DEVELOPMENT OF SPATIALLY-EXPLICIT MODELS TO PREDICT GROWTH-POTENTIAL OF AGE-0 GRAY SNAPPER, *LUTJANUS GRISEUS*, IN FLORIDA BAY DURING RESTORATION OF FRESHWATER FLOWS

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Proposed Everglades National Park restoration plans, which include restoring of historic freshwater flows, could have a significant influence on the growth, recruitment and survivorship of fishes in Florida Bay. One aspect of determining the effect of restoration plans on Florida Bay's fisheries resources is to understand the effect on growth rates. Growth is a vital biological rate, closely linked with survival and production, as well as providing an indication of habitat quality. Information on the effect of restoration plans on fish growth rate would provide scientists and managers alike a measure of the effect of proposed changes on fisheries resources. Further, a spatially explicit model of fish growth that includes the effects of changing environments would be a useful tool in comparing different water management scenarios and evaluating the potential effects on adjoining ecosystems.

The general goal of the proposed research is to examine patterns of growth in juvenile gray snapper and develop a bioenergetic model of growth that is a function of temperature, salinity and fish size. This model will be extended into a spatially explicit calculation of potential fish growth using historical environmental modeling data as well as predicted changes in the environment of Florida Bay under different water management strategies. Gray snapper was chosen as a study species because it is abundant in the South Florida ecosystem, is an important recreational and commercial species, is an important mid-level predator in both Florida Bay and neighboring reef ecosystems and is representative of the many species that spawn outside of Florida Bay but use juvenile habitats within Florida Bay.

The specific objectives are: 1) to quantify patterns in juvenile gray snapper growth through a retrospective analysis of previously collected samples; 2) to examine the relation between juvenile gray snapper growth and temperature and salinity using previously collected samples and historical monitoring date; 3) to develop an individual-based bioenergetic model for juvenile gray snapper under a range of temperature and salinity conditions; 4) to calibrate and validate the bioenergetic model through comparison of predicted growth with observed growth; 5) to develop a spatially explicit model that predicts growth-potential of young snapper throughout Florida Bay under various freshwater flow regimes.

The proposed research addresses the explicit recommendations of the Florida Bay Science panel to the Higher Trophic Group. They recommended a focus on the effects of salinity and regional variability on fish growth within Florida Bay. This study will quantify the effects of temperature and salinity on juvenile gray snapper growth. Further, the bioenergetic model will be coupled with spatially explicit predictions of changes in Florida Bay. Collectively, the results will increase the ability of managers to consider the effects of restoration plans on the fisheries resources of the Florida Bay and neighboring ecosystems.