PROJECT ABSTRACT

Modeling Pink Shrimp Recruitment from Florida Bay

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Florida Bay lies downstream of the Everglades ecosystem and is influenced not only by South Florida's seasonal, tropical savanna climate but also by the extensive water management system that dominates the South Florida landscape and has substantially changed hydropatterns and flow dynamics in the Everglades and the volume, timing, quality, and distribution of freshwater inflow to Florida Bay. Perceived declines in South Florida's natural systems have led to the development of the Federal and State Comprehensive Everglades Restoration Plan (CERP). CERP is a science-based restoration plan based on the concept of adaptive assessment, in which models and performance measures are used iteratively to design projects, monitor the effects of their implementation and, when the need is indicated, recommend design refinements. This proposal is for the continued development of a pink shrimp simulation model and performance measure to evaluate the impact on Florida Bay of upstream water management changes resulting from efforts to restore the Greater Everglades ecosystem. The proposed project is based on the following rationale. The pink shrimp is a good indicator of the health and productivity of the Bay. The effect of salinity and temperature on survival and growth and the effect of habitat on juvenile density provide a basis for predicting the abundance of pink shrimp juveniles on Florida Bay nursery grounds and the magnitude of recruitment to the Tortugas fishery. Objectives of proposed new work are to: (1) clarify the effect of freshwater inflow and seagrass habitat on Florida Bay's pink shrimp nursery function; (2) determine the major influences of meteorological and oceanographic processes on various life stages of pink shrimp and the ramification of these effects on recruitment to the fishery (with emphasis on postlarval immigration); and (3) improve the ability to predict recruitment to the Tortugas fishery in response to changes in water management. The work will involve four mutually supportive tasks: (1) development of a spatially-explicit recruitment model on the basis of the existing unit model, (2) adaptation of an existing hydrodynamic model to simulate postlarval transport into the Bay from the Bay's edge; (3) description of postlarval immigration pathways and influencing factors; and (4) model refinement and verification with statistical models relating immigrating postlarvae, juvenile pink shrimp (as affected by seagrass cover and composition), and recruits to the offshore fishery. The simulation model will link potential fishery recruitment from Florida Bay to models simulating freshwater inflow to the Bay so that water management alternatives can be evaluated in terms of their effect on the Bay's productive capacity.