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STUDY TITLE: Northeastern Gulf of Mexico Coastal Ecological Characterization

REPORT TITLE: The Ecology of Irregularly Flooded Salt Marshes of the Northeastern Gulf of Mexico: A Community Profile

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KEY WORDS: Eastern Gulf; Central Gulf; baseline; biology; characterization; community; salt marsh; needlerush; *Juncus*; Mississippi; Florida; Alabama; floral zones; macrofauna; fish; birds; impacts.

BACKGROUND: Marsh areas dominated by *Juncus roemerianus* (black needlerush) occur along Atlantic and Gulf of Mexico coasts of North America between 25°N and 40°N Lat. *J. roemerianus*-dominated marshes comprise over 50% of the marshland present along the northeastern Gulf (western Florida, Alabama, and Mississippi). These marshes provide food and nutrient sources, faunal habitat, water purification systems, and shoreline stabilization. Wide distribution and close proximity to open water of *J. roemerianus*-dominated marshes make them highly susceptible to man-induced impacts (e.g., oil spills). Large information gaps are present concerning many aspects of marsh habitats. To help understand and build awareness of marshland importance, information concerning the role and interrelationships of this habitat with natural and man-induced factors is vital.

OBJECTIVES: (1) To describe *J. roemerianus*-dominated marsh systems and the biological and ecological components within the systems; and (2) to evaluate the marsh systems and various impacts.

DESCRIPTION: The report concerns irregularly flooded *J. roemerianus* marshes along shores of the northeastern Gulf of Mexico from the Pearl River, Mississippi to Cedar Key, Florida. The marsh community profile provides "state-of-the- knowledge" synthesis of information and literature of this community. The profile includes information concerning structural and functional community aspects; its environmental setting, zonation, vascular and non-vascular plant communities, marsh fauna, ecology, and human impact.

SIGNIFICANT CONCLUSIONS: Presentation of existing data related to the marsh community emphasizes the paucity of information concerning various aspects of marsh ecology. Significant data gaps concern: overall biotic concepts (i.e., community dynamics), marsh hydrology, nutrient contributions, mitigation options, and impact studies. These large data gaps that exist are of special concern when considering *J. roemerianus*-dominated marshes. This is due in part to research emphasis being placed on marsh community structure and function dominated by species other than *J. roemerianus* (e.g., *Spartina alterniflora*).

Data confirm the relatively high primary productivity of marsh communities; however, productivity is probably underestimated because no data are available concerning the algal productivity component. Marshes are also ecologically important as a base for detrital food chains. Pollutants (e.g., oil spills) have the potential to alter community structure and affect aspects of ecological importance. Marshes must be protected because of their unique and critical role amongst coastal ecosystems. Mitigation options are limited, therefore, marsh preservation and restoration, where possible, is imperative.

STUDY RESULTS: *J. roemerianus*-dominated marsh distribution and development are dictated by a number of physical parameters (e.g., substrate conditions) that occur along the northeastern Gulf of Mexico. These variable physical parameters account for relatively low species diversity among marsh plant communities. Few plant species are adapted to the high stress conditions that exist in marsh environments.

A general zonation pattern applies to the *J. roemerianus*-dominated marsh. A *S. alterniflora* zone borders open water within the intertidal area. Moving landward, *J. roemerianus* becomes dominant. The *Juncus* zone is the largest and comprises the bulk of marsh biomass. Inside the *Juncus* zone, salt flats prevail where hypersalinity causes colonization of sparse halophytic plants. The most landward zone, called the high meadow, is not normally susceptible to strong tidal fluxes and, therefore, has a plant community of relatively high species diversity.

Marsh substrates provide for epiphytic microfloral communities. Blue-green benthic algae have low species diversity. Blue-green algal distributions are determined by light

intensity, therefore, habitat alteration that affects marsh canopy may impact community structure by altering algal composition. Little information is available concerning marsh non-vascular plants.

Eighty-eight species of macroinvertebrates (excluding insects and oligochaetes) are reported from northeastern Gulf of Mexico marshes. Macroinvertebrates show marked seasonal fluctuations due to plankton recruitment. Larval decapods dominate meroplankton and, as adults, are critical to detrital energy flow.

Fish populations are highly diverse and abundant due to availability of numerous habitats. Temporal population changes are related to breeding patterns of fish that utilize the marsh as nurseries. Marsh fish have little commercial importance, however, by functioning in energy transfer to other habitats, they indirectly affect commercial species.

Marsh avifauna are diverse (125 resident species). Large seasonal population changes are due to influxes of migratory species. Birds occupy high trophic levels within the marsh ecosystem and are very important in nutrient cycling.

Marshes are highly productive and have high nutrient turnover rates. Ecological linkages between marshes and adjacent habitats are obvious however, data are unavailable to indicate mechanisms and pathways.

Man-induced impacts on marsh habitats include: alteration, destruction, petroleum pollution, effluents, and mitigation. Oil pollution impacts can be acute and of long duration. Mitigation options consist of replanting and fertilization of existing marshes and establishment of new marshes by planting on dredge material disposal sites.

STUDY PRODUCT: Stout, J. P. 1984. The Ecology of Irregularly Flooded Salt Marshes of the Northeastern Gulf of Mexico: A Community Profile. 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 Region, Metairie, LA. FWS Report 85(7.1). Contract No. 14-12-0001-30037. 117 pp.

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