of 5-10 km were derived from Acoustic Doppler Current Profiler (ADCP) data at 14 m depth collected in the Lease Sale 181 continental shelf region. These scales are generally shorter than the comparable cross-shelf scales of 14-32 km and alongshore scales of 12-36 km observed over the broader West Florida Shelf (**Figure A-1**). The anticyclonic and cyclonic eddies that so greatly affect circulation in the DeSoto Canyon are of larger horizontal and vertical scales, and the 18- to 51-km cross-shelf scales and 31- to 50-km alongshore scales found along the 1,000-m isobath are attributed to the influence of eddies in the region (Jochens and Nowlin, 1999).

High-frequency variability is more striking in DeSoto Canyon and along the shelf break than elsewhere in this region. Subtidal current fluctuations in the shelf break region near the Canyon show some similarities with the Texas-Louisiana Shelf Circulation and Transport Process Program (LATEX)-A shelf break measurements. Variance in the cross-isobath direction is as large as in the along-isobath direction, as was observed on the Louisiana-Texas shelf break (Jochens and Nowlin, 1999). In January-July 1996, flow at the shelf break near DeSoto Canyon was from west to east, but in August flow reversed. Mississippi River water spread eastward in the summers of 1998, 1999, and 2000, but in spring and winter there was no significant eastward entrainment of Mississippi water (Muller-Karger et al., 2001). Opposing directions of flow frequently have been observed at adjacent moorings in the DeSoto Canyon region. Flow in the upper 100 m of water is generally eastward following the isobaths in this region, with opposing westward flow beneath at 200-300 m depth. This anticyclonic upper layer flow exists in the absence of warm core eddies in the region and remains when the Loop Current is confined to the southeast GOM. These upper layer flows affect transport of water from the shelf (Hamilton, 1999; SAIC, 1999).

Circulation on the continental shelf in the northeastern GOM has been observed to follow a cyclonic pattern, with westward alongshore currents prevailing on the inner and middle shelf and opposing alongshore flow over the outer shelf and slope (Dinnell, 1988; Brooks, 1991). Inner shelf currents are primarily wind forced and are also influenced by river outflow and buoyancy forcing from water discharged by the Mississippi, Apalachicola, Tombigbee, Alabama, and other rivers in the region. Preliminary ADCP results from the ongoing Northeastern GOM Chemical Oceanography and Hydrography Study appear to confirm these findings. Midshelf and inner shelf flow was weakly cyclonic except for the summer of 1999. Circulation over the slope and shelf edge appeared to be driven by offshore eddies and the Loop Current. Continental shelf waves may propagate westward along the slope in this region. These are long waves similar to TRW's, but their energy is concentrated along a sloping bottom with shallow water to the right of the direction of propagation, and due to this constraint they are effectively "trapped" by the sloping bottom topography. Cold water from deeper offshelf regions moves onto and off the continental shelf by cross-shelf flow associated with upwelling and downwelling processes. Upwelling of nutrient rich, cold water onto the shelf in 1998 was correlated with hypoxia, anoxia, and mass mortalities of fishes and invertebrates in the region, although causation has not been established (Collard and Lugo-Fernandez, 1999). A more extensive discussion of the physical oceanography of the continental shelf in this region is available in the Destin Dome EIS (USDOI, MMS, 1999).

Historical hydrographic cruises include several surveys of the entire GOM in the 1960's (including *R.V. Hidalgo* 62-H-3, *R.V. Geronimo* 67-G-12, and *R.V. Geronimo* 67-G-16) from which nearly synoptic circulation for the entire GOM can be inferred. **Table A-1** gives the names, depth ranges, densities, and identifying features of the remnants of the principal watermasses in the Eastern GOM, excluding the highly variable surface waters, as observed by Morrison and Nowlin (1977) and Nowlin and McLellan (1967). All of these subsurface waters flow into the GOM from the Caribbean Sea through the Yucatan Channel, and below its effective sill depth, horizontal distributions of temperature and salinity within the GOM are thought to be relatively uniform based on historical observations. For example, the well-defined relation of salinity to temperature found during the 62-H-3 cruise is illustrated for Eastern GOM stations in **Figure A-1**, and it is apparent that variability of salinity in shallow waters exceeds that in the colder, deep waters of this region. In addition to these synoptic cruises, a number of historical hydrographic cruises of more limited scope have been carried out in the northeastern GOM and surrounding regions aboard the *R.V. Alaminos* and other research vessels since that time. Summer heating and stratification affect continental shelf waters in the area, with salinity generally lower nearshore, although parcels of Mississippi River water occasionally move into outer shelf waters. Freshwater intrusions also lower the salinity after local storms. Summer salinities are higher and more uniform for

DeSoto Canyon waters than for shelf waters because of the lower frequency of such freshwater intrusions into DeSoto Canyon in midsummer in comparison with winter, when prevailing winds push fresher shelf waters towards the upper canyon. Upwelling events, such as the spring/summer 1998 upwelling, bring cold, deep water towards the surface and up onto the shelf in the northeastern GOM. This is clearly seen in the regional hydrography as in Collard and Lugo-Fernandez (1999).

Eastward and shoreward winds that could force upwelling in this region and that were related to the 1997-1998 El Nino climatic conditions were associated with the upwelling event that occurred in 1998 on the Florida continental shelf in the northeastern GOM. This event was documented by Advanced Very High Resolution Radiometer (AVHRR, an instrument by which infrared radiation can be detected over large areas via satellite), wind, bottom-water temperature, sea-surface height fields, and ADCP observations, and it has been attributed not directly to the prevailing winds but to a persistent anticyclone located over DeSoto Canyon during 1998 (Collard and Lugo-Fernandez, 1999).

Cold fronts, as well as diurnal and seasonal cycles of heat flux at the air/sea interface, affect near-surface water temperatures, although water at depths greater than about 100 m remains unaffected by surface boundary heat flux. Water temperature is greater than air temperature at the air/sea interface during all seasons. Frontal passages over the region can cause changes in temperature and velocity structure in the upper layers, specifically increasing current speeds and variability. These fronts tend to occur with frequencies from 3-10 days (weatherband frequency). In the winter, the shelf water is nearly homogeneous due to wind stirring and cooling by fronts and winter storms. Storms and hurricanes as far away as the Yucatan Peninsula can induce strong currents in this part of the northeastern GOM (Brooks, 1991, page 13). Hurricanes increase surface current speeds and cool the surface waters in much the same way as do cold fronts, but may stir the mixed layer to an even greater depth (Molinari, 1979). Surface waves and sea state may limit normal oil and gas operations as well as oil-spill response activities (Brower et al., 1972). During passage of a cold front, the cold air mass is warmed as it travels over surface waters. In deeper waters, the mixed layer deepens. In the summer, vertical density stratification increases with the development of a seasonal thermocline. In deeper waters, the mixed layer is diminished. The transition between summer and winter is believed to occur with passage of the first cold front, and the transition from winter to summer coincides with the last cold front (Molinari and Festa, 1978).

## A.3. METEOROLOGICAL CONDITIONS

### General Description

The GOM is influenced by a maritime subtropical climate controlled mainly by the clockwise circulation around the semipermanent area of high barometric pressure commonly known as the Bermuda High. The GOM is located to the southwest of this center of circulation. This proximity to the high-pressure system results in a predominantly southeasterly flow in the GOM region. Two important classes of cyclonic storms are occasionally superimposed on this circulation pattern. During the winter months, December through March, cold fronts associated with cold continental air masses influence mainly the northern coastal areas of the GOM. Behind the fronts, strong north winds bring drier air into the region. Tropical cyclones may develop or migrate into the GOM during the warmer months. These storms may affect any area of the GOM and substantially alter the local wind circulation around them. In coastal areas, the sea breeze effect may become the primary circulation feature during the summer months of May through October. In general, however, the subtropical maritime climate is the dominant feature in driving all aspects of the weather in this region; as a result, the climate shows very little diurnal or seasonal variation.

Two types of air masses primarily govern the climatology of the GOM region. One type of air mass is the warm and moist, maritime tropical air; the other type is the very cold and dry, continental polar air. During summer months, the mid-latitude polar jet retreats northward, allowing maritime air to dominate through the GOM. In the southeastern region of the GOM, the climate is dominated by the warm and moist, maritime tropical air year round. Selected climatological data for a few chosen GOM coastal locations can be found in **Table A-2**.

## Pressure, Temperature, and Relative Humidity

The western extension of the Bermuda High dominates the circulation throughout the year, weakening in the winter and strengthening in the summer. The average monthly pressure shows a west to east gradient along the northern GOM during the summer. In the winter, the monthly pressure is more uniform along the northern GOM. The minimum average monthly pressure occurs during the summer. The maximum pressure occurs during the winter as a result of the presence and influence of transitional continental cold air.

Average air temperatures at coastal locations vary with latitude and exposure. Air temperatures range from highs of 24.7-28.0°C in the summer to lows of 2.1-21.7°C in the winter. Winter temperatures depend on the frequency and intensity of penetration by polar air masses from the north. Air temperatures over the open GOM exhibit narrower limits of variations on a daily and seasonal basis due to the moderating effect of the large bodies of water. The average temperature over the center of the GOM is about 29°C in the summer and between 17° and 23°C in the winter. The relative humidity over the GOM is high throughout the year. Minimum humidities occur during the late fall and winter when cold, continental air masses bring dry air into the northern GOM. Maximum humidities occur during the spring and summer when prevailing southerly winds bring in warm, moist air.

## Surface Winds

Winds are more variable near the coast than over open waters because coastal winds are more directly influenced by the moving cyclonic storms that are characteristic of the continent and because of the land and sea breeze regime. During the relatively constant summer conditions, the southerly position of the Bermuda High generates predominantly southeasterly winds, which become more southerly in the northern GOM. Winter winds usually blow from easterly directions with fewer southerlies but more northerlies.

## Precipitation and Visibility

Precipitation is frequent and abundant throughout the year but does show distinct seasonal variation. During the warmer months of the year, stations along the entire coast record the highest precipitation values. The warmer months usually have convective cloud systems that produce showers and thunderstorms; however, these thunderstorms rarely cause any damage or have attendant hail (USDOC, 1967; Brower et al., 1972). The month of maximum rainfall for most locations is July. Winter rains are associated with the frequent passage of frontal systems through the area. Rainfalls are generally slow, steady, and relatively continuous, often lasting several days. Snowfalls are rare, and when frozen precipitation does occur, it usually melts on contact with the ground. Incidence of frozen precipitation decreases with distance offshore and rapidly reaches zero. The annual average precipitation in the State of Florida is about 1.37 m. The annual average precipitation in Lake Charles, Louisiana, is 1.35 m; it is 1.5 m in Gulfport, Mississippi. In the southern portions of the GOM, because of the warm climate, frozen precipitation is unlikely to occur.

Warm, moist GOM air blowing slowly over chilled land or water surfaces brings about the formation of fog. Fog occurrence decreases seaward, but visibility has reached less than 800 m due to offshore fog. Coastal fogs generally last 3-4 hours, although particularly dense sea fogs may persist for several days. The poorest visibility conditions occur during winter and early spring. Industrial pollution and agricultural burning also impact visibility.

## Mixing Height and Atmospheric Stability

The mixing height is very important because it determines the volume available for dispersing pollutants. Because the mixing height is directly related to vertical mixing in the atmosphere, a mixed layer is expected to occur under neutral and unstable atmospheric conditions. The mixing height tends to be lower in winter, and daily changes are smaller than in summer. Vertical mixing is most vigorous during unstable conditions. Vertical motion is suppressed during stable conditions. The mixing height tends to be lower in winter and daily variations are smaller than in summer.

## Severe Storms

The GOM is part of the Atlantic tropical cyclone basin. Tropical cyclones generally occur in summer and fall seasons; however, the GOM also experiences winter storms or extratropical storms. These winter storms generally originate in middle and high latitudes and have winds that can attain speeds of 15-26 m/sec (11.2-58.2 mph). The GOM is an area of cyclone development during cooler months due to the contrast of the warm air over the GOM and the cold continental air over North America. Cyclogenesis, or the formation of extratropical cyclones, in the GOM is associated with frontal overrunning (Hsu, 1992). The most severe extratropical storms in the GOM originate when a cold front encounters the subtropical jet stream over the warm waters of the GOM. Statistics of 100-year data of extratropical cyclones reveal that most activity occurs above 25° N latitude in the Western GOM. The mean number of these storms ranges from 0.9 storms per year near the southern tip of Florida to 4.2 over central Louisiana and average 2.9 in the proposed lease sale area (USDOI, MMS, 1988). The frequency of cold fronts in the GOM exhibits similar patterns during the four-month period of December through March. During this time the area of frontal influence reaches 10° N latitude. Frontal frequency is about nine fronts per month (1 front every 3 days on average) in February and about seven fronts per month in March (1 front every 4-5 days on average). By May, the frequency decreases to about four fronts per month (1 front every 7-8 days) and the region of frontal influence retreats to about 15° N latitude. During June-August frontal activity decreases to almost zero and fronts seldom reach below 25° N latitude (USDOI, MMS, 1988).

Tropical cyclones affecting the GOM originate over the equatorial portions of the Atlantic Ocean, the Caribbean Sea, and the GOM. Tropical cyclones occur most frequently between June and November. Based on 42 years of data, there are about 9.9 storms per year with about 5.5 of those becoming major hurricanes in the Atlantic Ocean (Gray, written communication, 1992). Data from 1886 to 1986 show that 44.5 percent of these storms, or 3.7 storms per year, will affect the GOM (USDOI, MMS, 1988). The Yucatan Channel is the main entrance of Atlantic storms into the GOM, and a reduced translation speed over GOM waters leads to longer residence times in this basin. The probability of a tropical storm or hurricane crossing the Escambia and Santa Rosa County coastlines is approximately 20 percent for any year; or they should experience one about once every five years (Bureau of Land Management (BLM) Open File Report 80-02). The probability of occurrence for a tropical storm in Louisiana and Mississippi is on average about 15 percent; it is approximately 20 percent in Alabama. Records from 1886 to 1992 show that 85 hurricanes hit the State of Florida, about one tropical storm per year.

There is a high probability that tropical storms will cause damage to physical, economic, biological, and social systems in the GOM. Tropical storms also affect OCS operations and activities; platform design needs to consider the storm surge, waves, and currents generated by tropical storms. The storm surge, waves, and high winds cause most of the damage from a tropical storm. Storm surge depends on local factors, such as bottom topography and coastline configuration, and storm intensity. Water depth and storm intensity control wave height during hurricane conditions. Sustained winds for major hurricanes (Saffir-Simpson Category 3 and above) are higher than 49 m/sec (109.6 mph). The Saffir-Simpson scale definitions and a listing of the most damaging hurricanes in the GOM can be found in **Table A-3**.

## Atmospheric Stability

Not all of the Pasquill-Gifford stability classes are found offshore in the GOM. Specifically, the F stability class seldom occurs and the G stability is markedly absent; the G stability class is the extremely stable condition that only develops at night over land with rapid radiative cooling. This large body of water is simply incapable of losing enough heat overnight to set up a strong radiative inversion. Likewise, A stability class is rarely present but could be encountered during cold air outbreaks in the wintertime, particularly over warmer waters. Category A is the extremely unstable condition that requires a very rapid warming of the lower layer of the atmosphere, along with cold air aloft. This is normally brought about when cold air is advected aloft, and in strong insolation rapidly warms the earth's surface, which, in turn, warms the lowest layer of the atmosphere. Once again, the ocean surface is incapable of warming rapidly; therefore, you would not expect to find stability class A over the ocean. For the most part, the stability is neutral to slightly unstable.

In the proposed lease sale area, the over-water stability is predominantly unstable, with neutral conditions making up the bulk of the remainder of the time (Hsu, 1996; Marks, written communication, 1996 and 1997; Nowlin et al., 1998). Stable conditions do occur, although infrequently.

The mixing heights offshore are quite shallow, 900 m or less (Hsu, 1996; Nowlin et al., 1998). Transient cold fronts also have an impact on the mixing heights; some of the lowest heights can be expected to occur with frontal passages and on the cold-air side of the fronts. This effect is caused by the frontal inversion.

## A.4. EXISTING OCS-RELATED INFRASTRUCTURE

### Offshore Infrastructure

The numbers below reflect offshore activities in the GOM OCS as of March 2003, unless otherwise denoted. All numbers presented are from an analysis of data contained in the MMS Technical Information Management System (TIMS), unless otherwise denoted.

| Exploration and Delineation Wells (all wells ever drilled) | | | | |
|---|---|---|---|---|
| | Water Depth | | | |
| Planning Area | 0-60 m | 61-200 m | 201-900 m | >900 m |
| Central | 3,213 | 4,342 | 3,013 | 1,036 |
| Western | 534 | 1,361 | 753 | 388 |
| Eastern | 1 | 21 | 22 | 5 |
| Total | 3,748 | 5,724 | 3,788 | 1,429 |

| Exploration and Delineation Wells (currently active wells) | | | | |
|---|---|---|---|---|
| | Water Depth | | | |
| Planning Area | 0-60 m | 61-200 m | 201-900 m | >900 m |
| Central | 900 | 1,047 | 784 | 424 |
| Western | 124 | 168 | 113 | 175 |
| Eastern | 1 | 1 | 0 | 1 |
| Total | 1,025 | 1,216 | 897 | 600 |

| Development Wells (boreholes) (all wells ever drilled) | | | | |
|---|---|---|---|---|
| | Water Depth | | | |
| Planning Area | 0-60 m | 61-200 m | 201-900 m | >900 m |
| Central | 7,463 | 9,541 | 6,134 | 869 |
| Western | 402 | 1443 | 1207 | 201 |
| Eastern | 0 | 0 | 1 | 3 |
| Total | 7,865 | 10,984 | 7,342 | 1,073 |

| Development Wells (boreholes) (currently active wells) | | | | |
|---|---|---|---|---|
| | Water Depth | | | |
| Planning Area | 0-60 m | 61-200 m | 201-900 m | >900 m |
| Central | 3,875 | 5,508 | 4,406 | 708 |
| Western | 250 | 760 | 852 | 166 |
| Eastern | 0 | 0 | 0 | 2 |
| Total | 4,125 | 6,268 | 5,258 | 876 |

| Percentage of Development Well Completions that Become Producing Wells | | | | |
|---|---|---|---|---|
| | Water Depth | | | |
| Planning Area | 0-60 m | 61-200 m | 201-900 m | >900 m |
| Central | 99.0 | 99.5 | 98.9 | 78.1 |
| Western | 99.4 | 99.2 | 100.0 | 93.3 |
| Eastern | 0.0 | 0.0 | 0.0 | 100.0 |
| Total | 99.1 | 99.4 | 99.2 | 83.3 |

| Average Number of Days to Drill a Development Well | | | | |
|---|---|---|---|---|
| | Water Depth | | | |
| Planning Area | 0-60 m | 61-200 m | 201-900 m | >900 m |
| Central | 70 | 83 | 94 | 87 |
| Western | 84 | 116 | 111 | 126 |
| Eastern | n/a | n/a | n/a | 46 |
| Total | 71 | 87 | 96 | 93 |

"n/a" refers to "not applicable"

| Average Life of a Producing Well (years) | | | | |
|---|---|---|---|---|
| | Water Depth | | | |
| Planning Area | 0-60 m | 61-200 m | 201-900 m | >900 m |
| Central | 21 | 14 | 10 | n/a |
| Western | 15 | 17 | 9 | n/a |
| Eastern | n/a | n/a | n/a | n/a |
| Total | 20 | 15 | 10 | n/a |

"n/a" refers to "not applicable"

| Average Measured Depth of a Development Well (feet) | | | | |
|---|---|---|---|---|
| | Water Depth | | | |
| Planning Area | 0-60 m | 61-200 m | 201-900 m | >900 m |
| Central | 10,445 | 10,893 | 9,243 | 14,125 |
| Western | 10,960 | 9,875 | 9,495 | 14,985 |
| Eastern | p | p | p | 13,076 |
| Total | 10,467 | 10,755 | 9,282 | 14,283 |

"p" refers to "proprietary"

| Number of Active Platforms by Platform Type | | | | |
|---|---|---|---|---|
| | Planning Area | | | |
| Platform Type | Central | Western | Eastern | Total |
| Caisson | 1,130 | 97 | 1 | 1,228 |
| Compliant Tower | 1 | 1 | 0 | 2 |
| Fixed Leg | 1,664 | 336 | 0 | 2,000 |
| Mobile Production Unit | 1 | 0 | 0 | 1 |
| Mini TLP | 3 | 0 | 0 | 3 |
| SPAR | 3 | 3 | 0 | 6 |
| Subsea Manifold | 0 | 2 | 0 | 2 |
| Subsea Template | 4 | 0 | 0 | 4 |
| Tension Leg | 7 | 0 | 0 | 7 |
| Well Protector | 369 | 50 | 0 | 419 |

As of April 2003.

| GOM Rig Utilization and Day Rates | | | | | | |
|---|---|---|---|---|---|---|
| Rig Type | Total Supply | Marketed Supply | Total Contracted | Fleet Utilization | Marketed Utilization | Day Rate Range ($ 000) |
| Jack-Ups | 129 | 125 | 89 | 69.0% | 84.0% | 16-45 |
| Semi-submersibles | 38 | 30 | 23 | 60.5% | 79.3% | 35-80 |
| Drillships | 8 | 8 | 7 | 87.5% | 100.0% | 105-165 |
| Submersibles | 7 | 4 | 3 | 42.9% | 75.0% | 16-20 |
| Platform Rigs | 68 | 56 | 28 | 41.2% | 50.0% | 12-25 |

Source: ODS-Petrodata, March 28, 2003.

# APPENDIX B

# STATE COASTAL ZONE MANAGEMENT PROGRAMS

# B. STATE COASTAL ZONE MANAGEMENT PROGRAMS

Each State's CZMP, federally approved by NOAA, is a comprehensive statement setting forth objectives, enforceable policies, and standards for public and private use of land and water resources and uses in that State's coastal zone. The program provides for direct State land and water use planning and regulations. The plan also includes a definition of what constitutes permissible land uses and water uses. Once a State's CZMP is federally approved, Federal agencies must ensure that their actions are consistent to the maximum extent practicable with the enforceable polices of the approved program. State and Federal agencies work together on joint planning and permitting, which reduces the regulatory burden on the public (USDOC, NOAA, 1989). Federal agencies provide feedback to the States through each Section 312 evaluation conducted by NOAA.

To ensure conformance with State CZMP policies and local land use plans, MMS prepares a federal consistency determination for each proposed OCS lease sale. Through the designated State CZM agency, local land use entities are provided numerous opportunities to comment on the OCS Program. Local land-use agencies also have the opportunity to comment directly to MMS at any time, as well as during formal public comment periods related to the announcement of the 5-Year Program, Call/NOI to Prepare an EIS, EIS scoping, public hearings on Draft EIS, and the Proposed Notice of Sale.

A State's approved CZMP may also provide for the State's review OCS plans, permits, and license activities to determine whether they will be conducted in a manner consistent with the State's CZMP. This review authority is applicable to activities conducted in any area that has been leased under the OCSLA and that affect any land or water use or natural resource within the State's coastal zone (16 U.S.C. 1456(c)(3)(B)).

### State of Texas Coastal Management Program

The Texas Coastal Management Program (TCMP)/Final EIS was published in August 1996. On December 23, 1996, NOAA approved the TCMP, and the requirements therein were made operational as of January 10, 1997. The TCMP is based primarily on the Coastal Coordination Act (CCA) of 1991 (33 Tex. Nat. Res. Code Ann. Ch. 201, *et seq.*), as amended by HB 3226 (1995), which calls for the development of a comprehensive coastal program based on existing statutes and regulations. The CCA established the geographic scope of the program by identifying the program's inland, interstate, and seaward boundaries. The program's seaward boundary is the State's territorial seaward limit (3 leagues or 10.36 mi). The State's inland boundary is based on the State's Coastal Facilities Designation Line (CFDL). The CFDL was developed in response to the Oil Spill Act of 1990 and basically delineates those areas within which oil spills could affect coastal waters or resources. For the purposes of the TCMP, the CFDL has been modified to capture wetlands in upper reaches of tidal waters. The geographic scope also extends upstream 200 mi from the mouths of rivers draining into coastal bays and estuaries in order to manage water appropriations on those rivers. The program's boundaries encompass all or portions of 18 coastal counties (including Cameron, Willacy, Kenedy, Kleberg, Nueces, San Patricio, Aransas, Refugio, Calhoun, Victoria, Jackson, Matagorda, Brazoria, Galveston, Harris, Chambers, Jefferson, and Orange Counties); roughly 8.9 million acres of land and water.

Within this coastal zone boundary, the scope of the TCMP's regulatory program is focused on the direct management of 16 generic "Areas of Particular Concern," called coastal natural resource areas (CNRA). These CNRA's are associated with valuable coastal resources or vulnerable or unique coastal areas and include the following: waters of the open GOM; waters under tidal influence; submerged lands; coastal wetlands; seagrasses; tidal sand and mud flats; oyster reefs; hard substrate reefs; coastal barriers; coastal shore areas; GOM beaches; critical dune areas; special hazard areas; critical erosion areas; coastal historic areas; and coastal preserves.

The State has designated the WPA as the geographical area in which Federal consistency shall apply outside of the coastal boundary. The TCMP also identifies Federal lands excluded from the State's coastal zone, such as DOD facilities.

Land and water uses subject to the program generally include the siting, construction, and maintenance of electric generating and transmission facilities; oil and gas exploration and production; and the siting, construction, and maintenance of residential, commercial, and industrial development on beaches, critical dune areas, shorelines, and within or adjacent to critical areas and other CNRA's.

Associated activities also subject to the program include canal dredging; filling; placement of structures for shoreline access and shoreline protection; on-site sewage disposal, storm-water control, and waste management for local governments and municipalities; the siting, construction, and maintenance of public buildings and public works such as dams, reservoirs, flood control projects and associated activities; the siting, construction, and maintenance of roads, highways, bridges, causeways, airports, railroads, and nonenergy transmission lines and associated activities; certain agricultural and silvicultural activities; water impoundments and diversions; and the siting, construction, and maintenance of marinas, State-owned fishing cabins, artificial reefs, public recreational facilities, structures for shoreline access and shoreline protection, boat ramps, and fishery management measures in the GOM.

The TCMP is a networked program that will be implemented primarily through 8 State agencies, 18 local governments, and the Coastal Coordination Council. The program relies primarily on direct State control of land and water uses, although local governments will implement State guidelines related to beach and dune management. Implementation and enforcement of the coastal policies is primarily the responsibility of the networked agencies and local governments through their existing statutes, regulatory programs, or other authorizations. Networked agencies include the General Land Office/School Land Board, Texas Natural Resource Conservation Commission, Railroad Commission, Texas Parks and Wildlife Department, Texas Transportation Commission, Texas Historical Commission, the Public Utility Commission, the Texas State Soil and Water Conservation Board, and the Texas Water Development Board. In addition, the Texas Sea Grant College Program is a nonvoting member of the Council. Other members on the Council include a coastal business representative and an agriculture representative. Similarly, 18 county and municipal governments, in those counties with barrier islands, are also networked entities with responsibilities for program implementation vis-a-vis beaches and dunes.

Local land uses and government entities are linked to the management of Texas CNRA's in the TCMP. Local governments are notified of relevant TCMP decisions, including those that may conflict with local land use plans or zoning ordinances. The Coastal Coordination Council includes a local government representative as a full-voting member. An additional local government representative can be added to the Council as a nonvoting member for special local matters under review. The Council will establish a permanent advisory committee to ensure effective communication for local governments with land use authority.

In 1994, MMS entered into a MOU with the Texas General Land Office to address similar mineral resource management responsibilities between the two entities and to encourage cooperative efforts and promote consistent regulatory practices. This MOU, which encompasses a broad range of issues and processes, outlines the responsibilities and cooperative efforts, including leasing and CZMA review processes, agreed to by the respective agencies. Effective January 10, 1997, all operators were required to submit to MMS certificates of consistency with the TCMP for proposed operations in the WPA.

The MMS developed coordination procedures with the State for submittal of offshore lease sale consistency determinations and plans of operation. Western GOM Lease Sale 168 was the first MMS Federal action subject to State consistency review. The MMS and the State of Texas have revised CZM consistency information for OCS plans, permits and licenses to conform to the revised CZM regulations that were effective January 8, 2001, and have also incorporated streamlining improvements into the latest NTL (NTL 2002-G08). The State of Texas requires an adequate description, objective, and schedule for the project; site-specific information on the onshore support base, support vessels, shallow hazards, oil-spill response, wastes and discharges, transportation activities, and air emissions; and a Federal consistency certification, assessment, and findings. The State's requirements for Federal consistency review are based specifically on DOI's operating regulations at 30 CFR 250 and 30 CFR 254 and NOAA's Federal consistency regulations at 15 CFR 930. The MMS is continuing a dialogue with the State of Texas on Federal consistency review of pipelines and other permits, and the result of these discussions will be incorporated into future updates of MMS's NTL's and/or permitting procedures.

## State of Louisiana Coastal Resources Program

The statutory authority for Louisiana's coastal zone management program, the Louisiana Coastal Resources Program (LCRP), is the State and Local Coastal Resources Management Act of 1978, *et seq*. (Louisiana Administrative Code, Vol. 17, Title 43, Chapter 7, Coastal Management, June 1990 revised). The State statute puts into effect a set of State coastal policies and coastal use guidelines that apply to coastal land and water use decisionmaking. A number of existing State regulations are also incorporated

into the program including those concerning oil and gas and other mineral operations; leasing of State lands for mineral operations and other purposes; hazardous waste and radioactive materials; management of wildlife, fish, other aquatic life, and oyster beds; endangered species; air and water quality; and the Louisiana Superport.

The State statute also authorized establishment of Special Management Areas. Included or planned to be included as Special Management Areas are LOOP and Marsh Island. For purposes of the CZMA, only that portion of LOOP within Louisiana's coastal zone is part of the Special Management Area. In April 1989, the Louisiana Legislature created the Wetlands Conservation and Restoration Authority and established a Wetlands Conservation and Restoration Trust Fund to underwrite restoration projects. The Legislature also reorganized part of the Louisiana Department of Natural Resources (LDNR, LADNR) by creating the Office of Coastal Restoration and Management.

Local governments (parishes) may assume management of uses of local concern by developing a local coastal program consistent with the State CZM plan. The State of Louisiana has 11 approved local coastal management programs (Calcasieu, Cameron, Jefferson, Lafourche, Orleans, St. Bernard, St. James, St. John the Baptist, Plaquemines, Terrebonne, and St. Tammany Parishes). Eight other programs (Assumption, Iberia, Livingston, St. Charles, St. Martin, St. Mary, Tangipahoa, and Vermilion Parishes) have not been formally approved by NOAA. The parish planning and/or permits offices often serve as the permitting agency for projects limited to local concern. Parish-level programs, in addition to issuing permits for uses of local concern, also function as a commenting agency to Louisiana's CZM agency, the Coastal Management Division, regarding permitting of uses of State concern.

Appendix C2 of the LCRP outlines the rules and procedures for the State's local coastal management programs. Under the LCRP, parishes are authorized, though not required, to develop local coastal management programs. Approval of these programs gives parishes greater authority in regulating coastal development projects that entail uses of local concern. Priorities, objectives, and policies of local land use plans must be consistent with the policies and objectives of Act 361, the LCRP, and the State guidelines, except for a variance adopted in Section IV.D. of Appendix C2 of the LCRP. The Secretaries of DNR and Wildlife and Fisheries may jointly rule on an inconsistent local program based on local environmental conditions or user practices. State and Federal agencies review parish programs before they are adopted.

The coastal use guidelines are based on seven general policies. State concerns that could be relevant to an OCS lease sale and its possible direct effects or associated facilities and nonassociated facilities are (a) any dredge and fill activity that intersects more than one water body, (b) projects involving the use of State-owned lands or water bottoms, (c) national interest projects, (d) pipelines, and (e) energy facility siting and development. Some coastal activities of concern that could be relevant to a lease sale include wetland loss due to channel erosion from OCS traffic; activities near reefs and topographic highs; activities that might affect endangered, threatened, or commercially valuable wildlife; and potential socioeconomic impacts due to offshore development. Secondary and cumulative impacts to coastal resources such as onshore facility development, cumulative impacts from infrastructure development, salt intrusion along navigation channels, etc. are also of particular concern.

Effective August 1993, the DNR Coastal Management Division required that any entity applying for permits to conduct activities along the coast must notify the landowner of the proposed activity. An affidavit must also accompany any permit application. Through this regulation, the State strives to minimize coastal zone conflicts.

The MMS and the State of Louisiana are currently working to revise CZM consistency information for OCS plans, permits, and licenses to conform to the revised CZM regulations that were effective January 8, 2001, and have also incorporated streamlining improvements into the latest NTL (NTL 2002-G08). The State of Louisiana requires an adequate description, objective, and schedule for the project. Also, the State requires site-specific information on the onshore support base, support vessels, shallow hazards, oil-spill response, wastes and discharges (including any disposal of wastes within the State coastal zone and waters and municipal, parish, or State facilities to be used), transportation activities, air emissions, and secondary and cumulative impacts; and a Federal consistency certification, assessment, and findings. An Internet web site for applicable Louisiana State fees for plan and permit applications is also included in the NTL. The State requirements for Federal consistency review are based specifically on DOI's operating regulations at 30 CFR 250 and 30 CFR 254 and NOAA's Federal consistency regulations at 15 CFR 930. The MMS is continuing a dialogue with the State of Louisiana on Federal

consistency review of pipelines and other permits, and the result of these discussions will be incorporated into future updates of MMS's NTL's and/or permitting procedures.

## State of Mississippi Coastal Program

The Mississippi Coastal Program (MCP) is administered by the Mississippi Department of Marine Resources. The MCP is built around 10 enforceable goals that promote comprehensive management of coastal resources and encourage a balance between environmental protection/preservation and development in the coastal zone. The primary coastal management statute is the Coastal Wetlands Protection Law. Other major features of the MCP include statutes related to fisheries, air and water pollution control, surface and groundwater, cultural resources, and the disposal of solid waste in marine waters. The Department of Marine Resources, the Department of Environmental Quality, and the Department of Archives and History are identified collectively as the "coastal program agencies." Mississippi manages coastal resources by regulation and by promoting activities that use resources in compliance with the MCP. The State developed a coastal wetlands use plan, which includes designated use districts in coastal wetlands and Special Management Area Plans that steer development away from fragile coastal resources and help to resolve user conflicts.

For the purposes of the coastal program, the coastal zone encompasses the three coastal counties of Hancock, Harrison, and Jackson and all coastal waters. The Mississippi coast has 594 km of shoreline, including the coastlines of offshore barrier islands (Cat, Ship, Horn, and Petit Bois Islands). According to NOAA, there are no approved local coastal management plans for the State of Mississippi. The Southern Mississippi Planning and Development District serves in an advisory capacity to the State coastal agencies.

The MMS developed coordination procedures with the State for submittal of offshore lease sale consistency determinations and plans of operation. The MMS and the State of Mississippi have revised CZM consistency information for OCS plans, permits and licenses to conform to the revised CZM regulations that were effective January 8, 2001, and have also incorporated streamlining improvements into the latest NTL (NTL 2002-G08). The State of Mississippi requires an adequate description, objective, and schedule for the project; site-specific information on the onshore support base, support vessels, shallow hazards, oil-spill response, wastes and discharges, transportation activities, and air emissions; and a Federal consistency certification, assessment, and findings. The State requirements for Federal consistency review are based specifically on DOI's operating regulations at 30 CFR 250 and 30 CFR 254 and NOAA's Federal consistency requirements at 15 CFR 930. The MMS is continuing a dialogue with the State of Mississippi on Federal consistency review of pipelines and other permits, and the result of these discussions will be incorporated into future updates of MMS's NTL's and/or permitting procedures.

## State of Alabama Coastal Area Management Program

The Alabama Coastal Area Act (AACA) provides statutory authority to review all coastal resource uses and activities that have a direct and significant effect on the coastal area. The Alabama Department of Conservation and Natural Resources (ADCNR) Lands Division, Coastal Section Office, the lead coastal management agency, is responsible for the management of the State's coastal resources through the Alabama Coastal Area Management Program (ACAMP). The ADCNR is responsible for the overall management of the program including fiscal and grants management and public education and information. The department also provides planning and technical assistance to local governments and financial assistance to research facilities and units of local government when appropriate.

The Alabama Department of Environmental Management (ADEM) is responsible for coastal area permitting, regulatory and enforcement functions. Most programs of ADCNR Coastal Section that require environmental permits or enforcement functions are carried out by the ADEM. The ADEM has the responsibility of all permit, enforcement, regulatory, and monitoring activities, and the adoption of rules and regulations to carry out the ACAMP. The ADEM must identify specific uses or activities that require a State permit to be consistent with the coastal policies noted above and the more detailed rules and regulations promulgated as part of the ACAMP. Under the ACAA, State agency activities must be consistent with ACAMP policies and ADEM findings. Further, ADEM must make a direct permit-type review for uses that are not otherwise regulated at the State level. The ADEM also has authority to

review local government actions and to assure that local governments do not unreasonably restrict or exclude uses of regional benefit. Ports and major energy facilities are designated as uses of regional benefit. The ADCNR Lands Division manages all lease sales of State, submerged bottomlands and regulates structures placed on State, submerged bottomlands.

Local governments have the option to participate in the ACAMP by developing local codes, regulations, rules, ordinances, plans, maps, or any other device used to issue permits or licenses. If these instruments are certified to be consistent with ACAMP, ADEM may allow the local government to administer them by delegating its permit authority, thereby eliminating the need for ADEM's case-by-case review.

The South Alabama Regional Planning Commission provides ongoing technical assistance to ADCNR for Federal consistency, clearinghouse review, and public participation procedures. Uses subject to the Alabama's CZMP are divided into regulated and nonregulated categories. Regulated uses are those that have a direct and significant impact on the coastal areas. These uses either require a State permit or are required by Federal law to be consistent with the management program. Uses that require a State permit must receive a certificate of compliance. Nonregulated uses are those activities that have a direct and significant impact on the coastal areas that do not require a State permit or Federal consistency certification. Nonregulated uses must be consistent with ACAMP and require local permits to be administered by ADEM.

The MMS developed coordination procedures with the State for submittal of offshore lease sale consistency determinations and plans of operation. The MMS and the State of Alabama have revised CZM consistency information for OCS plans, permits and licenses to conform to the revised CZM regulations that were effective January 8, 2001, and have also incorporated streamlining improvements into the latest NTL, NTL 2002-G08. The State of Alabama requires an adequate description, objective, and schedule for the project; site-specific information on the onshore support base, support vessels, shallow hazards, oil-spill response, wastes and discharges, transportation activities, and air emissions; and a Federal consistency certification, assessment, and findings. An Internet website for applicable Alabama State fees for plan and permit applications is also included in the NTL. The State's requirements for Federal consistency review are based specifically on DOI's operating regulations at 30 CFR 250 and 30 CFR 254 and NOAA's Federal consistency requirements at 15 CFR 930. The MMS is continuing a dialogue with the State of Alabama on Federal consistency review of pipelines and other permits, and the result of these discussions will be incorporated into future updates of MMS's NTL's and/or permitting procedures.

## State of Florida Coastal Management Program

For purposes of the CZMA, the State of Florida's coastal zone includes the area encompassed by the State's 67 counties and its territorial seas. Lands owned by the Federal Government and the Seminole and Miccosukee Indian tribes are not included in the State's coastal zone; however, Federal activities in or outside the coastal zone, including those on Federal or tribal lands, that affect any land or water or natural resource of the State's coastal zone are subject to review by Florida under the CZMA. The Florida Coastal Management Act, codified as Chapter 380, Part II, Florida Statutes, authorized the development of a coastal management program, and in 1981 the Florida Coastal Management Program (FCMP) was approved by NOAA.

The enforceable policies of the FCMP are the 23 chapters of the Florida Statutes that NOAA approved for incorporation in the State's program. With the exception of 2002 legislative amendments to the Florida Coastal Management Act, Chapter 380, Part II, F.S., and Section 403.061, F.S., the 1998 Florida Statutes are the most recent version approved by NOAA. In August 2002, the State submitted a Routine Program Change request to NOAA to update and incorporate the 1999 statutes in the FCMP. Routine Program Change requests to update the FCMP with 2000-2002 statutes should be completed by mid-2003.

A network of eight State agencies and five regional water management districts implement the FCMP's 23 statutes. The water management districts are responsible for water quantity and quality throughout the State's watersheds. The State agencies include the following: the Department of Environmental Protection, the lead agency for the FCMP and the State's chief environmental regulatory agency and steward of its natural resources; the Department of Community Affairs, which serves as the State's land planning and emergency management agency; the Department of Health, which, among other

responsibilities, regulates on-site sewage disposal; the Department of State, Division of Historical Resources, which protects historic and archaeological resources; the Fish and Wildlife Conservation Commission, which protects and regulates fresh and saltwater fisheries, marine mammals, and birds and upland species, including protected species and the habitat used by these species; the Department of Transportation, which is charged with the development, maintenance, and protection of the transportation system; the Department of Agriculture and Consumer Services, which manages State forests and administers aquaculture and mosquito control programs; and the Governor's Office of Planning and Budget, which plays a role in the comprehensive planning process.

Effective July 1, 2000, the Florida Governor assigned the State's responsibilities under the Outer Continental Shelf Lands Act (43 U.S.C.) to the Secretary of the Florida Department of Environmental Protection (DEP). The DEP's Office of Intergovernmental Programs coordinates the review of OCS plans with FCMP member agencies to ensure that the plan is consistent with applicable State enforceable policies and the Governor's responsibilities under the Act.

Over the past year, MMS consulted with the State to revise and clarify CZM consistency information requirements for OCS plans, permits, and licenses to conform to the revised CZMA regulations that went into effect January 8, 2001. These requirements will be incorporated into the latest NTL (NTL 2002-G08). The State of Florida requires an adequate description, objective, and schedule for all activities associated with a project; specific information on the natural resources potentially affected by the proposed activities; and specific information on onshore support base, support vessels, shallow hazards, oil spill response, wastes and discharges, transportation activities, air emissions; and a Federal consistency certification, assessment, and findings. These requirements have been incorporated into the Plans and Regional Oil-Spill Response NTL's. The State requirements for Federal consistency review are based on the requirements of State statutes, CZMA regulations at 15 CFR 930, and the Department of the Interior's operating regulations at 30 CFR 250 and 30 CFR 254. The MMS is continuing a dialog with the State of Florida on Federal consistency review of OCS plans, pipelines and other permits; the result of these discussions will be incorporated into future updates of MMS's NTL's and/or permitting procedures.

# APPENDIX C

# RECENT PUBLICATIONS OF THE ENVIRONMENTAL STUDIES PROGRAM, GULF OF MEXICO REGION, 1999-2002

# C. RECENT PUBLICATIONS OF THE ENVIRONMENTAL STUDIES PROGRAM, GULF OF MEXICO REGION, 1999-2002

| Study Number | Title |
|---|---|
| 2002-077 | *Offshore Petroleum Platforms: Functional Significance for Larval Fish Across Longitudinal and Latitudinal Gradients* |
| 2002-073 | *Emissions Inventories of OCS Production and Development Activities in the Gulf of Mexico; Final Report* |
| 2002-072 | *Effects of the Oil and Gas Industry on Commuting and Migration Patterns in Louisiana: 1960-1990* |
| 2002-064 | *Lagrangian Study of Circulation, Transport, and Vertical Exchange in the Gulf of Mexico* |
| 2002-063 | *Deepwater Program: Northern Gulf of Mexico Continental Slope Habitats and Benthic Ecology; Year 2: Interim Report* |
| 2002-055 | *Northeastern Gulf of Mexico Chemical Oceanography and Hydrography Study; Synthesis Report* |
| 2002-054 | *Socioeconomic Baseline Study for the Gulf of Mexico, Final Report: Description of the Dataset, 1930-1990* |
| 2002-044<br>2002-045<br>2002-046 | *Boating Uses, Economic Significance, and Information Inventory for North Carolina's Offshore Area, "The Point" — Volume I: Characterization of Recreational and Commercial Fisheries; Volume II: Economic Analysis of "The Point" and Adjacent Counties – Baseline Information, Valuation, and Potential Impacts; and Volume III: Data Inventory Related to the Hatteras Middle Slope Area Bibliography* |
| 2002-038 | *Outer Continental Shelf Pipelines Crossing the Louisiana Coastal Zone: A Geographic Information System Approach; Final Report* |
| 2002-035<br>2002-036 | *Stability and Change in Gulf of Mexico Chemosynthetic Communities — Volume I: Executive Summary and Volume II: Technical Report* |
| 2002-028 | *Observation of the Atmospheric Boundary Layer in the Western and Central Gulf of Mexico; Final Performance Report* |
| 2002-024<br>2002-025<br>2002-026 | *Socioeconomic Baseline and Projections of the Impact of an OCS Onshore Base for Selected Florida Panhandle Communities — Volume I: Final Report; Volume II: Technical Description of the MMS Florida Panhandle Model; and Volume III: User's Guide for the Model* |
| 2002-022<br>2002-023 | *Social and Economic Impacts of Outer Continental Shelf Activity on Individuals and Families — Volume I: Final Report and Volume II: Case Studies of Morgan City and New Iberia, Louisiana* |
| 2002-011 | *Socioeconomic and Environmental Issues Analysis of Oil and Gas Activity on the Outer Continental Shelf of the Western Gulf of Mexico; Final Report* |
| 2002-010 | *Economic Impact of Recreational Fishing and Diving Associated with Offshore Oil and Gas Structures in the Gulf of Mexico; Final Report* |
| 2002-009 | *Effects of Simultaneous Exposure to Petroleum Hydrocarbons, Hypoxia, and Prior Exposure on the Tolerance and Sublethal Responses of Marine Animals: Blue Crabs and Killifish; Final Report* |
| 2002-004 | *Proceedings: Gulf of Mexico Fish and Fisheries; Bringing Together New and Recent Research, October 2000* |
| 2001-102 | *Surface Circulation and the Transport of the Loop Current in the Northeastern Gulf of Mexico; Final Report* |
| 2001-101 | *Long-term Monitoring at the East and West Flower Garden Banks National Marine Sanctuary, 1998-1999* |
| 2001-095 | *Management Applicability of Contemporary Deep-Sea Ecology and Reevaluation of Gulf of Mexico Studies* |

| Study Number | Title |
|---|---|
| 2001-094 | *Survival of a Hydrocarbon-Utilizing Bacterium when Introduced into Native and Foreign Environments* |
| 2001-093 | *Velocity and Transport Characteristics of the Louisiana-Texas Coastal Current during 1994* |
| 2001-091 | *Deepwater Program: Northern Gulf of Mexico Continental Slope Habitats and Benthic Ecology; Year 1: Interim Report* |
| 2001-082 | *Proceedings: Twentieth Annual Gulf of Mexico Information Transfer Meeting, December 2000* |
| 2001-081 | *Proceedings: Nineteenth Annual Gulf of Mexico Information Transfer Meeting, November 30 – December 2, 1999* |
| 2001-080 | *Mississippi/Alabama Pinnacle Trend Ecosystem Monitoring; Final Synthesis Report* |
| 2001-078 | *How Does Produced Water Cause a Reduction in the Genetic Diversity of Harpacticoid Copepods?; Final Report* |
| 2001-077 | *Across-Shelf Larval, Postlarval, and Juvenile Fish Collected at Offshore Oil and Gas Platforms and a Coastal Rock Jetty West of the Mississippi River Delta* |
| 2001-066 | *Chemistry in the Gulf of Mexico--An Informative Poster and Teacher's Companion* |
| 2001-065 | *The Deep Sea Gulf of Mexico: An Overview and Guide* |
| 2001-064 | *Deepwater Physical Oceanography Reanalysis and Synthesis of Historical Data; Synthesis Report* |
| 2001-063 | *Spatial and Temporal Variability of Plankton Stocks on the Basis of Acoustic Backscatter Intensity and Direct Measurements in the Northeastern Gulf of Mexico; Final Report* |
| 2001-062 | *Management of the MMS-LSU Coastal Marine Institute: A Report of the First Six Years, 1992-1998* |
| 2001-057 | *Investigation of Pressure and Pressure Gradients along the Louisiana/Texas Inner Shelf and Their Relationships to Wind Forcing and Current Variability* |
| 2001-054 | *Dispersion in Broad, Shallow Estuaries: A Model Study* |
| 2001-052 | *Air Quality: User's Guide for the Gulfwide Offshore Activities Data System (GOADS); Final Report* |
| 2001-050 | *Improved Geohazards and Benthic Habitat Evaluations: Digital Acoustic Data with Ground Truth Calibrations; Final Report* |
| 2001-039 | *Gulf of Mexico Marine Protected Species Workshop, June 1999* |
| 2001-026<br>2001-027 | *Assessment of Historical, Social, and Economic Impacts of OCS Development on Gulf Coast Communities — Volume I: Executive Summary and Volume II: Narrative Report* |
| 2001-025 | *Wind and Eddy-Related Circulation on the Louisiana/Texas Shelf and Slope Determined from Satellite and In-Situ Measurements: October 1993-August 1994* |
| 2001-021 | *Workshop on the Physical Oceanography Slope and Rise of the Gulf of Mexico, September 2000* |
| 2001-020 | *Lafourche Parish and Port Fourchon, Louisiana: Effects of the Outer Continental Shelf Petroleum Industry on the Economy and Public Services, Part 2* |
| 2001-019 | *Lafourche Parish and Port Fourchon, Louisiana: Effects of the Outer Continental Shelf Petroleum Industry on the Economy and Public Services, Part 1* |
| 2001-013 | *Forecasting the Number of Offshore Platforms on the Gulf of Mexico OCS to the Year 2023* |
| 2001-012<br>2001-011 | *Deepwater Program: Literature Review, Environmental Risk of Chemical Products Used in Gulf of Mexico Deepwater Oil and Gas Operations — Volume I: Technical Report and Volume II: Appendices* |
| 2001-004 | *Fate and Effects of Barium and Radium-Rich Fluid Emissions from Hydrocarbon Seeps on the Benthic Habitats of the Gulf of Mexico Offshore Louisiana* |
| 2000-087 | *Estimation of Fisheries Impacts Due to Underwater Explosions Used to Sever and Salvage Oil and Gas Platforms in the U.S. Gulf of Mexico; Final Report* |

| Study Number | Title |
|---|---|
| 2000-086 | *Studying and Verifying the Use of Chemical Biomarkers for Identifying and Quantitating Oil Residues in the Environment* |
| 2000-083 | *Effects of Oil and Gas Development: A Current Awareness Bibliography* |
| 2000-081 | *User's Guide for the Breton Offshore Activities Data System (BOADS) for Air Quality; Final Report* |
| 2000-079<br>2000-080 | *DeSoto Canyon Eddy Intrusion; Final Report — Volume I: Executive Summary and Volume II: Technical Report* |
| 2000-078 | *Northeastern Gulf of Mexico Chemical Oceanography and Hydrography Study; Annual Report: Year 3* |
| 2000-075 | *Meteorology of the Northeastern Gulf of Mexico: Data from 1995 to 1997; Final Report* |
| 2000-074 | *Physical/Biological Oceanographic Integration Workshop for the DeSoto Canyon and Adjacent Shelf, October 19-21, 1999* |
| 2000-065 | *Coastal Alabama Offshore Natural Gas Economic Projection Model* |
| 2000-064 | *Environmental Impacts of Synthetic-Based Drilling Fluids* |
| 2000-060 | *Biodegradation of Aromatic Heterocycles from Petroleum-Produced Water and Pyrogenic Sources in Marine Sediments; Final Report* |
| 2000-053 | *Wave Climate and Bottom Boundary Layer Dynamics with Implications for Offshore Sand Mining and Barrier Island Replenishment in South-Central Louisiana* |
| 2000-049<br>2000-050 | *Deepwater Gulf of Mexico Environmental and Socioeconomic Data Search and Literature Synthesis — Volume I: Technical Narrative and Volume II: Annotated Bibliography* |
| 2000-045 | *Dynamic Height and Seawater Transport across the Texas-Louisiana Shelf Break; Final Report* |
| 2000-044 | *Economic Effects of Coastal Alabama and Destin Dome Offshore Natural Gas Exploration, Development, and Production* |
| 2000-042 | *Potential for Accelerated Bioremediation and Restoration of Oil-Impacted Marshes through the Selection of Superior Oil-Tolerant Vegetation* |
| 2000-030 | *Proceedings: Eighteenth Annual Gulf of Mexico Information Transfer Meeting, December 1998* |
| 2000-028 | *Remote Sensing Study of Upwelling in the Northeastern Gulf of Mexico and the Effects of Hurricanes Earl and Georges; Annual Report: Year 2* |
| 2000-027 | *Gulf-wide Information System (GWIS)* |
| 2000-017 | *Oceanic Gas Hydrate Research and Activities Review* |
| 2000-014 | *Air Quality and Dispersion Meteorology over the Northeastern Gulf of Mexico: Measurements, Analyses, and Syntheses* |
| 2000-009 | *Observation of the Atmospheric Boundary Layer in the Western and Central Gulf of Mexico, Second Annual Report* |
| 2000-005 | *Seasonal and Spatial Variation in the Biomass and Size Frequency Distribution of Fish Associated with Oil and Gas Platforms in the Northern Gulf of Mexico* |
| 2000-002<br>2000-003<br>2000-004 | *Cetaceans, Sea Turtles, and Seabirds in the Northern Gulf of Mexico: Distribution, Abundance, and Habitat Associations — Volume I: Executive Summary; Volume II: Technical Report; and Volume III: Data Appendix* |
| 99-0063<br>99-0064 | *Stakeholders' Issues in the Eastern Gulf of Mexico Volume I: Technical Report and Volume II: Annotated Bibliography* |
| 99-0060 | *Effect of Produced-Water Discharge on Bottom Sediment Chemistry; Final Report* |
| 99-0055 | *Northeastern Gulf of Mexico Coastal and Marine Ecosystem Program Ecosystem Monitoring, Mississippi/Alabama Shelf; Third Annual Interim Report* |
| 99-0054 | *Northeastern Gulf of Mexico Chemical Oceanography and Hydrography; Annual Report: Year 2* |
| 99-0051 | *DeSoto Canyon Eddy Intrusion Study; Annual Report: Year 3* |
| 99-0050 | *Northeastern Gulf of Mexico Coastal Characterization and Data Information Management System* |

| Study Number | Title |
|---|---|
| 99-0049 | *Coastal Upwelling and Mass Mortalities of Fishes and Invertebrates in the Northeastern Gulf of Mexico during Spring and Summer 1998; Final Report* |
| 99-0042 | *Proceedings: Seventeenth Annual Gulf of Mexico Information Transfer Meeting, December 1997* |
| 99-0037 | *Development and Characterization of Sea Anemones as Bioindicators of Offshore Resource Exploitation and Environmental Impact* |
| 99-0033 | *User's Guide for the Breton Offshore Activities Data System (BOADS) for Air Quality; Interim Report* |
| 99-0031 | *History of Coastal Alabama Natural Gas Exploration and Development; Final Report* |
| 99-0028 | *Economic and Social Consequences of the Oil Spill in Lake Barre, Louisiana* |
| 99-0005 | *Long-Term Monitoring at the East and West Flower Garden Banks 1996-1997* |
| 99-0004 | *Ecology of Live Bottom Habitats of the Northeastern Gulf of Mexico: A Community Profile* |
| 99-0001 | *Development and Application of the Sublethal Toxicity Test to PAH Using Marine Harpacticoid Copepods* |

# APPENDIX D
# CONSULTATIONS

# SECTION 7 CONSULTATIONS

**United States Department of the Interior**

MINERALS MANAGEMENT SERVICE
Washington, DC 20240

OCT 11 2002

Memorandum

To: Assistant Director for Endangered Species
U.S. Fish and Wildlife Service

From: Thomas A. Readinger
Associate Director for Offshore Minerals Management

Subject: Endangered Species Act (ESA), Section 7, Consultation Request for Proposed Eastern Gulf of Mexico (GOM) Lease Sales 189 and 197

The Minerals Management Service is preparing an Environmental Impact Statement for proposed Eastern Gulf of Mexico Oil and Gas Lease Sales 189 and 197, planned for December 2003 and 2005 respectively. Under section 7(a)(2) of the Endangered Species Act, the MMS requests formal consultation with U.S. Fish and Wildlife Service on these proposed sales. The consultation should address all aspects of oil and gas exploration, development, production, and decommissioning.

We request that the consultation be concluded within 90 days of initiation as provided for in 50 CFR §402.14(e). Unless you provide notice of missing data within 30 days of receiving this request, we will assume the consultation is initiated upon receiving this request. We also ask for a draft biological opinion and incidental take statement for our review by the end of the 90-day period. This should allow you to deliver a final biological opinion to the MMS within 45 days after concluding the consultation as provided for in 50 CFR §402.14(e). If you require an extension to the regulatory time frames referenced above, please provide a written request as specified in 50 CFR§402.14(e).

Additionally, if you consider recommending measures to minimize impacts to threatened and endangered species or determine a jeopardy situation may exist for all or any part of the proposed action, we ask that you notify us as early as possible, according to 50 CFR 402.14(g)(5), to allow our staff time to jointly discuss the findings. We believe that such discussions will facilitate the consultation and ensure effective protection of listed species. These discussions can also ensure that any proposed alternatives are within our authority to control and implement, and are feasible, appropriate, and effective. We understand that when the FWS issues a biological opinion for the proposed oil and gas lease sales in the Eastern GOM, the FWS does not relinquish the opportunity to reconsider and modify that opinion.

We are attaching the draft EIS for your review. The draft contains information on the anticipated composition, procedures, execution, and effects of the proposed Eastern GOM oil and gas lease sale. The draft EIS also contains data from and analysis of the Oil Spill Risk Assessment. The

20 Years of Service to America MMS Minerals Management Service 1982-2002

OSRA examines the possible occurrence and contact of hypothetical oil spills if leases are issued and commercial quantities of oil are found and produced from the proposed Eastern GOM lease sales. We are also providing a copy of the draft OSRA Report for your information. To facilitate a timely beginning and completion of this consultation, we are sending copies of this letter and attachment to the FWS Southeastern Regional Director in Atlanta, Georgia, and the FWS Ecological Services Field Office in Panama City, Florida.

If you have any questions on this consultation, please address them to Ms. Judy Wilson, Minerals Management Service, Mail Stop 4042, 381 Elden Street, Herndon, Virginia 20170-4817 (commercial and FTS telephone: (703) 787-1075), or Mr. Jeff Childs, Minerals Management Service, Gulf of Mexico Region, Mail Stop 5432, 1201 Elmwood Park Boulevard, New Orleans, Louisiana 70123-2394 (commercial and FTS telephone: (504) 736-2766).

Attachments

cc: Mr. Sam Hamilton
Regional Director
Southeastern Regional Office
U.S. Fish and Wildlife Service
1875 Century Boulevard
Atlanta, Georgia 30345

Ms. Lorna Patrick
Ecological Services Field Office
U.S. Fish and Wildlife Service
1612 June Avenue
Panama City, Florida 32405

**United States Department of the Interior**

MINERALS MANAGEMENT SERVICE
Washington, DC 20240

OCT 11 2002

Mr. Donald Knowles
Director, Office of Protected Resources
NOAA Fisheries
1335 East-West Highway, Room 13821
Silver Spring, Maryland 20910

Dear Mr. Knowles:

The Minerals Management Service is preparing an Environmental Impact Statement for proposed Eastern Gulf of Mexico Oil and Gas Lease Sales 189 and 197, planned for December 2003 and 2005 respectively. Under section 7(a)(2) of the Endangered Species Act, the MMS requests formal consultation with NOAA Fisheries on these proposed sales. The consultation should address all aspects of oil and gas exploration, development, production, and decommissioning.

We request that the consultation be concluded within 90 days of initiation as provided for in 50 CFR §402.14(e). Unless you provide notice of missing data within 30 days of receiving this request, we will assume the consultation is initiated upon receiving this request. We also ask for a draft biological opinion and incidental take statement for our review by the end of the 90-day period. This should allow you to deliver a final biological opinion to the MMS within 45 days after concluding the consultation as provided for in 50 CFR §402.14(e). If you require an extension to the regulatory time frames referenced above, please provide a written request as specified in 50 CFR§402.14(e).

Additionally, if you consider recommending measures to minimize impacts to threatened and endangered species or determine a jeopardy situation may exist for all or any part of the proposed action, we ask that you notify us as early as possible, according to 50 CFR 402.14(g)(5), to allow our staff time to jointly discuss the findings. We believe that such discussions will facilitate the consultation and ensure effective protection of listed species. These discussions can also ensure that any proposed alternatives are within our authority to control and implement, and are feasible, appropriate, and effective. We understand that when NOAA Fisheries issues a biological opinion for these proposed Eastern GOM oil and gas lease sales, you do not relinquish the opportunity to reconsider and modify that opinion.

We are enclosing the draft EIS for your review. The draft contains information on the anticipated composition, procedures, execution, and effects of the proposed Eastern GOM oil and gas lease sales. The draft EIS also contains data from and analysis of the Oil Spill Risk Assessment. The OSRA examines the possible occurrence and contact of hypothetical oil spills if leases are issued and commercial quantities of oil are found and produced from the proposed Eastern GOM lease sales. We are also providing a copy of the draft OSRA Report for

your information. To facilitate a timely beginning and completion of this consultation, we are sending a copy of this letter and enclosures to the NOAA Fisheries Southeast Regional Director in St. Petersburg, Florida.

If you have any questions on this consultation, please address them to Ms. Judy Wilson, Minerals Management Service, Mail Stop 4042, 381 Elden Street, Herndon, Virginia 20170-4817 (commercial and FTS telephone: (703) 787-1075), or Mr. Jeff Childs, Minerals Management Service, Gulf of Mexico Region, Mail Stop 5432, 1201 Elmwood Park Boulevard, New Orleans, Louisiana 70123-2394 (commercial and FTS telephone: (504) 736-2766).

Sincerely,

Thomas A. Readinger
Associate Director for
Offshore Minerals Management

Enclosures

cc: Mr. Charles Oravetz
Regional Administrator
Southeastern Regional Office
National Marine Fisheries Service
9721 Executive Center Drive
St. Petersburg, Florida 33702

# ESSENTIAL FISH HABITAT CONSULTATION

United States Department of the Interior

MINERALS MANAGEMENT SERVICE
Gulf of Mexico OCS Region
1201 Elmwood Park Boulevard
New Orleans, Louisiana 70123-2394

In Reply Refer To: MS 5430

SEP 2 0 2002

Dr. Andreas Mager, Jr.
Southeast Regional Office
National Oceanic and Atmospheric Administration
9721 Executive Center Drive, North
St. Petersburg, Florida 33702

Dear Dr. Mager:

The Magnuson-Stevens Fishery Conservation and Management Act requires Federal Agency consultation on any activity that may adversely effect Essential Fish Habitat (EFH). Implementing regulations provide for consultation to be conducted programmatically when the National Oceanic and Atmospheric Administration Fisheries (NOAA Fisheries) determines that potential effects on EFH can be addressed for all projects at a program level. Programmatic consultations provide a mechanism to minimize or reduce the need for numerous project-specific consultations. The Minerals Management Service (MMS) has previously entered into a programmatic consultation agreement with NOAA Fisheries for the Central Planning Area (CPA) and Western Planning Areas (WPA) in August 1999. This Programmatic-Level Agreement has been very effective in reducing previously large numbers of coordination efforts between our agencies, but this level of consultation has not previously included the Eastern Planning Area (EPA).

The NOAA Fisheries has also consulted utilizing MMS National Environmental Policy Act (NEPA) documents such as our recent multisale Environmental Impact Statement (EIS) for the CPA and WPA considering broader-scale issues such as Lease Stipulations. The MMS wishes to combine both levels of consultation in a single process using our multisale EIS. By using this technique, our multisale EIS will be reviewed on a 5-year cycle as a means to provide both generic and specific EFH conservation recommendations.

At this time, MMS is requesting consultation at both levels. First, we request your review of the enclosed EIS that provides the EFH Assessment information as required under 50 CFR 600.920(g) for upcoming lease sales and subsequent post lease activity for the next 5 years in the EPA, previously referred to as Lease Area 181. This consultation could be considered already accomplished with the Lease Sale 181 EIS consultation recommendations, but this EIS covers multiple years and it seems preferable to renew the consultation decision on this time frame consistent with the CPA and WPA.

We also request an amendment of the existing Programmatic Consultation Agreement to include this same area of the EPA now available for leasing. We are not including other areas of the eastern Gulf of Mexico at this time. As requested, this letter of request will stand alone to serve as the request for amendment. The original Programmatic Consultation EFH Assessment is hereby incorporated, in its

entirety by reference (attachment to the MMS letter dated, June 4, 1999). The following supplement to the referenced EFH Assessment for Programmatic Consultation follows below:

**Proposed Action:** This amendment would include lease sales and subsequent oil and gas activities in Lease Blocks 256 located in the EPA. The area includes about 1.5 million acres located 70 miles from Louisiana, 98 miles from Florida, 93 miles from Alabama, and 100 miles from Florida in water depths ranging from 1,600 to 3,000 meters. This amendment addresses pipeline rights-of-way, plans for exploration and production, and platform removal.

**Analysis of Effects:** There are no topographic features, pinnacle features, or known chemosynthetic communities in this EPA lease area. The nearest significant live bottom in the eastern Gulf is the Florida Middle Grounds, Habitat Area of Particular Concern, which lies approximately 190 miles east of the lease area. The lease area extends only 30 miles to the east from lease blocks that are part of the CPA. Analysis of effects would be consistent with the referenced EFH Assessment with consideration that no sensitive biological features occur within or near the area considered for this amendment.

**MMS's Views:** Consistent with the referenced 1999 EFH Assessment, it is expected that any marine environmental degradation associated with proposed activities in the active EPA would have negligible impact and result in an undetectable decrease in fish populations or EFH. As concluded in the referenced EFH Assessment, low-relief mud bottoms would not be adversely impacted by activities subject to this consultation.

**Mitigation Measures:** The Topographic Features Stipulation and Live Bottom (Pinnacle Trend) Stipulation would not apply in the current lease area of the eastern Gulf. Although the Live bottom (Low-Relief) stipulation does apply to the EPA, the water depths of the area (shallowest 1,600 meters) precludes consideration of this stipulation. Regardless, biological reviews will be performed by MMS on all pipeline applications and all plans of exploration and development due to the potential for undiscovered chemosynthetic communities. These reviews will also consider protection of deepwater hard-bottom features that could support high density communities similar in nature to "live bottoms" on the Continental Shelf.

We look forward to completing this EIS consultation and request for amendment to our Programmatic Consultation. If you have any questions or wish to discuss specific issues, please contact Mr. Gregory Boland, Biological Sciences Unit, at (504) 736-2740.

Sincerely,

Chris C. Oynes

Chris C. Oynes
Regional Director

Enclosure

**UNITED STATES DEPARTMENT OF COMMERCE**
**National Oceanic and Atmospheric Administration**
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
9721 Executive Center Drive N.
St. Petersburg, Florida 33702

November 19, 2002



Mr. Chris C. Oynes
Regional Director
Minerals Management Service
Gulf of Mexico OCS Region
1201 Elmwood Park Boulevard
New Orleans, Louisiana 70123

Dear Mr. Oynes:

The National Marine Fisheries Service (NMFS) has received the Minerals Management Service (MMS) letter of September 20, 2002, initiating Essential Fish Habitat (EFH) consultation for activities associated with Gulf of Mexico (GOM) Eastern Planning Area (EPA) Lease Sales 189 and 197 included in the *Outer Continental Shelf Oil and Gas Leasing Program: 2002-2007* (the 5-Year Program). By your letter, the MMS also is requesting an amendment of the 1999 EFH Programmatic Consultation Agreement (PCA) between NMFS and MMS. These EFH consultation requests were made pursuant to the Magnuson-Stevens Fishery Conservation and Management Act and its implementing regulations.

**GOM Outer Continental Shelf (OCS) Oil and Gas Lease Sales 189 and 197**

The proposed Federal actions addressed in the 5-Year Program are for two oil and gas lease sales in the EPA of the GOM. The Draft Environmental Impact Statement (DEIS) has been prepared in support of two proposed Lease Sales 189 and 197. Under the 5-Year Program, proposed Lease Sale 189 is scheduled for 2003, while proposed Lease Sale 197 is scheduled for 2005. The purpose of the proposed Federal actions is to offer for lease Federal tracts that may contain economically recoverable oil and natural gas resources.

The area of the currently proposed lease sales falls within the westernmost portion of the area encompassed by the 2001 Lease Sale 181. The area includes 256 blocks covering 1.5 million acres in an area of the GOM which has water depths ranging from 1,600 to 3,000 meters. The DEIS includes the same detailed description of fishery resources and habitats and the same assessment of potential adverse impacts associated with development found in the Lease Sale 181 DEIS, previously reviewed and commented on by NMFS. Because there is no new information which would cause us to alter our past recommendations, we have no additional EFH Conservation Recommendations, specific to these lease sales, to offer.

**Amendment to the Essential Fish Habitat (EFH) Programmatic Consultation between National Marine Fisheries Service, Southeast Region and Minerals Management Service, Gulf of Mexico OCS Region**

MMS has requested an amendment of the 1999 EFH PCA to include this same 256-block area of the EPA now available for leasing, as described in the Final Environmental Impact Statement for EPA Lease Sale 181 and the DEIS for EPA Lease Sales 189 and 197. NMFS agrees with your proposal to amend the PCA. Because potential exploration and production activities, fishery resources, and categories of EFH are similar to those of the Central and Western Planning Areas, we are enclosing an addendum to the PCA. It does not appear that other changes to the 1999 document are necessary.

Because this letter does not substantially amend the agreements resulting from our previous EFH consultations, we assume that your reply will affirm your continued acceptance of appropriate EFH conservation measures. However, if MMS's response in inconsistent with our conservation recommendations, MMS must explain its reasons for not following the recommendations, including the scientific justification for any disagreements with NMFS over the anticipated effects of the proposed actions and the measures needed to avoid, minimize, mitigate, and offset such effects.

If MMS adopts the NMFS's recommendations contained herein, no further EFH consultation is required, except in those special cases described in the PCA as requiring project-specific consultation, where individual consultation has been specified. Additional portions of the GOM EPA may be considered for addition to this programmatic consultation at a date to be determined appropriate by both agencies.

Sincerely,

Andreas Mager, Jr.
Assistant Regional Administrator
Habitat Conservation Division

Enclosure

**ADDENDUM TO THE EFH 1999 PROGRAMMATIC CONSULTATION BETWEEN THE MMS AND NMFS**

1. The EFH Programmatic Consultation conducted during July and August 1999, is hereby amended to expand the geographic scope of the area covered to include the 256 blocks within the Eastern Planning Area encompassed by Lease Sales 189 and 197.

2. The EFH Conservation Recommendations contained in NMFS's letter of July 1, 1999, (with clarification provided by the August 12, 1999, MMS response) are amended to incorporate the negotiated outcome of the EFH consultation for Lease Sale 181.

Mitigation measures specified as part of the Proposed Action for Lease Sale 181 shall be implemented, as appropriate. These measures include the live bottom (low-relief), eastern Gulf pinnacle trend, and oil spill response stipulations, and are included by reference. While it is unlikely that live bottom or pinnacle trend features occur in the deepwater area subject to Lease Sales 189 and 197, incorporation of these measures is precautionary and could be applied if found appropriate in the future.

No activity, including structures, drilling rigs, pipelines, or anchoring shall be allowed within 500 feet ("No Activity Zone") of any formally authorized artificial reef located in or immediately adjacent to any of the 256 Eastern Planning Area blocks.