

**TITLE:** SFP 2002 Upstream larval supply to Florida Bay – the Dry Tortugas connection.

**PRINCIPAL INVESTIGATORS:** William J. Richards<sup>1</sup>, Cynthia Yeung<sup>2</sup>, Maria M. Criales<sup>3</sup>, and David L. Jones<sup>2</sup>

**INSTITUTIONS:** <sup>1</sup>NOAA Fisheries, Southeast Fisheries Science Center, 75 Virginia Beach Drive, Miami, FL 33149; <sup>2</sup>Cooperative Institute for Marine and Atmospheric Studies (CIMAS), Rosenstiel School of Marine and Atmospheric Science, University of Miami, Miami, FL 33149; <sup>3</sup>Division of Marine Biology and Fisheries, Rosenstiel School of Marine and Atmospheric Science, University of Miami, Miami, FL 33149

**PROJECT SUMMARY:** The population dynamics of marine species with pelagic early life stages are regulated to a large degree by physical oceanographic processes. In South Florida, valuable resources such as the pink shrimp, the spiny lobster, and many groupers and snappers spawn offshore near reef habitats in the Florida Keys and the Dry Tortugas, then migrate into Florida Bay as pre-settlement stages where they reside for a period before entering the adult population. The population dynamics of these keystone species are thus affected not only by Florida Bay but adjacent environments of the Atlantic coastal zone, the Florida Shelf, and the Gulf of Mexico. Are higher trophic level populations in the Bay dependent on external larval sources? Where are the sources? What pathways and processes link them with the Bay? How will natural and anthropogenic disturbances at the sources and links impact population distribution and abundance? The answers are fundamental to build ecological models for higher trophic level species in South Florida, and to provide the scientific basis for preservation and restoration measures.

The research proposed herein addresses these questions through a joint effort by CIMAS (Theme 2: Fisheries Dynamics and Theme 3: Coastal Oceans Ecosystems Processes) and NOAA-SEFSC. The research hypotheses concern: (1) a larval source – the Dry Tortugas; (2) a hydrodynamic process – Tortugas gyre and associated coastal eddies; and (3) a recruitment pathway – Dry Tortugas to Florida Bay over the southwest Florida Shelf. These three elements are believed to play crucial roles in sustaining marine resources in South Florida. The Dry Tortugas is an important spawning ground and a potential main source of recruits for downstream areas. The semi-permanent Tortugas gyre that resides there for periods of up to three months provides a retention mechanism in a nutrient-rich pelagic upwelling environment. Subsequently, when the gyre propagates towards the Florida Keys as a coastal eddy, it can act as an effective transport and detrainment vehicle, facilitating the migration of pre-settlement stages into the Bay. The inter-island channels along the Keys are recognized gateways for this migration, but an ingress from the west across the Southwest Florida Shelf has distinct possibilities that have yet to be explored. The objectives of the research are to understand (1) the role of eddy processes in higher trophic level dynamics near the Dry Tortugas, and (2) the efficacy of the recruitment pathway connecting the Dry Tortugas with Florida Bay over the SW Florida Shelf. The research plan includes multidisciplinary oceanographic surveys targeting the gyre near the Dry Tortugas during the summer spawning season, and along the proposed pathway across the Shelf to West Florida Bay. Coordinated with investigations in offshore oceanographic processes will be the monitoring of the influx of early stages through nearby channels with concurrent OSCAR (Ocean Surface Current Radar) observations of coastal circulation, and field studies of juvenile

settlement bayside of the channels. Timing and rate of influx and settlement will be correlated with coastal eddy processes. Specimens collected nearshore will also be correlated with larvae found in the Dry Tortugas through age/stage progression or geochemical signatures (trace element analysis of otoliths in fishes) to verify the link between the Dry Tortugas spawning ground and Florida Bay recruitment.