Influx of Larval fish in the Sandy Bay - West End Special Marine Protection Zone, Roatán, Honduras

Afluencia de larvas de peces en Sandy Bay - Zona de Protección Marina Especial West End, Roatán, Honduras

Afflux de larves de poissons dans la Sandy Bay – West End zone de protection marine spéciale, Roatán, Honduras

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EXTENDED ABSTRACT

Reef fishes constitute one of the main functional groups of coral reef ecosystems, as they contribute to maintaining the stability and resilience of these ecosystems. The fish life cycle consists of four main stages; pelagic egg, larval, demersal juvenile, and adult stages (Hixon & Randall, 2019) along with intermediate stages that are family/taxa specific. The first two stages are called "Early Life History Stages" (ELH). During ELH, individuals are very small, extremely sensitive to changes in water conditions, and vulnerable to predation, and their dispersion is facilitated by water currents. The larvae return to the reef seeking nourishment and protection. The arrival of larvae and post-larvae to the coast is a critical process in the continuation of the fish life cycle, while also aiding in replenishing reef populations (Sponaugle and Cowen 1996).

This study aims to establish a baseline for research on spatial and temporal patterns, composition, and abundance of fish larvae and post-larvae that arrive at the reefs of the Sandy Bay West End-Special Marine Protection Zone (SBWE-SMPZ) during an annual cycle.

Data on fish larvae were gathered monthly from January to December 2015 during consecutive nights associated with the new moon. Light traps (Sponaugle and Cowen 1996) were set up at two reef sites within the SBWE-SMPZ: Lagoon site and Crest site. The area of study was chosen to determine if the geographical location and topographical features influence the larval species composition. Our samples consisted of egg, larval and post-larval stages of fish of sizes 0.5 mm - 50mm. Light traps create a taxonomic bias for the larvae caught however, a benefit of this approach is that it allows for the collection of a large sample. Identification of larval stages was done using taxonomic keys, web guides, and expert support from El Colegio de la Frontera Sur (ECOSUR). Various invertebrate taxa were also caught in the traps and separated for future studies.

A total of 2506 specimens were recorded in 2015. *Scaridae*, *Engraulidae*, *Clupeidae*, and *Monacanthidae* accounted for 64.7% of the total abundance. 27% of the larvae were not identified because of their small size, indistinct features, and/or because they were damaged, and the remaining 8.3% were represented by eleven families. At the Lagoon station, the families *Scaridae*, *Engraulidae*, *Monacanthidae*, and *Clupeidae* contributed 38.2%, 12.7%, 4.2%, and 2.3% of the total

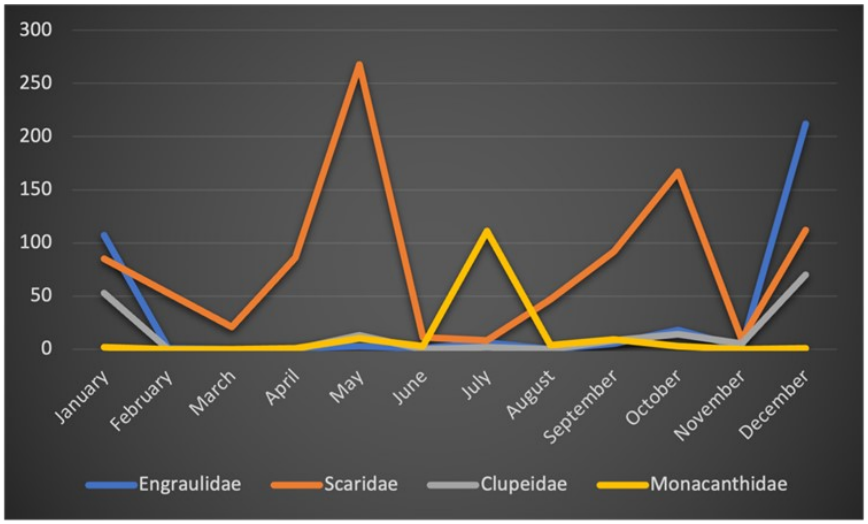

Figure.1. Combined monthly distribution of most abundant Larval fish caught with the light trap from Crest and Lagoon sites in the Sandy Bay West End-Special Marine Protection Zone, Roatan, Honduras in 2015.

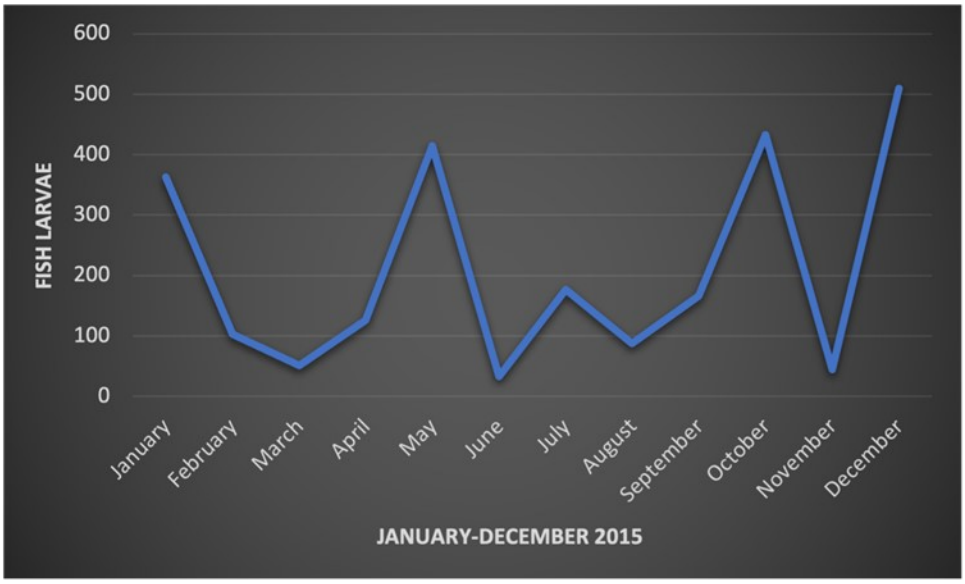

Figure. 2. Combined Monthly distribution of Larval fish caught with the light trap from Crest and Lagoon sites in the Sandy Bay West End-Special Marine Protection Zone, Roatan, Honduras in 2015.

abundance, respectively. The Crest station was dominated by the families *Scaridae* (20.0%), *Clupeidae* (4.3%), *Monacanthidae* (1.6%), and *Engraulidae* (1.5%).

Within the dominant species, *Scaridae* larvae were most abundant in May and October, *Monacanthidae* in July, and *Engraulidae* and *Clupeidae* in January and December (fig.1). The months of May, October, and December presented the highest abundance of fish larvae (Fig.2). Site 1 had a Shannon-Weiner diversity index of 0.89 and site 2 was 0.78. Statistical significance was analysed using t-tests ($p>0.05$) indicating that both sites provided a suitable nursery habitat and are equally responsible for the recruitment and settlement of larvae.

Our results demonstrate the high diversity of larvae arriving at the SBWE-SMPZ to settle in sheltered nursery areas. Our findings indicate a significant contribution of *Scaridae* larvae to the SBWE-SMPZ, a fish family crucial for the proper functioning of reef ecosystems. The high abundance of *Scaridae* larvae is an indicator of the restocking of these ecologically valuable species in the reef systems. Adult *Scaridae* actively stablise the reef, creating optimal conditions for commercially important fish such as those from the families of *Clupeidae* and *Engraulidae*. A large proportion of reef fish in the Caribbean spawn during February, March, and April (Munro et al., 1973). Existing spawning data and collected larval data would allow a deeper insight into the pelagic development times of various Caribbean fish species.

Identification of fish larvae at the species level is difficult and time-consuming without the use of one of the most well-known tools: Genetic identification. Further studies are required to confirm our findings on the temporal and spatial patterns of larvae and post-larvae that enter SBWE-SMPZ. These studies are currently being undertaken.

Our results include the first report on the taxonomic composition and abundance of reef fish larvae arriving at coastal marine habitats in the Sandy Bay-West End Special Marine Protection Zone (SBWE-SMPZ). This preliminary study reflects the first effort made in Roatan, Honduras, and the work needed to understand the recruitment processes of reef fish.

KEYWORDS: Fish Larvae, Light traps, Reef fish, Early Life History Stages, Marine Protected Area

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