# Detection of Fish Spawning Aggregations from Reef Habitats Mapped with High Resolution Side Scan Sonar Imagery

JOSÉ A. RIVERA[1], MARTHA C. PRADA[2], JEAN-LUC ARSENAULT[3],
GARY MOODY[2], and NICOLAS BENOIT[2]
[1]*NOAA/National Marine Fisheries Service*
*Miami Laboratory-Biodiversity and Protected Resources Division*
*HC-01, Box 1736*
*Cabo Rojo, Puerto Rico 00622-9704*
*jarivera@msn.com*
[2]*P.O. Box 2048*
*San Andres Isla, Colombia*
[3]*Geophysique GPR International, Inc.*
*2545 Rue Delorimier*
*Longueuil (Quebec),Canada J4K 3P7*

## ABSTRACT

As part of a multibeam and side scan sonar (SSS) benthic survey of the Marine Conservation District (MCD) south of St. Thomas, USVI and the seasonal closed areas in St. Croix; Lang Bank for red hind (*Epinephelus guttatus*) and the mutton Snapper (*Lutjanus analis*) area, a summary of all fish aggregations and benthic habitats encountered in the SSS imagery was accomplished. The survey covered a total of 18 km² throughout the federal jurisdiction fishery management areas. The complementary set of 28 habitat classification digital maps covered a total of 5,462.3 ha, with the MCDW

consolidated habitats were significantly more abundant than submerged aquatic vegetation (SAV) on unconsolidated sediments or unconsolidated sediments as shown in Table 1. Both MCDW and the MCDE were the areas having continuous coral habitat as the most abundant consolidated habitat, accounting for 41 % and 43 %, respectively. LB and MS areas had their consolidated habitats constituted predominantly by gorgonian plain habitat with 95 % and 83 %, respectively. Coral limestone habitat was more abundant than coral patch habitat and it was found near to the shelf break in MS, MCDW and MCDE. There was minimal coverage for those habitats types at LB. The acquired imagery had high spatial resolution (0.15 m) and allowed the detection of different fish aggregation types. The largest FA densities were located at MCDW and MCDE over coral communities that occupied up to 70 % of the bottom cover. USO's densities were similar among locations and occurred primarily over sand and shelf edge areas. FA's school size was significantly smaller at MS than the other three locations (MCDW, MCDE, LB). This study shows the advantages of utilizing SSS in determining fish distributions and density.

## La Detección de las Agregaciones de Peces de las Áreas Arréciales atravez de Mapas de Imágenes Laterales de Alta Resolución del Sonar

Como parte de la colección de datos para la formulación de un mapa batimétrico y temático utilizando las técnicas de un ecosonda de focos múltiples y un sonar lateral en el distrito de conservación marina (designado MCD en inglés) al sur de la isla de St. Thomas en las islas Vírgenes de los EEUU y las areas de veda en Sta. Cruz; Bajo de Lang para la cabrilla (*Epinephelus guttatus*) y la area denominada como Sama (*Lutjanus analis*), se realizó un censo de todos los cardúmenes identificados en las imágenes del sonar lateral. El censo cubre una area de 18 km$^2$ a través de la region de manejo de pesca en jurisdicción federal. Las imágenes de sonar lateral tienen alta resolución espacial (0.15 m) y permiten la detección de diferentes tipos de cardúmenes. Este estudio demuestra las ventajas en usar el sonar lateral para detectar cardúmenes de peces y estimar sus densidades.

PALABRAS CLAVES: Detección remota de peces, sonar lateral, pesquerias arrecifales