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## SYNOPSIS OF IMPACTS FROM THE 1985 GULF OF MEXICO HURRICANES

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### INTRODUCTION

In recent years, hurricanes have had a great impact on offshore oil development in addition to posing threats to residents of coastal regions and causing extensive economic damage. Hurricane Camille (1969) caused 262 deaths and record tidal surges of 22.9 ft. (6.9 m) in Mississippi. Three offshore platforms were affected; the first was completely destroyed, the second was severely damaged and removed from the offshore, and the third platform suffered damages but was repaired and reused in another area. The damage to these three platforms, plus 5,997 ft. (1,828 m) of pipelines, exceeded \$40 million.

Other hurricanes which have caused destruction to offshore development are as follows: Hurricane Hilda (1964) destroyed six platforms; Hurricane Carmen (1974) caused four pipeline breaks; Hurricane Eloise (1975) caused one pipeline break; and Hurricane Bob (1979) caused one pipeline break (DeWald, 1982).

### OVERVIEW OF 1985 HURRICANES

Tropical Storm Bob (July 1985) hit the Florida coast in the vicinity of Naples/Ft. Myers with 50 mph winds and heavy rains totaling 11 inches in a 24-hour period. No injuries were reported and only minor damage resulted to properties along the coast.

The southwest coast of Louisiana was hit by Hurricane Danny (August 1985) with gusts of winds reaching 100 mph. Flash floods, tornadoes, and power failures resulted which forced hundreds of people from low-lying homes. No deaths resulted from the storm.

The evacuation of more than 500,000 people from Louisiana to Florida was the result of Hurricane Elena (September 1985). Although she caused millions of dollars worth of property damage, no deaths or serious injuries resulted. Winds were recorded up to 125 mph, and at least 10 tornadoes were sighted.

Hurricane Juan (October/November 1985) intensified so quickly that the offshore oil and gas industry was unable to evacuate personnel on many rigs and platforms. As a result, massive rescue of more than 140 people was performed by the U.S. Coast Guard. When the legs collapsed on a Penrod 61 drilling rig, 43 people evacuated into escape capsules; however, one capsule swamped, which resulted in the death of one crewman. By October 31, Hurricane Juan had come within 60 miles of New Orleans. Seven lives were lost and 50,000 homes were flooded.

Hurricane Kate (November 1985) was the first November storm to hit the U.S. coast in 50 years. About 100,000 people left their homes before the storm hit the Florida panhandle. Sixteen people, including 10 in Cuba, lost their lives. Kate's winds were recorded at 75 mph and up to 8 inches of rain fell in some areas.

#### Natural Resource Losses in the Central Gulf Area

Hurricanes and winter storms are major contributors to the destruction of Louisiana's barrier islands. High wave energy and the associated storm surges erode the land areas, particularly the shorelines.

The 1985 hurricanes resulted in hurricane levee failure and North Shore beach erosion at Lake Pontchartrain; beach erosion of 25-75 ft., breaching, dune destruction, and backbarrier de-vegetation at Chandeleur Islands; beach erosion of 25-75 ft., breaching and backbarrier de-vegetation at Plaquemines barrier shoreline; beach erosion of 25-100 ft., breaching, dune destruction, seawall failure, partial hurricane levee destruction, and backbarrier de-vegetation at Bayou Lafourche barrier shoreline; beach erosion of 24-100 ft., breaching, dune destruction, and backbarrier de-vegetation at Isles Dernieres; beach erosion of 20-50 ft., breaching, and wildlife refuge damage at Têche Basin, and beach erosion of 20-60 ft., breaching, and wildlife refuge damage at Chenier Plain (Penland et al., 1986).

Impacts of Hurricane Danny on wildlife in the State of Louisiana were heavy. Alligator nests and eggs were destroyed throughout the marshes from Pecan Island to Pearl River, including north of Vermilion Bay, West Cote Blanche Bay, East Cote Blanche Bay, and Atchafalaya Bay. Deer on Marsh Island were severely impacted (50 percent loss) and an unknown number lost at other wildlife refuges. Thousands of nutria and muskrat carcasses along with raccoons, rabbits, and clapper rails were found in the Louisiana coastal areas. It was estimated that 60 to 70 percent of the nutria population was lost. Much of the vegetation, except wiregrass, was burned from high salinity water (Tarver, 1985a).

Hurricane Juan adversely affected the Louisiana shrimp industry. Considerable debris and detritus were deposited on the shrimping grounds, resulting in losses to fishing gear and a loss of fishing time. The

storm dispersed the population of shrimp, caused premature immigration, resulted in some shrimp mortalities, and resulted in a decrease in shrimp landings (Chatry, 1986).

Ninety percent of the Alabama oyster resources were lost as a result of Hurricane Elena. All major reefs--Cedar Point, Buoy, and Kings Bayou--were impacted. The most productive reef, Cedar Point Reef (Mobile County), was virtually destroyed. Estimates were that restoration of 1,184 acres of reef area by planting adequate cultch material should result in replacement of the lost oyster resources within a period of 1.5-2.0 years, providing adequate spat set occurs (Tatum, 1985).

Damage estimates of the 1985 hurricanes off the Mississippi coast resulted in the death of approximately 10,000 marine birds (primarily eastern kingbirds, oven-birds, rails, herons, and egrets) and in a massive nutria kill (Thomas, 1986).

#### Natural Resource Losses in the Eastern Gulf Area

Hurricane Elena affected the beaches and shores of the Florida coast from Escambia County through Sarasota County, a shoreline distance of about 494 statute miles. Balsillie (1985) performed a Type I erosion value analysis relative to Hurricane Elena's effects on Florida beaches and shores. This was an average for sampled profiles where only erosion occurred. Through this analysis, it was determined that beach and coast erosion volumes for Pinellas, Franklin, Gulf, and Escambia Counties ranged from 8.3 to 15.6 cubic yards per shorefront foot of coast. The average erosion was 10 cubic yards per foot.

At the St. Vincent NWR, the 1985 Gulf of Mexico hurricanes resulted in the death of five deer; two loggerhead sea turtle nests and both eagle nests on the island were destroyed (Holloman 1986). A dolphin was temporarily stranded on the beach and there were massive fish kills in the freshwater lakes on the island. Many trees and understory vegetation were destroyed or damaged. At the St. Marks NWR, seven eagle nests were destroyed, fish were killed in an impoundment, and some trees were destroyed or damaged (White, 1986).

#### Economic Losses in the Central Gulf Area

Offshore losses to the oil and gas industries were extensive. Some of the losses follow: Bright (1985) reported that a Pennzoil 6 inch pipeline at South Pass Block 78 broke three times during the 1985 hurricanes, resulting in estimated repair costs of \$800,000 from Hurricane Juan and \$1,600,000 from Hurricane Elena. Wallis (1985) estimated \$36,000 for replacement of three Southern Natural Gas meter station sheds and \$5,000,000 to replace and put back in operation an 18-inch pipeline at South Pass Block 60. Linton (1985), with Chevron Pipeline Company, estimated that Hurricane Juan resulted in a \$1,000,000 mudslide pipeline break at South Pass Block 78. Other Chevron Pipeline Company replacement/repair cost estimates for Louisiana onshore and offshore facilities as a result of Hurricane Juan included: \$368,800 for an oil treatment terminal at Main Pass Block 69; \$287,000 for a Fourchon oil treatment

terminal; \$220,000 for an oil storage facility at Bay Marchand; \$4,000 for a business office/shop at Leeville; \$38,000 for an oil storage facility at Empire; \$83,000 for West Delta tank battery; and \$81,000 for personnel evacuation. Production platforms were damaged in several offshore areas including South Timbalier, Ship Shoal, Eugene Island, Vermillion, Destin Dome, and Mobile. The Coast Guard (1986) reported vessel casualty damage at almost \$9,000,000 and \$1,000,000 as a result of Hurricanes Elena and Danny, respectively.

The seafood industry suffered total damages in excess of \$54,000,000 as a result of the 1985 hurricanes (Dawley, 1986). In Louisiana, this included damages to 50 seafood plants, 9 vessels, 1 machine shop and the destruction of 1 plant and 4 vessels. This, including industry-related damage, resulted in losses of \$3,143,000 (Simpson, 1986). In Mississippi, Hurricane Elena damaged 30 seafood plants and destroyed another, damaged 8 vessels, caused considerable plant and equipment damage to 3 local shipyards, and caused significant industry-related damage, which resulted in total damage estimates of \$2,386,500. In addition, Tatum (1985) requested \$1,492,088 in disaster funds to be used in replanting three very productive oyster reefs in the coastal area of Alabama. The economic loss from the 1985 hurricanes to the Alabama oyster industry was \$48,000,000.

The Louisiana Department of Wildlife and Fisheries summarized hurricane impacts on Louisiana's wildlife refuges and management areas (WMA's) as follows: Hurricane Juan damaged the Pass-A-Loutre WMA headquarters and destroyed equipment there in the amount of \$17,054; damaged the Salvador WMA headquarters, destroyed equipment, and damaged a levee and water control structure with a cost estimate of \$73,000; and damaged the Pointe-Au-Chien WMA headquarters, destroyed equipment, and damaged levee and water control structures in the amount of \$539,797. Damage cost estimates at the Marsh Island Refuge totaled \$13,346,140 for equipment replacement, equipment repairs, levee and water control structure repairs, and for miscellaneous repairs including the replacement of boundary signs and lost lumber. Losses at the Atchafalaya Delta WMA for damage to the generator and storage sheds, equipment replacement, and loss of shell on a ring levee totaled \$32,400. At the State Wildlife Refuge, the cost estimate was \$918,840 for headquarters repairs, levee and water control structure repairs, and miscellaneous damage repair. Levee and water control structure repairs, along with some miscellaneous repairs, were estimated at \$13,898,000 at Rockefeller Wildlife Refuge. At St. Tammany Refuge the cost estimate was \$1,161,000 for levee and water control structure repairs. Restoration of the levee shoreline at the Manchac Management Area was estimated at \$1,650,000 (Tarver, 1985b).

Estimated costs for highway repair and related damages by the Louisiana Department of Transportation and Development for Hurricanes Danny and Elena were \$453,640 and for Hurricane Juan \$1,957,139 (Creagon, 1985). Road/road-related repair costs in coastal Alabama for Hurricane Elena were \$561,000 for Baldwin County and \$156,500 for Mobile County (Poiroux, 1986.)

Hurricane Juan resulted in a \$194,663,585 agricultural economic loss in Louisiana. This included \$174,934,146 for crops, \$11,951,664 for soybean quality loss, \$5,686,500 for total immovables (farm buildings, mobile homes, service buildings, equipment and land damage), \$450,250 for livestock, and \$1,641,025 for aquaculture (Byrd, 1986).

The 1985 hurricanes resulted in impacts on schools, public offices, and other facilities/operations in Louisiana. The American Red Cross (1986) reported that it provided \$8,000,000 in assistance to families in south Louisiana as a result of Hurricane Juan and \$400,000 as a result of Hurricane Danny.

Hurricane Danny forced a major evacuation of the Mississippi coast. It cost property owners in Mississippi an estimated \$51,000 in damages. Hurricane Elena was particularly devastating to the area, with damage estimates of more than \$500,000,000. Approximately \$500,000 to \$700,000 in damages, due to flooding, were the results of Hurricane Juan (Sun Herald, 1986).

Total cost estimates reported for 1985 hurricane damages to the coastal counties of Alabama were: \$336,969 for State agencies; \$1,041,620 for Baldwin County, and \$1,722,806 for Mobile County. These were estimates for eligible applicants under the Public Assistance Program (Bennett, 1986).

#### Economic Losses in the Eastern Gulf

Balsillie (1985) conducted Type II volumetric erosion values relative to Hurricane Elena. These values included all profiles regardless of gain or loss of beach/coast. From these values, it was suggested that the lower Gulf and panhandle coasts of Florida resulted in \$12,400,000 to \$22,900,000 of beach and coast erosion damages.

As a result of the damage to the Apalachicola oyster reefs from Hurricane Elena, \$1,570,000 was requested for emergency funding under Chapter 4.B. of the Marine Fisheries Research and Development Act (PL 88-309) to reconstruct natural oyster reefs (Simpson, 1986). Estimated losses in potential oyster production in Apalachicola Bay's Cat Point Bar and East Hole Bar exceeded \$30,000,000. Estimated losses in potential dock-side revenues from harvests exceeded \$6,000,000 (Berrigan, 1986).

Hurricane Elena resulted in replacement/repair cost estimates of \$128,500 for the St. Vincent NWR. At the St. Marks NWR, cost estimates to repair/replace items damaged by Hurricane Elena were estimated to be \$49,000. Hurricane Kate resulted in \$40,000 worth of damage to the refuge (White, 1986). Cost estimates for damages to the Gulf Islands National Seashore in Gulf Breeze, Florida, were in excess of \$72,000. Uninsured damages on Florida's state parks as a result of Hurricane Elena were estimated at \$702,664 (Barber, 1986). Hurricane Elena damages expected to be covered by insurance on Florida's state parks were estimated at \$52,684 (Barber, 1986).

U.S. Highway 98 damage estimates were \$750,000 for Hurricane Elena and \$1,500,000 to \$2,250,000 for hurricane Kate. The 1985 hurricanes resulted in \$2,500,000 to \$3,000,000 in damages to the St. George Island Causeway. Miscellaneous highway damages in Gulf County amounted to \$50,000 (Spangenberg, 1986).

#### Conclusion

The 1985 Gulf of Mexico hurricanes were both environmentally and economically devastating. In the Central and Eastern Gulf of Mexico areas, coastal erosion and land loss were tremendous. Wildlife losses were fairly heavy in the Central Gulf area but appeared to be less in the Eastern Gulf area. Oyster resources were heavily impacted in the Central Gulf area (Mobile Bay) as well as in the Eastern Gulf area (Apalachicola Bay). The oil and gas industries suffered millions of dollars in losses in the Central Gulf. Wildlife facilities and parks suffered heavy economic losses in both areas. Likewise, highway damages in both areas were in the millions of dollars. Agricultural damages were heavy in the Central Gulf area. The 1985 hurricane season serves to underscore the continued importance of sound evacuation procedures and safety measures for the offshore industry, fishermen, wildlife managers and local residential communities.

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