A GIS-based Characterization of Commercial Sponge Populations in the Florida Keys, Florida (USA)

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Nearshore hard-bottom communities constitute ~ 30% of the coastal zone of the Florida Keys, Florida (USA). Sponges are characteristic of these communities and several large sponges are commercially fished, representing approximately 1% of the total invertebrate harvest in 1999. *Hippospongia lachne* (sheepswool sponge), *Spongia barbara* (yellow sponge), and *Spongia graminea* (glove sponge) dominate the commercial sponge harvest in south Florida and were the focus of this study. Our goal was to determine the spatial structure of these communities with particular emphasis on the region distribution of commercial sponge species in the Florida Keys. Data were obtained as part of a survey conducted in 2002 of 117 GPS-positioned hard-bottom sites distributed throughout the Florida Keys in a double-stratified (region x depth) design. At each survey site, four 2m x 25m non-overlapping belt transects were surveyed and all sponges > 10cm diameter were enumerated. A GIS model was produced representing the spatial distributions and abundances of *H. lachne*, *S. barbara* and *S. graminea*. For each site, distance to land, water depth, and bottom type classification were used to determine the influence of these variables on the distribution, abundance, and co-occurence of the three sponge species. A kriging interpolation was used as a predictor of abundances in adjacent areas. This information, along with other data collected on hard-bottom community structure, sponge growth, and sponge fishery impacts, will be used to assess the efficacy of current management policy in maintaining a sustainable fishery and healthy sponge communities in the Florida Keys.

KEY WORDS: Sponges, GIS, population assessment, Florida

Caracterización Basada en GIS de las Poblaciónes de Esponjas en Florida Keys, Florida (USA)

Communidades cerca de la orilla de fondo duro constituen 30% de la zona costera de Florida Keys, Florida (USA). Esponjas son características de estas communidades y varias esponjas grandes son pescadas commercialmente,

representando approximadamente 1% de la cosecha total de invertebrados en el año 1999. *Hippospongia lachne*, *Spongia barbara*, y *Spongia graminea* dominan la cosecha en el sur de Florida y son el foco de este estudio. Nuestra meta fue en determinar la estructura espacial de estas communidades con un emphasis en la distribución regional de las especies de esponjas commerciales en Florida Keys. Datos fueron obtenidos en parte de una encuesta realizada en el año 2002 con 117 GPS posiciones de fondo duro distribuidos por todo Florida Keys en un diseño region x profundidad. En cada sitio de la encuesta, cuatro zonas de tamaño 2m x 25m fueron creadas en los cuales todas las esponjas > 10cm fueron contadas. Un modelo GIS fue producido representando la distribución y abundancia de *H. lachne*, *S. barbara* and *S. graminea*. Para cada sitio, una clasificación de la distancia a tierra, la profundidad del agua, y el tipo de fondo fueron usados para determinar la influencia de estas variables sobre la distribución y abundancia de estas tres especies de esponjas. Una interpolacion kringing fue utilizada para predecir las abundancias en zonas adyacentes. Esta información, junto con otros datos collectados en la estructura de las communidades de fondo duro, crecimiento de las esponjas y impactos de la pesca de esponjas seran utilizadas para valorar la efficacia de la corriente póliza en la administración en mantener una pesca sostenible y una communidad de espongas sana en Florida Keys.

PALABRAS CLAVES: Esponjas, GIS, poblaciónes, Florida

Using GIS to Measure Multiple Scales of Topographic Complexity for Reef Fish Assemblage Structure and Species Distribution Analyses

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The diverse variables involved in determining the spatial relationships of reef fish obfuscate predicting their distributions. Topographic complexity (rugosity) ranks high among these variables, influencing reef fish assemblage structure and species distribution. This relationship is scale dependent. Reef fish respond to different scales of topographic complexity according to their body size, habitat use, and behavior. The smaller, resident fishes, such as gobiids or pomacentrids, are influenced by rugosity on a much smaller scale than larger, transient fishes like Scarids or Acanthurids. Therefore, similar to reef fish population assessments, topographic complexity must be sampled at scales appropriate to the targeted organism(s). In most studies, this relationship has been overlooked. One explanation for this oversight is *in situ* rugosity measurements, such as the chain method, are easily attainable for small, linear