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STUDY TITLE: Southwest Florida Shelf Coastal Ecological Characterization

REPORT TITLE: The Ecology of the Seagrasses of South Florida: Community Profile

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KEY WORDS: Straits of Florida; Eastern Gulf; Southwest Florida Shelf; Florida; baseline; biology; characterization; seagrasses; community; ecosystem; productivity; impacts; coastal zone; literature review; synthesis

BACKGROUND: Seagrasses form a unique habitat that is productive, faunally rich, and ecologically important. So important are seagrass and adjacent habitats that up to 70% of commercial fish species are considered estuarine dependent and utilize these habitats at some time in the life cycle. South Florida maintains large expanses of seagrass beds, having 85% of the total Gulf of Mexico seagrass. These habitats may be the richest feeding grounds and nursery habitat in coastal waters. It has only recently been determined that seagrasses are highly productive. Increased coastal and offshore development (e.g., urbanization, oil and gas exploration) has led to habitat encroachment. To maintain this ecologically diverse and complex habitat, it is important to present information concerning the role and interrelationships of natural and man-induced factors as they relate to the seagrass habitats of south Florida.

OBJECTIVES: (1) To describe seagrasses, their habitats, and ecology; and (2) to evaluate interrelationships of seagrass communities and factors affecting these communities.

DESCRIPTION: The report provides information useful for understanding seagrass communities and their role in regional ecosystems of south Florida. Information

presented is primarily concerned with seagrass communities along the Florida coast between Biscayne Bay on the east to Tampa Bay on the west. The report summarizes information and literature concerning seagrass biology, ecology, community structure and function, interrelationships with other systems, and impacts. This synthesis serves as a reference source of known data concerning seagrass ecology as it relates to south Florida.

SIGNIFICANT CONCLUSIONS: Seagrass communities are functionally important as a living and protective habitat for large populations of fish and invertebrates, many of which are commercially important. Seagrasses are vital to the maintenance of the structurally complex ecosystem, where seagrass-associated communities (e.g., benthos) are determined by seagrass species composition, abiotic conditions, and seagrass density. Seagrass habitats are ecologically important for inter-community exchange by providing habitat for a vast number of species during some part of their life cycle and by contributing to detrital food webs of adjacent habitats. Man-induced impacts have been detrimental to seagrass habitats. The most prominent impacts are from dredging, eutrophication, and oil. Loss of habitat, as important as seagrass communities, has far-reaching implications. Although there is abundant information concerning seagrasses it is imperative to build on this information to appropriately manage this sensitive ecosystem.

STUDY RESULTS: Six seagrass species are found in Florida: *Thalassia testudinum, Syringodium filiforme, Halodule wrightii, Halophila decipiens, H. engelmanni*, and *H. johnsonii*. Of these species, *T. testudinum* is most common in south Florida. Seagrasses are unique angiosperms that live fully submerged, living their entire life cycle completely and obligately in seawater.

Various physical parameters (e.g., sediment type) determine seagrass establishment, growth, and propagation. Once established, distributional limits are dictated by the amount of light and hydrostatic pressure at depth, and exposure at the shallow end of the gradient. Minimal exposure and extreme temperature variations cause seagrass mortality. Seagrasses function as sediment stabilizers and have most of their biomass below the sediment-water interface. Sediment cover then acts as a buffer against temperature variations.

Seagrass communities are highly productive environments, although productivity varies with season, seagrass density, seagrass species composition, and measurement technique. Seagrasses are extremely efficient at nutrient uptake and utilization, allowing for high productivity in low nutrient environments. High detrital production and sedimentation promotion provide active nutrient cycling in seagrass communities. Seagrasses have the ability to fix nitrogen, making sediment nitrogen available to the water column and associated microflora.

Seagrass habitats support a diverse biotic community. Seagrass blades are used for an epiphytic attachment which contributes to overall seagrass primary production. Seagrasses provide numerous invertebrates with protection from predators by providing cover and interfering with predator feeding efficiency. Seagrasses provide ideal nursery

and feeding grounds for a diverse fish fauna. Diel movements of mobile fauna, primarily fish, occur between adjacent habitats and seagrasses. Many birds, utilizing various feeding modes (e.g., wading, diving), frequent seagrass beds.

Seagrass ecosystems maintain a complex food web with a wide variety of direct consumers. Ingestion of seagrasses increases the decomposition timeframe responsible for increased nutrient cycling and provides a nutrient pathway between seagrasses and adjacent habitats. Besides direct herbivory, energy transfer occurs by detrital food webs which appear to be the primary energy pathway through trophic levels. Seagrass habitats export large quantities of organic matter to distant locations by producing high amounts of dissolved organic carbon (DOC) during decomposition. DOC is the most readily utilized organic component by low trophic level detritivores.

Because of the intricate relationships that exist between seagrasses, the associated fauna, and adjacent habitats, it is very important to reduce impacts. Greatest impact is due to dredging. Eutrophication and oil damage is most evident on seagrass-associated fauna. Indirect effects on seagrasses from community structure disruption are inestimable. Recolonization of disturbed areas is not yet economically feasible. Low recovery rates of seagrasses and long lasting effects of impacts emphasize the importance of finding impact prevention alternatives.

STUDY PRODUCTS: Zieman, J. C. 1982. The Ecology of the Seagrasses of South Florida: A Community Profile. A final report by the U.S. Fish and Wildlife Service for the U.S. Department of the Interior, Bureau of Land Management Service Gulf of Mexico OCS Office, Metairie, LA. NTIS No. PB83-140574. FWS/OBS-82/25. Contract No. 14-12-0001-30036. 158 pp.

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