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REPORT TITLE: Ecological Characterization of the Mississippi Deltaic Plain Region: A Narrative with Management Recommendations

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BACKGROUND: Increasing human pressure on coastal ecological resources has resulted in the need for a more thorough understanding of ecosystem interrelationships. The ultimate management goal is a comprehensive understanding of coastal systems and ability to utilize and preserve coastal ecological resources more effectively. Effective management depends upon knowledge of functional interdependencies, both within coastal ecological systems and between human and natural systems. This report attempts to document current level of knowledge of ecological interdependencies in the Mississippi Deltaic Plain Region (MDPR) of coastal Louisiana and Mississippi. Funding was provided by the Bureau of Land Management and the work effort was completed through a Memorandum of Understanding with the U.S. Fish and Wildlife Service.

OBJECTIVES: (1) To develop management priorities, assess tradeoffs between the competing uses of resources, and evaluate socioeconomic and natural processes in common units.

DESCRIPTION: This report is a descriptive narrative aimed at characterizing the ecology and environmental problems of the Mississippi Deltaic Plain Region (MDPR). The report summarizes the major classes of environmental problems, their origins, and interdependencies; the natural systems of the region and their histories, structure, and functions; management recommendations; and how the data base developed for a separate technical report can help in dealing with recognized problems within the region. This report is a companion to the technical report entitled "Ecological Models of the Mississippi Deltaic Plain Region: Data Collection and Presentation," published as FWS/OBS-82/68 and funded under this contract.

SIGNIFICANT CONCLUSIONS: The MDPR is intimately linked through its geologic, hydrologic, biologic, and socioeconomic resources. Twenty different habitats in seven different hydrologic units comprise the MDPR. Wetlands are an important contributor to the world class fisheries of the region but have been severely impacted by conflicting uses. Two approaches which could be taken to offset the existing and future impacts from development include a tax and subsidy method or a zero net loss of habitat method. Various management approaches are available to address the wetland loss, eutrophication, salt water intrusion, and toxic substance problems facing the region.

STUDY RESULTS: The MDPR extends from the western side of Vermilion Bay in Louisiana to the Mississippi/Alabama border on the east. The inland boundary was established at the official Coastal Zone Boundary in Louisiana and the 15 ft contour in Mississippi, while the three mile limit forms the offshore boundary. The region includes the largest active delta system, the most productive inshore and nearshore fishery areas, one of the largest domestic concentrations of oil and natural gas, and one of the most active port systems in North America.

The single most important geologic influence throughout the MDPR is the Mississippi River which supplies the sediment to sustain the region. Hydrologic processes integrate the entire region by regulating biological processes, eroding and depositing sediments, modifying the climate, transporting aquatic organisms and human commerce, and disposing of wastes. The region is biologically rich and fertile. The biological setting is affected and constrained by both the physical and climatic settings which are in turn affected by the biology. The overall economy of the MDPR is based on abundant renewable and nonrenewable natural resources and it's location at the mouth of the country's major navigation systems.

Twenty different ecologic and economic habitats were described for the region. These habitats can be broadly grouped into three categories: (1) high land or terrestrial; (2) intertidal or periodically flooded; and (3) aquatic or continuously flooded. Estuarine open water has the largest areal extent of these habitats, covering 56% of the region. Brackish marsh, the next largest habitat, comprises 11.7% of the region's total area.

Other major contributors, in terms of area, include agriculture (2.8%); bottomland hardwood (1.3%); cypress-tupelo (4.6%); fresh marsh (4.8%); fresh open water (1.0%); nearshore gulf (3.4%); rivers, streams, and bayous (1.1%); salt marsh (5.3%); upland forest (2.0%); and urban-industrial (2.9%). Remaining habitats which cover less than 1% of the region include beach and dune; canals; fresh aquatic beds; fresh scrub-shrub; mangroves; flats; estuarine aquatic beds; and spoil areas.

Seven hydrologic units comprise the MDPR, including: Mississippi Sound, Pontchartrain, Mississippi River Delta, Barataria, Terrebonne, Atchafalaya, and Vermilion. Within each of these units, the relative proportion of area covered by the 20 habitats differ greatly based on their natural and economic histories. At the hydrologic unit level of resolution, habitats are the functional components. The primary connections between habitats are water flows with their dissolved and suspended loads of nutrients and organic matter, natural animal migrations, harvests of economically important plants and animals, and flows of urban and agricultural waste products.

Important ecological issues relative to estuaries involve the source of nutrients that support estuarine primary productivity and the role of wetlands in the trophic support of coastal fisheries. Evidence from the MDPR suggests that wetlands enhance coastal fisheries production both in terms of providing habitat and a food source.

Conflicting demands on the wetlands and waters of the MDPR have led to significant alteration and degradation of the natural system. These have led to wetland loss from natural processes and human activities; accelerated eutrophication in water bodies; introductions of toxic materials; and salt water intrusion.

Two approaches can be taken to addressing the management issues in the MDPR. The tax and subsidy approach does not disallow any development a priori but requires that the total social cost of all activities be paid and that those affected be compensated. A second approach seeks a net zero habitat loss. This approach requires that any disruption of a natural coastal habitat be accompanied by appropriate mitigation. This mitigation would involve the restoration of an equivalent area of natural habitat at another location. Either approach would require an estimate of the total direct and indirect impacts of the proposed activity. Additionally, the approaches would require that the impacts be converted to common units.

Ways to manage wetland loss are to minimize additional loss or to build new wetlands to offset losses. The most important source to the building of new land are the sediments of the Mississippi River. Two approaches for land building are controlled diversions on the lower Mississippi River channel and optimizing land building in the Atchafalaya Bay region. Eutrophication can be reduced by limiting nutrient sources and treating runoff. Impoundment or semi-impoundment of wetlands is a feasible method of reducing salt water intrusion. However, this has the effect of limiting marsh productivity over the long term. Another solution may be to artificially increase fresh water input to a basin. This may entail alterations on canals to restore as much natural hydrology as possible.

The control or disposal of toxic substances is perhaps the most immediate environmental management problem. The MDPR is a national center of the petrochemical industry which contributes large amounts of toxic substances to the environment. A tax and subsidy approach may be more effective than a direct regulation approach in managing this problem.

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