VIDEO SAMPLING

Characterization of the least studied fishing communities in and around Professor Luiz Saldanha Marine Park

BIOMARES Program
Task start: 2019

INTRODUCTION

Anthropogenic pressures on marine ecosystems cover practically the entire length of the oceans, resulting in the degradation of marine resources. Marine Protected Areas (MPAs) appear in this context as one of the most used and effective tools in the conservation of the marine environment. Assessing the effectiveness of MPAs depends mainly on the implementation of monitoring programs.

The monitoring of fish communities in the Professor Luiz Saldanha Marine Park has been carried out by visual censuses of fish using diving, a technique that is limited to the maximum depth of recreational diving, which is about 30 meters. The use of high definition video systems allows the monitoring and characterization of the fish communities in the deepest areas of the Marine Park as well as the pelagic communities in its surroundings due to its high autonomy, ease of use and precision in estimating abundances and sizes.

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OBJECTIVE

Characterization of the least studied fish communities within and around the Marine Park using high definition video systems - BRUV (Baited Remote Underwater Video).

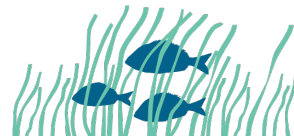More specifically, the following specific objectives have been established:

1- Characterization of demersal fish communities of sand habitats and rocky reef, from the deepest areas of the Marine Park and surroundings, using BRUV.

2- Characterization of pelagic communities in the region adjacent to the Marine Park using drifting BRUVs.

METHODS

Video systems

- Each BRUV built for the purpose of this task, consists of a stainless steel structure where two GoPro 5 Hero Black camcorders were inserted, inserted in watertight boxes specially built for the camera model used. The chambers were fixed at a distance of 80 cm from each other and at a converging angle of 7 ° (Letessier et al 2013). The use of two chambers with this configuration, that is, in a stereo system, allows the estimation of sizes with high precision, of the organisms attracted by the bait that appear in the plane of the chambers.

- Two benthic BRUVs and three pelagic BRUVs were built. Each benthic BRUV has a "Black Molly 3" flashlight (Bigblue AL2600XWP) for video lighting.

- The bait used in the sampling of BRUVs is frozen mackerel (*Scomber colias*), previously thawed before each release.

- BRUV calibration is performed using a calibration cube (100x100x50 cm, Figure 1c) and the "CAL" calibration software, both purchased from SeaGIS (www.seagis.com.au).

- Video analysis and estimation of fish sizes and abundances is carried out using the "EventMeasure" software also from SeaGIS.

- In pelagic sampling, we chose to place three BRUVs joined in series, as shown in Figure 1. The purpose of this design, a 500-meter-long series system, is to minimize the number of zeros in the sample as much as possible (BRUV without registration of individuals).

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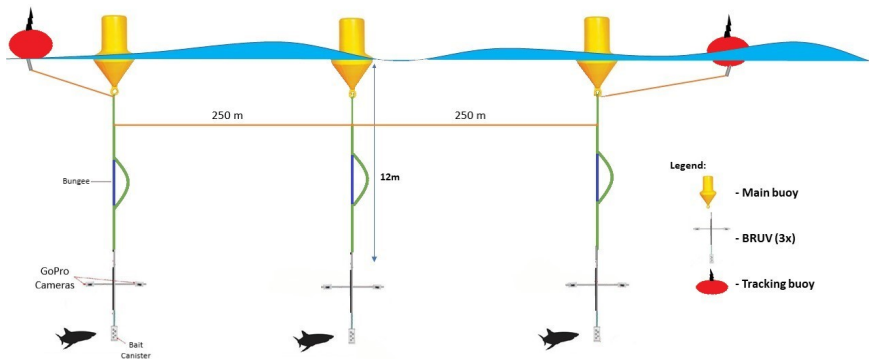
Figure 1. **Outline of the placement of pelagic structures in the water.** Three BRUVs were assembled in series, connected by a 500m cable. This BRUV system drifts freely with the surface ocean currents.

METHODOLOGY

Specific objective 1

Characterization of demersal fish communities from sand habitats and rocky reef, from the deepest areas of and around the Marine Park, through BRUV:

- A total of 54 sampling points were carried out in rocky habitat (habitat 1170) where the structures were placed according to a depth gradient between 15 and 75 meters, in the spring season in 2019 and 2020.

- 193 BRUV were carried out in sand habitat (habitat 1100) in the winter and summer seasons of 2019 and winter of 2020. In each sampling season, 16 BRUVs were carried out in the total protection area, 16 in the partial protection areas and 16 in the complementary protection areas and 8 points outside the Marine Park. The sampling points were arranged according to the depth gradient between 5 and 100 meters.

- Additionally, some sampling points were carried out in the Portinho da Arrábida area in order to start monitoring the fish community associated with the Zostera marina spot and the surrounding area.

Specific objective 2

Characterization of pelagic communities in the region adjacent to the PMPLS using drifting BRUVs:

- The region surrounding the Marine Park is characterized by a great bathymetric variability derived from the presence of the Lisbon-Setúbal submarine cannon system. In order to consider this bathymetric variability in the experimental design, 8 sampling points were established per bathymetric stage (Figure 2), making a total of 24 points.

- All points were sampled in the spring of 2019 and 2020, and 12 points in the fall of 2019.

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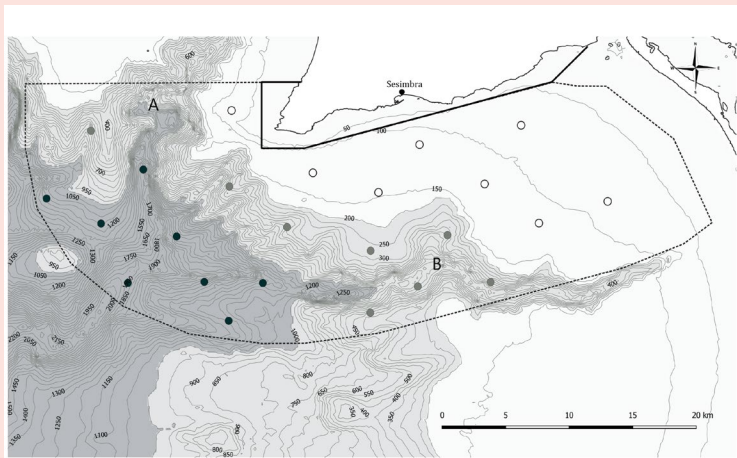
Figure 2. **Experimental design of pelagic BRUVs in an area of 10 nautical miles around the Marine Park.** White zone represents the epipelagic zone (range 0-200m deep), light gray zone the mesopelagic zone (200-100m) and the dark gray zone the bathypelagic zone (> 1000m). White circles refer to the sampling points of the epipelagic zone, gray circles to the points of the mesopelagic zone and the black circles to the points of the bathypelagic zone. Thick black line corresponds to the Park's boundaries, the dashed line to the sampling area and the gray lines to the isobathimetric lines (50m deep intervals). The letter A indicates the submarine cannon of Lisbon and the letter B the submarine canyon of Setubal.

MAIN RESULTS

Specific objective 1)

In a first approach, the observation of the videos was made quickly in order to first identify species. The collected videos are currently being analyzed. The collected data will allow to perceive the existence of differences in the composition of species and abundance of certain species, between the different protected areas and the area adjacent to the Marine Park.

Species of commercial interest were observed, such as hake (*Merluccius merluccius*), lobster (*Palinurus elephas*), Snapper (*Pagrus auriga*), Safio (*Conger conger)* and several species of sea bream, in addition to species with conservation status as are the cases of skate species (Fig. 3).

## MAIN RESULTS

Specific objective 2)

All videos were analyzed, the species identified, and the abundance and size of the recorded individuals. With these data it is intended to evaluate the species composition of the various bathymetric floors, as well as the distribution and population structure of the Blue Shark in the study area.

Some of the fish species seen in the videos were *Prionace glauca*, *Centrolophus niger, Caprus Aper, Trachurus sp.*, *Scomber sp.* and *Isurus oxyrinchus* (Fig.4).

Marine mammal species such as the Fin Whale and the Common Dolphin were also observed (Fig. 4).

Many of the individuals observed are juveniles, which may indicate the existence of a nursery area around the Park for some species.
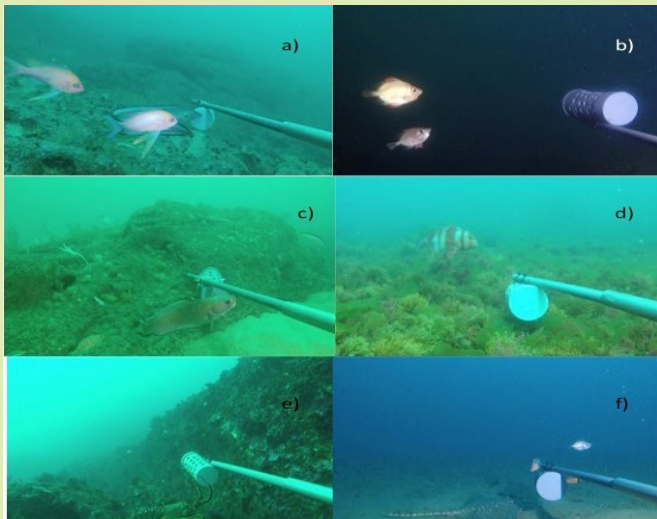
Figure 3. **Demersal species observed in BRUV's in rocky and sandy habitat,** a) *Anthias anthias, Conger conger,* b) *Caprus aper,* c) *Phycis phycis,* d) *Pagrus auriga,* e) *Palinurus elephas,* f) *Raja clavata.*
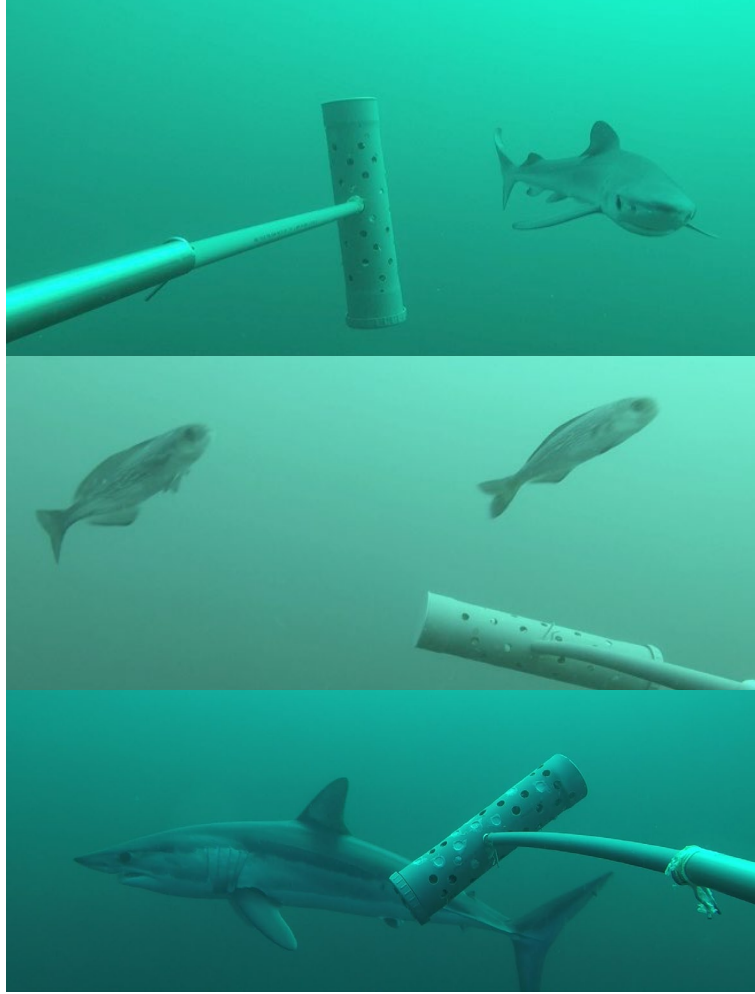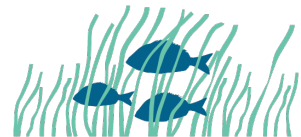
Figure 4. **Fish species observed in pelagic BRUV's:** *Prionace glauca* (blue shark) *Centrolophus niger, Isurus oxyrinchus* (shortfin mako shark)

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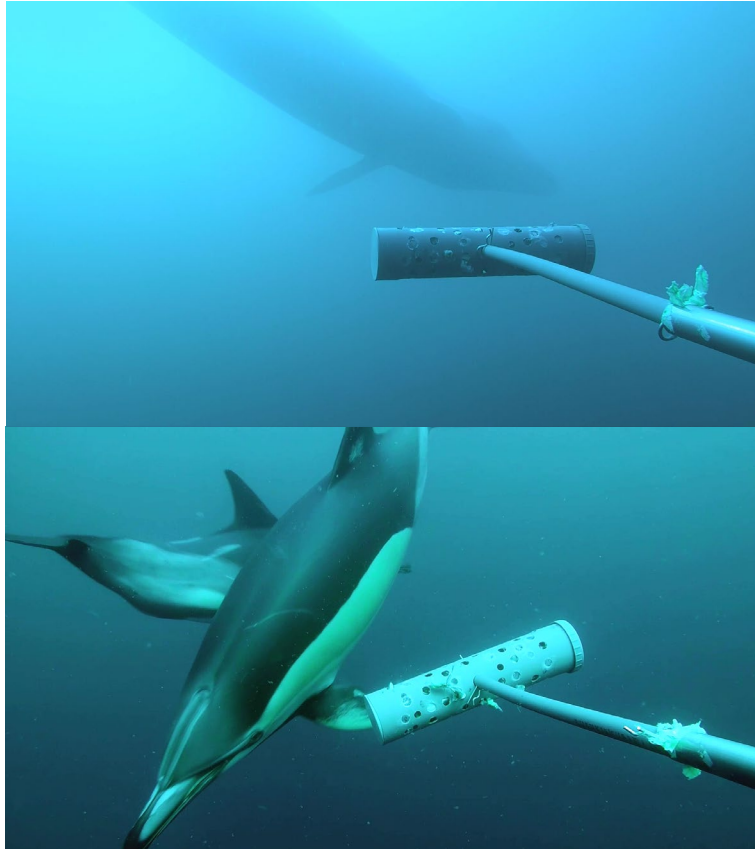
Figure 5. **Species of cetaceans observed in pelagic BRUV's:** *Delphinus delphis* (short beaked common dolphin) e *Balaenoptera physalus* (fin whale).

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