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Distribution and Abundance of Coastal Elasmobranchs in Tenerife (Canary Islands, NE Atlantic Ocean) with Emphasis on the Bull Ray, *Aetomylaeus bovinus*

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Abstract
The current status of the elasmobranchs' populations and distribution in the Canary Islands is uncertain. Here we investigate the abundance and distribution patterns of coastal elasmobranchs of Tenerife, with a special attention on the *Aetomylaeus bovinus* population using a photo-identification methodology. A total of 35 visual surveys were conducted in 5 coastal areas, in which pictures were taken every time an elasmobranch individual was sighted to conduct further biometry analyses. For *A. bovinus* sightings, pictures were used to identify each individual. Relative abundances and sex-ratios of the elasmobranchs recorded were calculated. The Western Coastline of the island was more diverse, showing 8 species out of the 9-total observed. The photo-identification technique allowed a preliminary estimation of the population size of *A. bovinus* in El Palmar area with 10 individuals identified and 10 re-sightings over a period of 12 months. This study provides the first relevant information regarding broad distribution, abundance and diversity of coastal elasmobranchs around Tenerife. The study also provides information regarding site fidelity of 3 mature individuals of *Aetomylaeus bovinus* in the South West area.

Keywords Elasmobranch · Distribution · Abundance · Diversity · *Aetomylaeus bovinus* and photo-identification

Introduction

Shark and ray populations have been greatly decreasing in the last decades due to overfishing and habitat degradation. Currently, 16% of rays and 20% of shark species are classified as threatened by the International Union for Conservation of Nature (IUCN), but 40% of the elasmobranch's species are considered data deficient (Dulvy et al. 2014). The Canaries are known to have a high marine biodiversity of both pelagic and benthic elasmobranchs (Brito et al. 2002). The elasmobranch populations of the islands are subject to intensive fishing (recreational and commercial) (Mendoza et al. 2018), as well as habitat degradation caused by the spread of coastal development for harbours or touristic resorts (Riera et al. 2014). As such, the proliferation of the sea urchin *Diadema africanum* due to ocean warming and overfishing of the predators (Clemente et al. 2007), has caused acute damage on the coastal rocky ecosystems of the islands. This particular habitat degradation, affects the populations of fish and invertebrates of these ecosystems on which the coastal elasmobranchs depend to prey on (Brito et al. 2002).

The distribution of coastal elasmobranchs species around the island of Tenerife are certainly unknown. There have been some studies in the last years directed to elasmobranchs, but focused on the fisheries of the sharks and rays of the Canary Islands (Mendoza et al. 2018). Some studies have focused on the critically endangered Angel Shark, *Squatina squatina* (Escánez et al. 2016; Meyers

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et al. 2017). As such, one of the coastal areas surveyed in this research is Las Teresitas beach, which has been previously reported as a nursery for a critically endangered angel shark species *Squatina squatina* (Escánez et al. 2016), where juveniles of this species can be found throughout the entire year. Nevertheless, studies focusing on the ecology of other coastal elasmobranchs species from the Canary Islands remain absent.

The species *Aetomylaeus bovinus* (St. Hilaire G. 1817) belongs to the Myliobatidae family in the Myliobatiformes' order, which is a group commonly known as eagle rays. The genus *Aetomylaeus* is composed of 6 species, and the species of the genus are commonly known for bull rays. This coastal myliobatiformes can grow up to 2 m disk wide(DW), with a 2.2 m total length (TL) of maximum known length in a female (Dulčić et al. 2008). Its reproduction is matrotrophic viviparous with a gestation period of 5–6 months, and a size at birth that goes from 25 to 45 cm DW (Jabado et al. 2021). This demersal semi pelagic species inhabits coastal tropical and warm temperate waters ecosystems, so it is distributed along the south, north and west Africa, including the Canary Islands and the Mediterranean Sea (Jabado et al. 2021; Dulvy et al. 2014). Known locally in the Canaries as "Raya Obispo'' or "Peje Obispo", *A. bovinus* is globally classified as critically endangered (CR) according to the IUCN, with a decrease of 80% of their populations in the last 51 years (Jabado et al. 2021). The principal reason for the greater risk of this elasmobranch is being a large body shallow water species, with a narrow depth range from 0-150 m (Dulvy et al. 2014). This makes it a common catch across most of the range of this species in the increasing fishing activities in the recent decades (Jabado et al. 2021). Furthermore, the west African region has some of the highest levels of illegal, unreported and unregulated fishing in the world, exceeding more than 40% the legal catches for the species of the region (Pauly and Zeller 2016). In order to improve the ecological knowledge regarding the CR species *A. bovinus*, alternative methodologies to study its populations must be considered. As such, recent studies focused on using photo-identification methods to identify each individual of the population, which is key for monitoring a population contributing to its conservation (Solleliet et al. 2018). This research will employ this technique to study *A. bovinus* in the island of Tenerife, in order to gain valuable information regarding this CR ray.

Photo-identification is a robust and widely accepted methodology for the study of many shark and ray species in the last decade such as the whale shark, *Rhincodon typus* (Graham and Roberts 2007), the reef Manta-Ray, *Manta birostris* (Marshall et al. 2011) or the zebra shark, *Stegostoma fasciatum* (Dudgeon et al. 2008) The photo-identification methodology for *A. bovinus* has recently been proven to be of great potential to study this species (Solleliet et al. 2018), so a photo-ID protocol was developed to study a local population in Tenerife.

The current situation of elasmobranchs which inhabit the coast of Tenerife is unknown due to the lack of in-depth studies. As such, our study aims to investigate the status of the distribution and relative abundance of most of the coastal elasmobranchs which can be found in the coastal shores of Tenerife, as well as compiling the first information about the population of *A. bovinus*.

Material and Methods

Study Area

This study was conducted in the eastern and western coastlines of Tenerife, the largest island of the Canary archipelago with 2,034 km^2 and 342 km of coastline. The northern coastline was not included due to prevailing harsh ocean conditions, that together with the presence of a steep coastline, made impossible to undertake the surveys. Within the eastern and western sides of the island, four areas were sampled: north eastern (NE) area, south eastern (SE) area, north western (NW) area and south western (SW) area. The SW area was divided in two areas, "El Palmar'' and "Los Cristianos". As such, the study was carried out in 5 coastal areas of Tenerife.

The surveys of the NE area were conducted at "Las Teresitas'' beach (Fig. 1), a sheltered sandy artificial beach with a breakwater. The SE area surveys took place at Abades (Fig. 1), an area characterised by the presence of the seagrass *Cymodocea nodosa*. The surveys on the NW area were conducted in "Los Gigantes" (Fig. 1), where sandy-rocky bottoms prevailed. High levels of boat traffic were present due to the existence of a marina. The SW area was located at "Los Cristianos", and it was split in two. The first was located north of the cliffs of "Guaza Mountain", including the beach and harbour of "Los Cristianos". The second subarea was located south of the cliffs, in "El Pal-mar Bay" (Fig. 1). Furthermore, sandy-rocky bottoms prevail in both subareas.

Data Collection

The underwater visual census method following the Roving Diver Technique (RDT) was used to estimate abundances of elasmobranchs. RDT consists of a group of divers swimming freely without any assigned direction, so the track of the survey is random. As such, this method is efficient to study species with a low sighting rate, since it allows to survey larger areas in shorter time periods and allows the observers to swim freely towards the animal to collect data, e.g. taking a picture. Due to elasmobranchs being relatively rare,

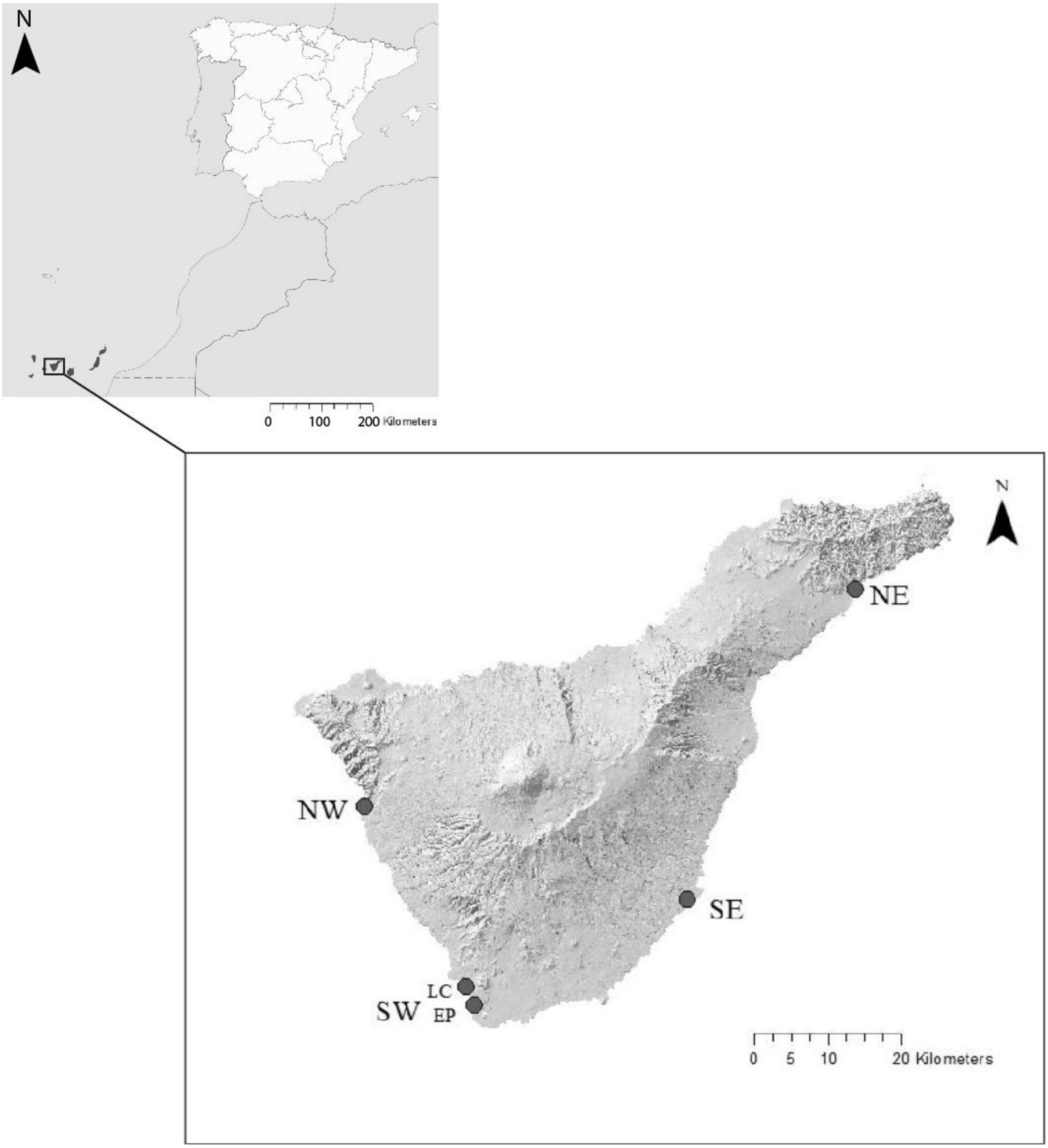

Fig. 1 Map of study areas in Tenerife (Canary Is., NE Atlantic Ocean). NE (Las Teresitas), SE (Abades), NW (Los Gigantes), LC (Los Cristianos, area SW) and EP (El Palmar, area SW)

this methodology was chosen over conventional underwater transect methods (Ward-Paige and Lotze 2011).

Surveys were conducted by snorkelling buddy teams for a minimum time of two hours (day-night variation has been excluded from this study). 35 snorkelling surveys were conducted between October 2017 and June 2019, with a total of 70 h. The depth of the surveys has been limited to a maximum of 20 m due to freediving constraints. An underestimation of elasmobranch abundances may be expected due to the lack of extensive sandy bottoms in the Canary archipelago, mostly formed by rocky substrates and mixed bottoms (sandy-rocky).

An Olympus-TG5 camera was used to gather pictures of the sightings. Two underwater lasers were incorporated to the camera and they were conveniently calibrated. These lasers were used to estimate individuals' sizes employing laser photogrammetry technique (Deakos 2010; Webster et al. 2010). Every time an elasmobranch was sighted, it was sexed, and notes were taken regarding the behaviour of the animal at the moment of the encounter. Regarding the photo-identification treatment for *A. bovinus*, pictures had to be taken with an 90º angle, and a maximum variation of 30º, aiming to avoid parallax errors (Rohner et al. 2011). ImageJ software was used to analyse both the Photo-ID pictures of *A. bovinus*, and to measure the elasmobranchs (using the lasers attached to the camera, Fig. 2). A specific procedure was followed for the measurement and Photo-ID treatments, following the method of Solleliet et al. (2018).

The measurement treatment started by setting the 20 cm between the laser dots as a scale on ImageJ. Then, several body measurements were taken. A visual estimation of the individual size was also recorded and considered whenever photographs were not of a good quality or absent. To conduct the Photo-ID treatment of the bull ray, the area of interest was selected, which consisted of each individual's body without the tail. The photo identification area for this species represent a rectangle of which each corner is defined by the respective left eye, right eye, right pelvic fin and left pelvic fin (Fig. 2). Pictures were turned into a binary black and white result using ImageJ, so the differences became more apparent during the visual comparison (Fig. 2).

This study faced certain limitations such as the lack of a seasonality despite the study having taken place for 2 years (2018 and 2019). As such, the winter effort has been limited due to rough weather conditions, for which the majority of the sightings occurred during summer season. Overall, environmental variables like water temperature, turbidity or weather condition have an effect on elasmobranchs (Schlaff et al. 2014). However, these abiotic variables have not been considered in this investigation.

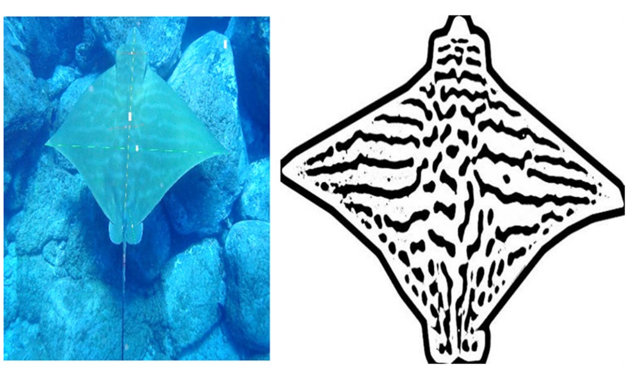

Fig. 2 Examples of the treatments carried out using the software Image J. On the left picture it is shown the measures of a individual of the species *Aetomylaeus bovinus*. On the right picture it is presented other individual of the same species, with its pattern already turned into black and white

Data Analysis

Surveys where no elasmobranch was sighted were excluded from the data analysis. Relative abundances were used to avoid overestimation of abundances of the studied species.. This methodology is broadly used in fisheries, employing catch per unit of effort in that case to measure relative abundance (Watters and Derriso 2000; Cardinale et al. 2009). The relative abundance per unit of effort (OPUE) was calculated using the total hours of effort employed for the surveys at each area, and the hours of effort needed to sight each one of the species from the area. The relative abundances were obtained from the relation between the necessary OPUE to sight a species with the total OPUE employed on an area to sight all the species.

Mean total length (TL) and sex ratio were calculated for each species at each study area. For the species *Gymnura altavela*, disk width (DW) was used instead of TL. Individuals which sexes were unknown were not included in the analysis of the sex ratios.

Finally, ArcGIS software was used to map the sightings of the elasmobranch species recorded in the surveys.

Results

Relative Abundances and Distribution of Elasmobranchs

A total of 237 elasmobranchs belonging to 9 species were sighted during 70 h of surveys. Namely, 3 species of Dasyatidae (*Dasyatis centroura, D. pastinaca* and *Taeniura grabata*), 1 species of Gymnuridae (*Gymnura altavela*), 2 species of Myliobatidae (*Aetomylaeus bovinus* and *Myliobatis aquila*), 1 species of Squatinidae (*Squatina squatina*), 1 species of Torpedinidae (*Torpedo marmorata*) and 1 species of Triakidae (*Galeorhinus galeus*) (Table 1). Relative abundances showed that the most abundant species were *G. altavela* (46% of sightings) and *D. pastinaca* (22% of sightings), with 110 and 52 individuals, respectively. The species *T. grabata*, *A. bovinus and S. squatina* were reported in 25 (10% of sightings), 21 (8% of sightings) and 16 sightings (6% of sightings), respectively (Table 1). In contrast, *T. marmorata, G. galeus* and *D. centroura* were the least abundant species, with 3 sightings (1%) for the first species and 1 (0,004%) for the remaining two. The number of sightings of *M. aquila* was also relatively low with only 7 sightings (Table 1).

Only 3 species were sighted in the NE area: *D. pastinaca, G. altavela* and *S. squatina* (Table 1). Within this area, the most abundant species were *G. altavela* and *S. squatina*

Table 1 Relative abundances per unit of effort of each species of elasmobranch sighted at every study area: North east area (NE), south east area (SE), north west area (NW), south west area (SW): Los Cristianos (LC) area and El Palmar area (EP). TN: Total number of sighting per species. The surveying time spent in each area can be seen (in hours) in the first row

Species	NE (18 h)	SE(12 h)	NW(8 h)	SW (LC) (8 h)	SW (EP) (24 h)	TN
A. bovinus	0	0	0	0	0,24	21
D. centroura	0	0	0	0	0,01	1
D. pastinaca	0,09	0,08	0,14	0,18	0,45	52
G. galeus	0	0	0,03	0	0	1
G. altavela	0,55	0	0,55	0,72	0,05	110
M. aquila	0	0	0,03	0,1	0,04	7
S. squatina	0,36	0,92	0	0	0	16
T. grabata	0	0	0,25	0	0,17	25
T. marmorata	0	0	0	0	0,03	3

(Fig. 3). In the SE area, *S. squatina* clearly prevailed with the highest abundance; only *D. pastinaca* was recorded in the area, but with an extremely low abundance (< 10%) (Fig. 3).

The most abundant species in the NW area was *G. altavela* (55% of the sightings), followed by *T. grabata* and *D. pastinaca.* The species *M. aquila* and *G. galeus* were scarce. Also,

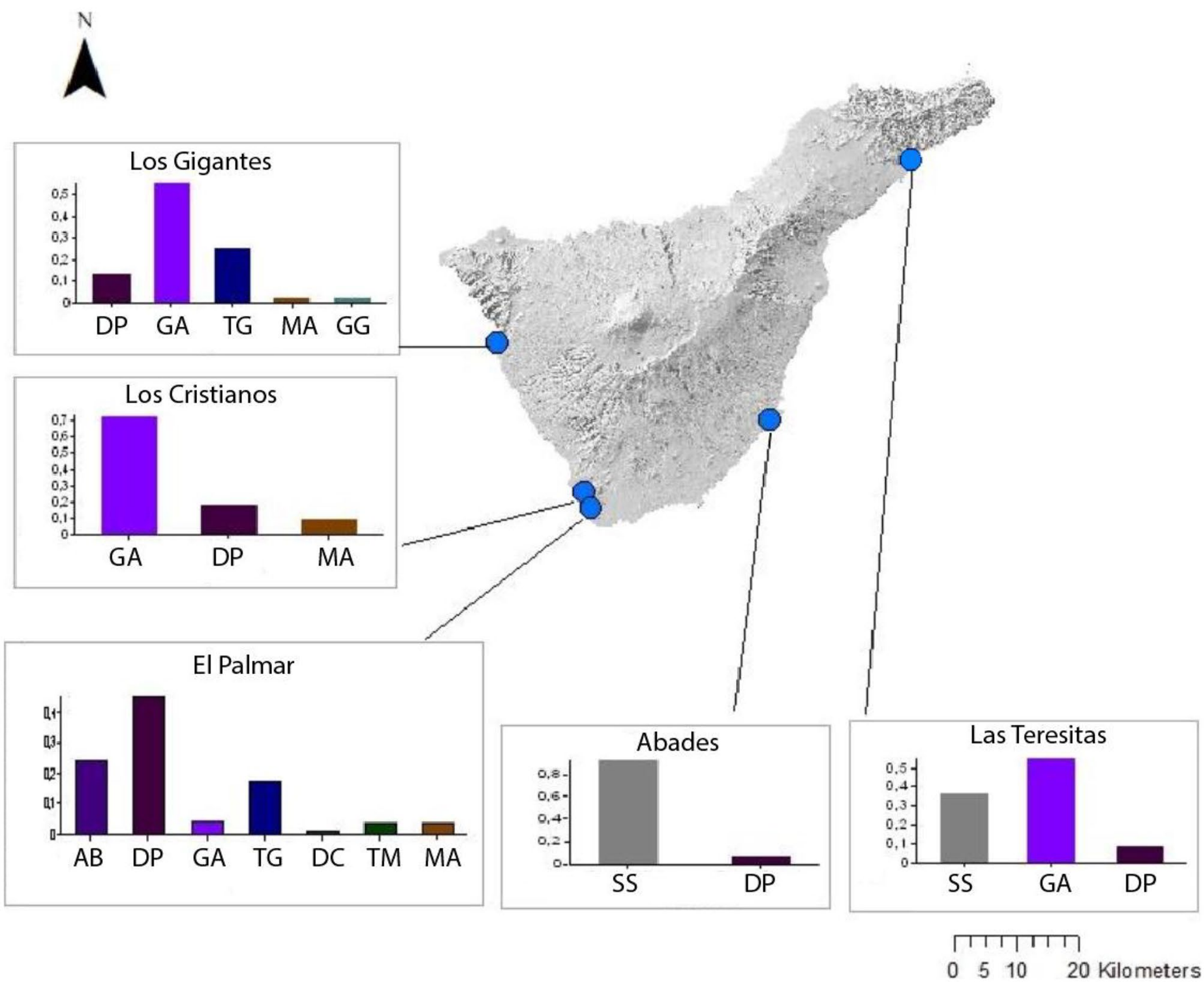

Fig. 3 Distribution map for the coastal elasmobranchs' species sighted at the 5 different study areas. Each area has represented the relative abundance based on the survey effort employed on each one of the species registered (DP: Dasyatis pastinaca, GA: Gymnura altavela, SS: Squatina squatina, MA: Myliobatis aquila, DC: Dasyatis centroura, AB: *Aetomylaeus bovinus*, TG: Taeniura grabata, GG: Galerhinus galeus, TM: Torpedo marmorata

the species *G. galeus* was only found in this area (Table 1). The two SW sub-areas showed different abundance patterns. *G. altavela* was the most abundant species in Los Cristianos, while the other 2 species reported in this area, *D. pastinaca* and *M. aquila,* showed low abundances. The highest number of species was found in El Palmar, where 7 species were sighted out of the 9 species recorded in the study: *A. bovinus, D. pastinaca, D. centroura, G. altavela, T. grabata, T. marmorata, M. aquila* (Table 1). It is the only area where the species *A. bovinus, D. centroura* and *T. marmorata* were recorded. The less abundant species was *D. centroura,* with only one sighting. The most abundant species in El Palmar was *D. pastinaca,* making up 45% of the total sightings in the area (Fig. 3 and Table 1).

The sex ratios showed a greater proportion of females relative to males in all species. When the species only had one sighting, this individual was a female in both cases (*D.* centroura and *G. galeus*) (Table 2). The species which showed the highest proportion of males were *S. squatina* (36%), followed by *T. marmorata* (25%). The species that showed the largest mean total length were *T. grabata* (143.28 ± 28.67 cm) and *G. altavela* (142.00 ± 33.42 cm). For *S. squatina*, over 50% of sightings belonged to juveniles, so the mean total length was low, of 62,06 ± 48.44 cm (Table 2). However, for the other species the sightings of juveniles were occasional and not enough to be remarked as for the *S. squatina.*

Photo-Identification of *Aetomylaeus bovinus*

21 specimens of *A. bovinus* were sighted in 7 surveys, but exclusively in the SW area of El Palmar (Table 1 and Fig. 3). 10 individuals were photo-identified in this area (Fig. 4). All the individuals identified were females, with sizes ranging from 103.07 to 158.05 cm TL (Table 2). The individual C and F were re-sighted once, and individual D was re-sighted 8 times. A total of 10 re-sightings within one year (summer 2018 – summer 2019) supports the hypothesis that these individuals have certain residency patterns in the area.

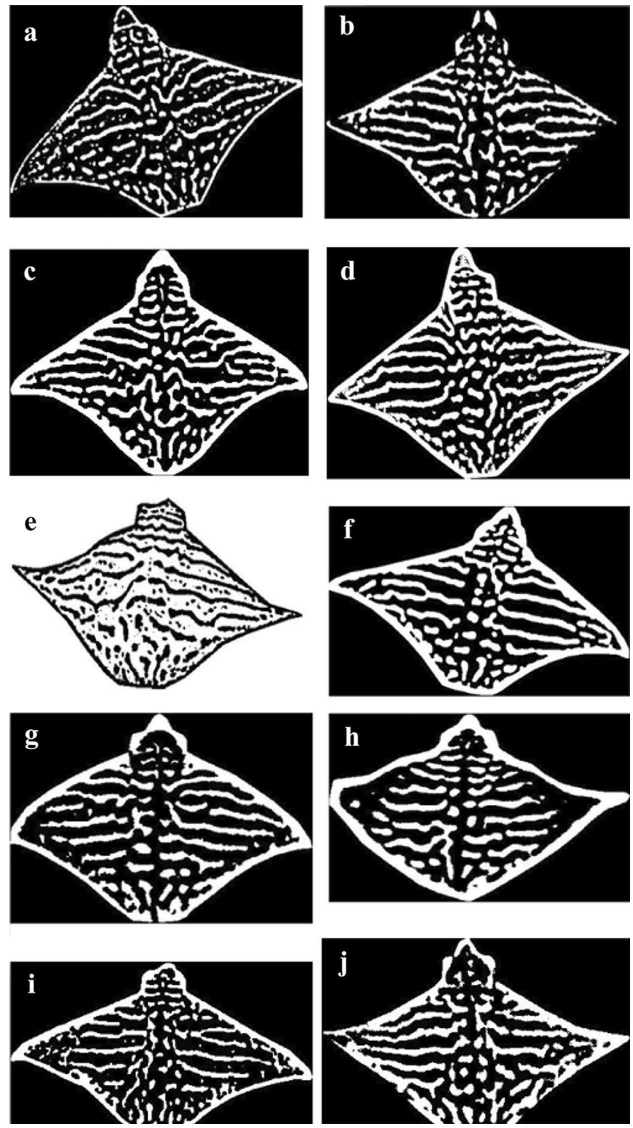

Fig. 4 Pictures of all the individuals identified in El Palmar area (SW) from **a-j**. The pictures have been transformed to black and white following the method described by Solleleit et al. 2018

Table 2 Table of sex ratios (%) and mean total length (cm) of each elasmobranch species recorded in the study. F: female; M: male

Species	Sex ratio (F/M) %	TL ± SD (cm)
A. bovinus	100/0	129.86 ± 18.81
D. centroura	100/0	-
D. pastinaca	85/15	55.65 ± 15.88
G. galeus	100/0	131.20 ± 0
G. altavela	95/5	142.00 ± 33.42
M. aquila	100/0	38.39 ± 20.65
S. squatina	64/36	62.06 ± 48.44
T. grabata	90/10	143. 28 ± 28.67
T. marmorata	64/36	-

Discussion

The current status of the coastal elasmobranchs in Tenerife has been established, providing relevant information about the abundance of 9 species of the families Dasyatidae, Gymnuridae, Myliobatidae, Squatinidae, Torpedinidae and Trikidae. This may be useful for future monitoring of the populations and for developing future studies on coastal elasmobranchs in the Canary Islands. The Roving Diver technique has proven to be an effective technique to conduct this type of research in the Canary Islands, sighting a total of 237 elasmobranchs in 35 surveys. Regarding the elasmobranch biodiversity, the western coastline of Tenerife island showed higher diversity (8 species) than the eastern coast (3 species). As such, more in depth studies regarding these coastal elasmobranch species should be carried out in the western coastline. We here bring important knowledge regarding elasmobranch species which are either critically endangered, endangered or remain data deficient according to the IUCN (Table 3).

Seven species out of the 9 sighted were benthic rays, which can be found frequently in shallow waters of the Canary archipelago (Brito et al. 2002). Two species of shallow benthic sharks have been sighted: *Galeorhinus galeus* and *Squatina squatina*. More effort should be considered in the NE and NW areas in order to increase the potential findings of more common coastal shark species in the Canary Islands, such as *Mustelus mustelus* (Brito et al. 2002). Night-day variation was not included in this study, but it is possible to infer that the sightings of sharks occurred afternoon (*G. galeus*) or at night (*S. squatina*), as some previous studies suggest (Escánez et al. 2016).

The presence of the Angel shark was restricted to the eastern coastline (NE and SE), which might be explained by how these areas are sheltered relative to the remaining areas. Las Teresitas (NE area) has already been claimed as a nursery for the Angel shark, complementing the three criteria for a shark nursery area (Heupel et al. 2007). From the results obtained here, Abades (SE area) copes with 2 criteria: Sharks are more commonly encountered in the area than in others, and sharks have a tendency of remaining or returning for extended periods.

The most abundant species was *Gymnura altavela*, which may be explained by the large aggregations of individuals on the shores of the Canary Islands during summer season. The species *G. altavela* and *Dasyatis pastinaca* are the only ones which can be found in both eastern and western coastlines. This is due to these species being the most frequent species on mixed (sandy-rocky) seabeds in the Canaries (Brito et al. 2002). The less abundant ray species were *Torpedo marmorata* and *Myliobatis aquila*. According to the testimony of several dive centres, these species are "rare" to sight in Tenerife (*pers. comm.*).

Table 3 Global and European conservation status for each one of the coastal elasmobranch species sighted in this study

Species	Global conservation status IUCN	European conservation status IUCN
A. bovinus	Critically endangered	Critically endangered
D. centroura	Data deficient	Data deficient
D. pastinaca	Data deficient	Data deficient
G. galeus	Critically endangered	Vulnerable
G. altavela	Endangered	Critically endangered
M. aquila	Critically endangered	Critically endangered
S. squatina	Critically endangered	Critically endangered
T. grabata	Data deficient	Data deficient
T. marmorata	Data deficient	Low concern

Most of the elasmobranchs sighted were reported as females. Females from the species *D. pastinaca, T. grabata* and *G. altavela*, were visibly swollen on their abdomens, which may indicate these individuals were potentially pregnant. Moreover, calm behaviour (usually resting in the sand) was observed in these potentially pregnant females. *G. altavela* mating behaviour was observed in mature individuals, males larger than 78 cm DW and females larger than 67 cm DW (Capapé et al. 1992) in Los Cristianos during the summer season. Aggressive male behaviour when approaching the larger females at shallow waters was characteristic (J. Moreno *pers. obs.*). Regarding *D. pastinaca*, the sightings of potentially pregnant females (> 62 cm TL) observed in El Palmar area were substituted by sightings of new-born individuals in the following surveys during the summer season (Yigin and Ismen 2012). It is known that aggregations of *G. altavela* occur in shallow waters of Tenerife during summer (*pers. comm.*). The nature of these aggregations is still unknown, but we hypothesize that breeding and reproductive activities could be the explanation for them after the observations of this study. Nevertheless, further research is required to make reliable conclusions about the mating and pupping grounds of these species in Tenerife.

It must be considered how the inherent characteristics of some of the study areas could affect the presence of elasmobranchs; namely, the presence of aquaculture farms and "ray-feeding" activities for tourist attractions at the SW area. Several diving centers in the area conduct this "feeding" activities on the green turtles (*Chelonia mydas*), and on the ray species *D. pastinaca, T. grabata* and *Aetomylaeus bovinus*. This practice has been undertaken for years, showing the speciments an opposite behaviour to shyness regarding humans. Instead, they would conduct numerous vigorous approaches to the divers looking for food (J. Moreno *pers. comm.*). These activities have an effect on elasmobranchs, as previously observed in Gran Canaria, where fish and ray abundances were much higher at the areas close to the farms (Boyra et al. 2004). As such, not only they have gotten used to human presence, but to relate human presence with food. It should be remarked that no pelagic shark has been observed close to the aquaculture farms area in this study. This could be due to coastal species of smaller size tending to reside near the farms, against the higher range of distribution of pelagic sharks, which tend to frequent the farms for short periods of time (Papastamatiou et al. 2010).

As such, the results showed that the area of El Palmar beholds the highest diversity, which can be explained by the presence of farms, attracting fishes by providing an easy and permanent source of food as observed in previous studies (Boyra et al. 2004; Loiseau et al. 2016; Papastamatiou et al. 2010). Knowing that the western coastline beholds higher biodiversity of elasmobranchs, future studies should focus on the El Palmar area, and use the NW area of Los Gigantes as a “control”. It would be interesting to explore the high diversity at Los Gigantes without the presence of any aquaculture farm. Increasing the sampling effort, future studies could be focused on the seasonality of the different species, and if the presence of the aquaculture farms are affecting the residency or seasonality of the elasmobranchs.

Population of *Aetomylaeus bovinus*

A. bovinus is a critically endangered ray species, whose populations have been severely depleted in the last years due to overfishing (Jabado et al. 2021; Dulvy et al. 2014). The low abundance of this species reported in the present study fits to those reported in previous studies, in the Mediterranean sea (Walls and Buscher 2016) and globally (Jabado et al. 2021). As such, we here shown a highly valuable information on this species, studying a population through visual census surveys. Our study supports the hypothesis of a stable population of *A. bovinus* at El Palmar, conformed at least by 10 females with sexual maturity sizes (> 60 cm DW, Jabado et al. 2021). This study is a baseline to conduct further studies on this critically endangered species, in order to expand the knowledge regarding its population structure, i.e. genetic studies, seasonality and residency or diet studies.

It has not been possible to explain why all *A. bovinus* individuals at El Palmar were females. A possible hypothesis to explain this may be habitat segregation of males and females in elasmobranchs (Kock et al. 2013). Another possible cause is that aquaculture farms may provide a habitat where food is abundant, which could be used as a reason for the females to remain close by. The dive centers testimony on how these female individuals (which have been fed by the diving industry for years) have been sighted in the area for several years, supports the hypothesis of a stable population of the species located in El Palmar. Bull rays have a diet based on small fish and invertebrates (Brito et al. 2002). According to the diving industry from the area, after several years practising feeding on *A. bovinus*, its favourite meal is small squids, denying any kind of fish bait when there are squid bait around. During these dives, the bull rays tend to appear conforming groups of various individuals, circling the divers and looking for the bait (J. Moreno *pers comm*). Afterwards, once the food is gone, the same group leaves at the same time. As such, they might display some kind of group formation like other ray species such as *Mobula tarapacana* (Sobral and Afonso 2014). Nevertheless, further investigation on the bull ray diet (stomach content analysis) and social behavior is required to infer any conclusions.

The photo-identification method provided evidence of re-sightings of this species which supports the idea of residency patterns for the species at El Palmar. The 10 re-sightings along a maximum period of 12 months support the potential of photo-identification method to study *A. bovinus*, creating a valuable database for future monitoring and assessment studies of this critically endangered species.

Conclusions

1. The current status of the coastal elasmobranchs in Tenerife has been preliminarly established, providing relevant information about the abundance of 9 species of the families Dasyatidae, Gymnuridae, Myliobatidae, Squatinidae, Torpedinidae and Trikidae. This may be useful for future monitoring of the populations and for developing future studies on coastal elasmobranchs in the Canary Islands.
2. A total of 237 elasmobranch sightings recorded in 35 surveys have proven that the free-swimming surveying technique (known as “Roving Diver Technique”, RDT) is highly efficient for the study of elasmobranchs in the Canary Islands.
3. The areas of the Western coastline of Tenerife, with a total of 8 species recorded, showed a higher coastal elasmobranch diversity than the Eastern coastline, where only 3 species were sighted, *Squatina squatina, Dasyatis pastinaca* and *Gymnura altavela*.
4. The rays *Dasyatis pastinaca* and *Gymnura altavela* were the most abundant species. Other species such as *Dasyatis centroura*, *Galeorhinus galeus, Myliobatis aquila* and *Torpedo marmorata* were more occasional species, being only observed in the western coastline of Tenerife. The occurrence of the angel shark, *Squatina squatina*, was restricted to protected bays of the eastern coastline.
5. The photo-identification method has been successfully applied to the population of *Aetomylaeus bovinus* located in El Palmar, estimating its population size to 10 individuals. A total of 10 re-sightings showed site fidelity of 3 individuals during the study. The discovery of a potential stable population of *Aetomylaeus bovinus* in El Palmar area, is the perfect baseline for future studies focusing on this critically endangered species.

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Declarations

Ethics Approval No animal has been harmed during the conduction of this research.

Consent to Participate Not applicable.

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Conflict of Interest On behalf of all authors, the corresponding author states that there is no conflict of interest.

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