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STUDY TITLE: Northeastern Gulf of Mexico Coastal Ecological Characterization

REPORT TITLE: Alabama Coastal Region Ecological Characterization, Volume 1, Coastal Bibliography and Volume 2, A Synthesis of Environmental Data

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BACKGROUND: Coastal Alabama and adjacent waters are an important industrial, recreational, and seafood production area in the northern Gulf of Mexico. Discovery of oil and gas in and around Mobile Bay, development of State-owned and outer continental shelf fossil fuel reserves, and completion of the Tennessee- Tombigbee Waterway have enhanced the area and should promote continued urban and industrial expansion. Recognizing the highly productive area along the Alabama coast and the resource planning to maintain these areas, the U.S. Fish and Wildlife Service initiated the Ecological Characterization Program for selected coastal areas.

OBJECTIVES: (1) To summarize all available information on natural resources of coastal Alabama.

DESCRIPTION: Coastal Alabama lies within the Coastal Plain province and the Mississippi-Alabama shelf section of the Continental Shelf province. Part of the study was a literature search and bibliography pertaining to coastal Alabama. The report

characterizes the area with respect to geology, hydrology, climate, plant life, animal life, endangered and threatened species, and an area-wide conceptual model. The aim of the conceptual representation is for the information synthesis to present the coastal water environment as integrated systems of physical, chemical, and biological forces. These representations were developed to serve as a reference source of known information about coastal Alabama.

SIGNIFICANT CONCLUSIONS: The holistic conceptual model of coastal Alabama as a single energy system was comprised of two basic units. One unit consisted of four natural ecosystems and their connective pathways. The second unit consisted of manipulated subunits such as agricultural ecosystems and urban/industrial systems that require extensive inputs of external energy. The conceptual model provides a workable hierarchical system that indicates the interrelationships that exist between natural and modified systems. Although some areas need further research, the conceptual model may be used as a management tool for maintaining the balance between individual subunits within the system.

STUDY RESULTS: Coastal Alabama has four physiographic subdivisions. The southern pine hills comprise the elevated east and west lateral portion of coastal Alabama. The alluvial plain, deltaic plain, and coastal lowlands are relatively flat, are adjacent to Mississippi Sound, and extend along margins of Mobile, Bon Secour, and Perdido Bays. These flat physiographic subdivisions also extend northward along the Tombigbee and Alabama Rivers. The coastal boundaries of these relatively shallow bays are defined by various barrier islands and spits. The Mississippi-Alabama shelf is a triangular area seaward of the barrier islands and extends from the Mississippi River Delta to the De Soto Canyon.

Coastal and offshore Alabama are underlain by sediments ranging from pre-Jurassic to Holocene. These rock units are possibly more than 7,620 m (25,000 ft) thick at the coast and decrease southward by 1.9 to 9.4 m/km (10-50 ft/mi). The coastal and continental shelf topography and sedimentation, result from tidal and current movements, as well as alluvial and deltaic progradation and destruction.

The prominent structural geological features along coastal Alabama are the peripheral faults, Mobile graben, the Citronelle domal anticline, and the Wiggins uplift. Tectonic hazards are not a problem in coastal Alabama because there are no known active faults.

Oil and gas production is well established in coastal Alabama with developed fields at Citronelle, Chunchula, Hatter's Pond, and South Carlton. There is a high potential for future gas and oil production.

Coastal Alabama has a dynamic hydrologic system with the focal point of the system being Mobile River and Mobile Bay into which it flows. Average yearly (freshwater) discharge from this system into the Gulf of Mexico is 50 km^3 (12 mi^3). Flooding is the worst natural hazard of coastal Alabama and may result from storm surges and heavy rainfall associated with hurricanes and other tropical storms. Flood discharge has a

pronounced effect on inland and estuarine water salinity and coastal sedimentation. Climatic and physical oceanographic factors along coastal Alabama are well understood and recorded because of the extent to which they affect this particular area.

Specific studies of coastal Alabama phytoplankton were lacking, however, an intensive study of Mobile Bay phytoplankton has been undertaken. Community diversity and species composition of aquatic vegetation has declined. Habitat types were described and characterized by associated flora. Animal diversity was high in coastal Alabama where the fauna included terrestrial, freshwater, saltwater, and brackish water species characteristic of temperate and subtropical climates. Coastal Alabama has important habitats for many commercially valuable biota (i.e., shrimp, oysters, and fish). This area maintains a highly diversified avifauna (greater than 300 species) which is attributed to the multiple habitats present in coastal Alabama. Fifty-seven mammalian species have been reported from coastal Alabama. Some flora and fauna are considered endangered or threatened.

The natural ecosystems are functionally composed of producers, consumers, and decomposers. Energy within the system is transferred and transformed between trophic levels. This system is considered self-sustaining. The agricultural, urban/industrial, and associated pathways rely heavily on external energy from other systems illustrating their independence on natural ecosystems.

STUDY PRODUCTS: O'Neil, P. E., M. F. Mettee, E. J. McCullough, L. A. Acker, and D. W. Wilson. 1982. Alabama Coastal Region Ecological Characterization. Volume 1, Coastal Bibliography. A final report by the U.S. Fish and Wildlife Service for the U.S. Department of the Interior, Minerals Management Service Gulf of Mexico OCS Office, Metairie, LA. NTIS No. PB83-180661. FWS/OBS-82/21. Contract No. 14-12-0001-30037. 408 pp.

O'Neil, P. E. and M. F. Mettee. 1982. Alabama Coastal Region Ecological Characterization. Volume 2, A Synthesis of Environmental Data. A final report by the U.S. Fish and Wildlife Service for the U.S. Department of the Interior, Minerals Management Service Gulf of Mexico OCS Office, Metairie, LA. NTIS No. PB83-190009. FWS/OBS-82/42. Contract No. 14-12-0001-30037. 346 pp.

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