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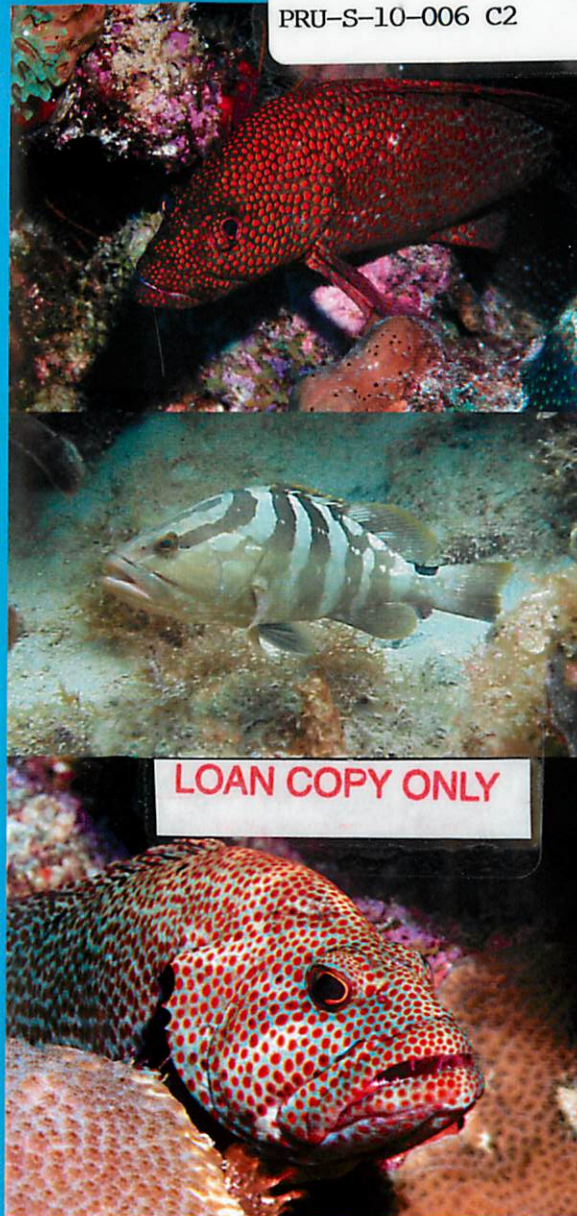www.drna.gobierno.pr

Shallow Water Reef Fish Survey

US Virgin Islands

Caribbean Southeast Area Monitoring and Assessment Program (SEAMAP-C)

Introduction

The Caribbean Southeast Area Monitoring and Assessment Program (SEAMAP-C) started a shallow water reef fish monitoring program in 1988. During the first year, a pilot study was conducted in Puerto Rico by the Fisheries Research Laboratory (DNER); in order to establish an appropriate experimental design for the long-term fisheries independent data collection of shallow reef resources. This combined pilot project was designed to standardize information from PR and the United States Virgin Islands (USVI).

Fisheries independent data collecting surveys are not derived with direct reliance on statistical and biological information collected from comercial fishermen. A properly designed fishery independent survey program will collect data in a consistent and statistically valid format without the potential biases associated with the normal activities of fishermen. The generated fisheries independent data can be used by the National Marine Fisheries Service, the Commonwealth of PR, the Government of the US Virgin Islands and any other public or private institution for management or scientific purposes.

Rational decision making requires a long time series of biological and environmental information to predict fluctuations in resource abundance, which is provided by fisheries independent data. Due to the lack of reliable fisheries dependent data, the fisheries independent data is needed to effectively evaluate management plans. This data can be used to estimate fish production in the insular shelf, catch per unit of effort (CPUE), determine species composition and evaluate annual trends in the fishery. The data is also available for comparison with fisheries dependent data collected under other fisheries statistics programs.

Objectives

- Enable the authorities to collect and disseminate fisheries independent biological and ecological data on shallow water reef fish stock resources, providing scientific information as a long term time series from an integrated, coordinated, and cost effective sampling approach. This data is used to maintain, identify, and quantify the effectiveness of fishery management of reef resources and to restore the fishing stocks to sustain recreational and commercial reef fisheries.

- Enhance the usefulness of the data, i.e. catch per unit of effort estimates (CPUE), changes in species composition, sex ratios, recruitment, spawning maturity, etc. and increase the accessibility of information to fishery managers throughout the Caribbean region.

- Make the data available for comparison with fisheries dependent data collected under other statistic programs in PR and the USVI.

- Coordinate efforts to support regional plans to conserve and manage the fisheries from a Caribbean scope.

- Provide information to support the Caribbean Fishery Management Council's effort to implement and monitor the effectiveness of fishery management plans for fisheries in the USA Economic Exclusive Zone (EEZ).
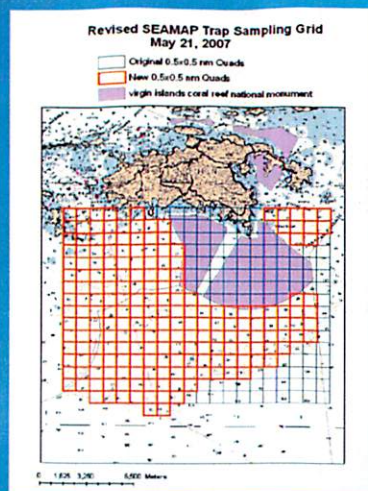
Methodology
Site Selection

Two areas were selected for reef fish sampling, one to the northeast of St. Croix and the other south of St. John. In St. Croix, a 20 square mile area was selected that extends from 1.5 nautical miles west of Buck Island to 5.5 nautical miles northeast of Buck Island onto Lang Bank. A similar area covering 64 square miles and extending 11 km from shore to the shelf edge was also selected south of St. John. Depths on the shelf range from 3.0 to 25.0 meters, while the shelf edge ranges from 25.0 to 50.0 meters before descending to more than 200 meters.

a- Fish Trap Survey

Each monitoring area was divided into 2 x 2 nautical mile quadrants, five in St. Croix and 16 in St. John. Each quadrant was then further divided into sixteen 0.5 x 0.5 nautical mile sub-quadrants. Sampling consisted of a day spent fishing within a single sub-quadrant. Quadrants and sub-quadrants were randomly selected and located using a GPS. Since 1999, the sampling area was stratified into three depth range classes: 0-10 fathoms, 11-20 fathoms and more than 20 fathoms.
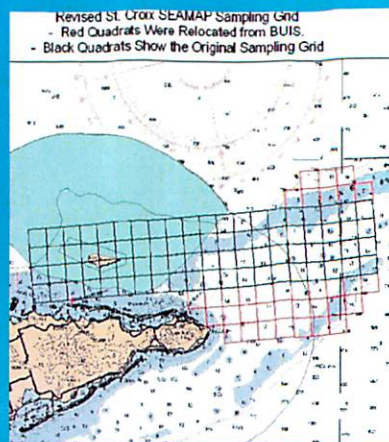
On each sampling trip, 9 to 12 square traps (4 x 4 x 1.5 feet), baited with blue fry (*Jenkensia* spp.) were deployed. Prior to March 1994, all traps were constructed with 1.25 in. mesh, complying with local mesh size regulations. However, following a subsequent change in the regulations, all trap fishing after June 1994 were modified to a larger 1.5 in. mesh.

For each trip, the location, time, depth, total number of traps and soak time was recorded. Distances between traps were approximately 150 feet and each trap was soaked for up to six hours. During the sampling period of 1992 to 2002, traps deployment varied between sets of three traps on a string or a set of single traps. Fish caught were identified by species and trap number, and their total or fork length (mm), weight (kg), sex, and developmental stage of their gonads was recorded.

b- Line Fishing Survey

Fishing was conducted by hook and line while traps were soaking. Each line consisted of three # 6 hooks baited with squid and a sinker.

In St. Croix, hook and line fishing was conducted while drifting, however, in St. John all line fishing was done anchored within the selected sub-quadrant. For the hand line sampling, the number of hand lines and total fishing time by line was recorded for each fisherman. Data from the fish caught by hand line was also recorded as described in the trap survey.

Results

The observed differences in species composition and abundance of trap catch were related to differences in habitat type and water depth (Tobias et al., 2002, 2008). Differences in bycatch and marketable species compositions of hook and line fishing capturing effectiveness are dependent on the specific fishing location (Whiteman, 2005). Independent of the fishing gear, more fish were caught in patch reef and hard bottom habitats than in sand, seagrass or rubble habitats (Tobias et al., 2002, 2008).

A total of 1098 individuals representing 39 species were reported in St. Croix during 1992 to 2002 (Whiteman, 2005), and 1490 individuals representing 65 species caught in St. John. More fishing trips were conducted in St. John than in St. Croix.

During two surveys in St. Croix (Tobias et al., 2002, 2008) and one in St. Thomas / St. John (Tobias et al., 2008), it was observed that traps caught more fish species than handline in St. Croix (15 and 18 vs.18 and 22 species), while in St. Thomas / St. John the number of species caught by both gears were very similar (24 vs. 25 species).

More fish were caught by handline than with traps (Tobias et al., 2002, 2008; Whiteman, 2005). Total percent of species caught between handline and traps were very similar between islands (Tobias et al., 2002); with a similar tendency observed between the surveys of St. Croix and St. Thomas/St. John. In St. Croix during 2002, handline caught fish were 78.0% of the catch and during 2008 it consisted of 70.8%; while trap caught fish comprised 22.0% of the catch in 2002 and 29.2% in 2008. The catch in St. Thomas/St. John during 2008 was distributed as 72.6% and 27.3% by handline and trap, respectively.

Handline biomass captures were also much higher than traps and the percent weight distributions were very similar in the two surveys done in St. Croix and the one in St. Thomas/St. John (Tobias et al., 2002; 2008). In St. Croix, the handline catch by weight represented 83% and 77.7% for 2002 and 2008; while trapcatch by weight represented 17% and 22.2% for 2002 and 2008. For St. Thomas/St. John during 2008, the total catch by weight represented 83.5% and 16.4% for trap and handline, respectively.

Whiteman (2005) and Tobias et al., (2002, 2008) reported similar results for the catch composition from both districts (St. Croix and St. Thomas/St. John), where small serranids dominated the catch. Coney (*Cephalopholis fulva*) dominated the trap catch in St. Croix and St. Thomas/St. John (Tobias et al., (2002, 2008, Whiteman, 2005). Recovery of larger species, especially Nassau groupers in trap catch during 1992-2002, was not observed according to Whiteman (2005).

Fish Traps

Coney was the most abundant species caught in traps, followed by red hind and queen triggerfish (*Balistes vetula*) (Tobias et al., 2008). Trap bycatch for both islands was dominated by small reef fish species, especially butterflyfish (*Chaetodon* spp.) (Whiteman, 2005).

Handline

In St. Croix, the handline catch was dominated by coneys (*Cephalopholis fulva*), red hind (*Epinephelus guttatus*), and tilefish (*Malacanthus plumieri*). Tobias (2002) reported that tilefish was the second most abundant fish caught, coinciding with Whiteman (2005), as a species caught in large numbers. In soft bottom habitats, blue runner (*Caranx crysos*) and grasby (*Cephalopholis cruentatus*) were also important in the total for the handline catch (Tobias et al., 2002).

In St.Thomas/St. John, the most abundant species caught by handline were red hind (*Epinephelus guttatus*), coney (*Cephalopholis fulva*) and yellowtail snapper (*Ocyurus chrysurus*) (Tobias et al., 2008). The most abundant bycatch species reported by Whiteman (2005) for the sampling period of 1992 to 2002 was the ocean triggerfish (*Canthidermis sufflamen*).