

## Contribution of Mangrove Nursery Habitats to Replenishment of Adult Reef Fish Populations in Southern Florida

David L. Jones<sup>1</sup>, John F. Walter<sup>2</sup> and Joseph E. Serafy<sup>2</sup>

<sup>1</sup>Cooperative Institute for Marine & Atmospheric Studies, University of Miami–Rosenstiel School, Miami, FL, USA

<sup>2</sup>NOAA Fisheries, Miami, FL, USA

Connectivity between mangrove forests and coral reefs, mediated by ontogenetic migrations of reef fishes that use mangroves for juvenile nursery habitat, may be crucial for the replenishment of adult populations on the reef. However, direct evidence of this linkage and an understanding of the influence variability of juveniles within mangrove nurseries has on the dynamics of nearby adult reef fish populations is lacking for many species. Our goal is to establish the nature and extent of the linkage between mangrove and reef habitats by synthesizing two long-term, visual survey-based monitoring efforts of southern Florida populations of fishes from: 1) the inshore mangrove nursery habitats in Biscayne Bay (J. Serafy, Univ. of Miami/NOAA Fisheries) and 2) the adjacent Florida Keys reef tract (J. Bohnsack, NOAA Fisheries). This involves construction of predictive models of recruitment dynamics that incorporate ontogenetic habitat shifts (i.e., mangrove to reef), account for environmental variation, and allow estimation of adult reef fish stock size. Development of an annual, abundance-based index of recruitment, based on the juvenile survey data, will allow identification of essential fish habitat and provide information necessary for adequate stock assessment and proper management of the fishery.

Based on their presence and abundance in both the mangrove and reef surveys, ten target species from seven families were identified as having potential to exhibit ontogenetic shifts between the two habitats (i.e., *Abudefduf saxatilis*, *Gerres cinereus*, *Haemulon flavolineatum*, *H. parra*, *H. sciurus*, *Lagodon rhomboides*, *Lutjanus apodus*, *L. griseus*, *Scarus guacamaia*, *Sphyraena barracuda*). Length and abundance data for these species collected during 981 mangrove survey transects conducted in Biscayne Bay over nearly a decade (1999–2007) form the basis of the present work. These data were partitioned according to spatial (habitat, lat/long) and temporal (year, season) treatments and redundancy analysis (RDA) was used to establish the influence of these along with several other environmental variables (i.e., salinity, temperature, depth, dissolved oxygen, freshwater discharge) on the distribution and abundance of juvenile mangrove fishes.

Habitat had the greatest influence on the distribution and abundance of these fishes. Most (80%) of the target species showed an affinity for Leeward Key sites, which were farther from the influence of freshwater canal discharge than sites along the Mainland and closer to offshore waters where the adults reside and larval input originates. Large-scale spatial trends in utilization of mangrove nursery sites within Biscayne Bay further highlight the importance of Leeward Key mangroves in providing essential nursery habitat as 90% of the target species immature stages were significantly more abundant here than along the Mainland. Juveniles and/or subadults of all target species showed greatest abundances in the mangroves during the wet season, ostensibly coincident with seasonal peaks in reproduction and the subsequent timing of habitat shifts made by early juveniles that initially settled in seagrass beds. Life history stage data provide evidence suggesting habitat shifts from the mangroves occur between the juvenile and adult stages in nine of the 10 species examined. Patterns of habitat utilization among closely related species indicate alternative life history strategies exist to minimize competition. For example, French grunt (*H. flavolineatum*) and schoolmaster snapper (*L. apodus*) inhabit the mangroves at earlier stages and

for shorter durations than their generic counterparts, bluestriped grunt (*H. sciurus*) and gray snapper (*L. griseus*).

Contact Information: David L. Jones, Cooperative Institute for Marine and Atmospheric Studies, University of Miami - Rosenstiel School, 4600 Rickenbacker Cswy, Miami, FL, 33149, USA, Phone: 786-374-5295, Email: [djones@rsmas.miami.edu](mailto:djones@rsmas.miami.edu)