

## **Progress in Assessing Geomorphological Characteristics and Reef Fish Utilization of Reported Reef Fish Aggregation Sites in the Florida Keys, USA**

KEY WORDS: Reef fish, spawning, aggregation, geomorphology, acoustics

TODD KELLISON<sup>1\*</sup>, CHRIS TAYLOR<sup>1</sup>, ARTHUR GLEASON<sup>2</sup>, ALEJANDRO ACOSTA<sup>3</sup>, DANIELLE MORLEY<sup>3</sup>, and MICHAEL FEELEY<sup>4</sup>

*NOAA National Marine Fisheries Service, Southeast Fisheries Science Center, 101 Pivers Island Road, Beaufort, North Carolina 28516 USA. \*[todd.kellison@noaa.gov](mailto:todd.kellison@noaa.gov). <sup>2</sup>University of Miami, Physics Department, 1320 Campo Sano Ave., Coral Gables, Florida 33146 USA. <sup>3</sup>Florida Fish and Wildlife Conservation Commission, Fish and Wildlife Research Institute, 2796 Overseas Highway Suite 119, Marathon, Florida 33050 USA. <sup>4</sup>National Park Service Inventory and Monitoring Program, South Florida and Caribbean Network, 18001 Old Cutler Road Suite 419, Palmetto Bay, Florida 33157 USA.*

## **El Progreso en la Evaluación de las Características Geomorfológicas y la Utilización de Peces de Arrecife de Denuncias de los Sitios de Agregación de Peces de Arrecifes en los Cayos de Florida, EE.UU.**

PALABRAS CLAVES: Peces de Arrecife, agregación, geomorfológicas

## **Les Progrès Réalisés dans l'Évaluation des Caractéristiques Géomorphologiques et l'Utilisation de Poissons de Récif de Sites de Concentration de Poissons des Récifs Signalé dans les Keys de Floride, USA**

MOTS CLÉS: Poissons de récif, concentration, géomorphologiques

### **EXTENDED ABSTRACT**

Fish spawning aggregations (FSAs) are a vital part of the life cycle of many reef fish species. In many cases, a lack of knowledge of the location of FSA sites prohibits their protection and effective management. Therefore, practical approaches to identify undocumented sites and assess their utilization by aggregating species are needed. We used acoustic technologies at reported FSA sites in the Florida Keys, USA, to accomplish two objectives:

- i) Assess whether reported FSA sites are characterized by similar habitat characteristics, with a focus on geomorphological features, and
- ii) Assess reef fish utilization patterns of reported FSA sites, including multiple sites reported to have been “fished out” in previous decades.

To characterize geomorphological features at FSA sites, we used a commercial single-beam acoustic seabed classification system [QTCView Series V; Quester Tangent Corp., Sidney, BC, Canada; see Gleason et al. 2006] to map historical FSA sites in the upper and lower Florida Keys. Results from the upper FL Keys indicated that drowned, margin-parallel, rocky ridges, known locally as outlier reefs, are features found in proximity to all FSA sites studied (n = 6 sites; Gleason et al. In press). Reported FSA sites in the lower Keys (n = 4 sites) were also mapped in proximity to outlier reefs. In both the upper and lower Keys, the reported FSAs were located near steep slopes.

For the fish utilization component, we used split-beam acoustic surveys (120kHz; hereafter “fisheries sonar”) and diver surveys to assess and groundtruth, respectively, fish occurrence and abundance patterns at reported FSA sites. In the upper FL Keys, fisheries sonar and diver surveys were performed in 2009 - 2010 at reported FSA sites during predicted full-moon spawning periods for snappers (summer 2009) and groupers (winter 2010). Surveys confirmed that the snapper aggregation sites continue to be targeted by commercial snapper-grouper vessels during known snapper spawning periods. No fishing was observed at grouper aggregation sites during winter full-moon surveys, a result of recent South Atlantic Fisheries Management Council-enacted regulations prohibiting the landing of shallow-water grouper species during the months of January-April. Moderately elevated densities (relative to densities typically observed in the FL Keys) of mutton snapper (*Lutjanus analis*; n = 2 sites), cubera snapper (*L. cyanopterus*; n = 1 site) and black grouper (*Mycteroperca microlepis*; n = 1 site) were observed on scuba surveys during predicted spawning moons, as were those of several non-snapper-grouper species. However, no aggregations or specific spawning behaviors were observed.

In the lower FL Keys, fisheries sonar and diver surveys were performed in 2010 at reported gray snapper (*Lutjanus*

*griseus*; n = 3 sites) aggregation sites (Lindeman et al. 2000) during predicted full-moon spawning periods. Positive signs of aggregated gray snapper were observed at multiple locations near Key West, including one site where relatively large (~ 35 - 50 cm FL) gray snapper were observed over multiple days in aggregations totaling many hundreds of fish (one diver estimated ~ 800 fish in his field of view, and the aggregation appeared to extend beyond his field of view).

Although positive signs of aggregations have been observed during this ongoing research, particularly in the lower Keys, actual spawning has not yet been observed. Additional surveys are planned in 2011. From a management perspective, results from this project demonstrate the benefit of using acoustic and habitat-based approaches to identify critical reef fish aggregation sites for additional monitoring, research and management focus.

#### LITERATURE CITED

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