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Assessment of Morphometric Characteristics and Conservation Challenges of Pteroplatytrygon Violacea (Bonaparte, 1832) in Libyan Waters

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Abstract

The pelagic stingray *Pteroplatytrygon violacea*, a vulnerable species with limited protection measures, is an incidental catch in both artisanal and industrial Libyan fisheries. This study examines the morphometric characteristics and conservation challenges faced by this species in Libyan waters, aiming to enhance knowledge of its biological attributes and inform future conservation efforts. A mature female specimen was collected off the coast of Tripoli, Libya, and analysed for its morphometric parameters, including total weight, disc width, and various head measurements. The specimen had a total weight of 1519 g, a total length of 92.5 cm, and a disc width of 39.3 cm. Conservation risks to *P. violacea are* high due to bycatch in longline fisheries targeting species such as tuna and swordfish, as well as additional pressures from trawling and gillnetting. The species, listed as threatened by the IUCN, has not yet benefitted from targeted conservation measures. This research underscores the importance of establishing species-specific conservation initiatives, including detailed population assessments and bycatch monitoring, to address the threats facing *P. violacea* in Libyan waters.

Keywords: *Pteroplatytrygon Violacea*, Threatened Species, Bycatch, Libya.

Introduction

Among the most vulnerable species are cartilaginous fishes, which are prone to overexploitation [1]. Indeed, they are an important bycatch in artisanal and industrial fisheries as well, especially the larger sizes [2]. Sharks, rays, and chimaeras are examples of cartilaginous fishes, which comprise about 57 families, 219 genera, and about 1280 extant species [3, 4]. Cartilaginous fish constitute a substantial portion of the diverse range of marine species and habitats found along the Libyan coast. Due to their reproductive habits, these fish are susceptible to overexploitation, yet overall, they are one of the few species that can withstand hardship. Out of about 88 known species in the Mediterranean Sea, studies indicate that 59 species of cartilaginous fish from 24 families have been found near the Libyan coast [5, 6]. One of the six genera of the family Dasyatidae (Myliobatiformes), *Pteroplatytrygon* is a monotypic genus [7, 8]. It was formerly thought to be a rare species that was limited to the Mediterranean Sea[9].

The pelagic stingray may be the only stingray species that lives in the pelagic zone [3]. Although reports of it reaching 381 m have been made, it is often found over deep water from the surface to 100 m depth

[10, 11]. The highest size reached by it is 90 cm disc width (DW); the male reaches maturity at 35–41 cm DW [12, 13, 3], while the female reaches 39–50 cm DW. The reproductive system is viviparous, with litter sizes ranging from 1–13 and birth weights between 14–24 cm [14, 10, 15, 16, 3]. The generation duration is 6.5 years since females develop at 3 years and males at 2 years, with a maximum age of roughly 10 years [14, 10],.

Pteroplatytrygon violacea is included on the International Union for Conservation of Nature's (IUCN) Red List as a threatened species. Using longlines, eight different species of cartilaginous fish have been identified as bycatch in Libyan tuna fisheries. *Pteroplatytrygon violacea*, a pelagic stingray, is one of these species [17]. The pelagic longline fisheries for billfish, tuna, and pelagic sharks pose the biggest danger to the pelagic stingray [16]. Longliners that target tuna and swordfish, as well as other gear like trawls and pelagic gillnets, are the main methods used to catch this species [18]. There are no conservation initiatives in existence that are species-specific. To help with the creation of population assessments and management recommendations, fisheries monitoring is required, including the gathering of data on landings and discards specific to individual species.

This research aims to provide a comprehensive report on the morphometric characteristics of this species and identify the threats that endanger it, with the goal of enhancing conservation efforts and effectively managing it in the future.

Material and methods

The pelagic stingray *Pteroplatytrygon violacea* (Bonaparte, 1832) was collected from Tripoli, Libyan waters (32.58935°N, 13.21465°E) and reported by local fishermen in June 2024. This mature female specimen was at a depth of 15-20 meters (Figure 1), captured using a longline. Longline fishing is a marine fishing method used in Libya, employing long lines carrying numerous small baited hooks spaced evenly apart. This method is used to catch large fish such as tuna and sharks. The essential measurements of *Pteroplatytrygon violacea* were recorded in centimetres.

Results and Discussion

The study presents the first description of the morphometric characteristics of the pelagic stingray. The female specimen collected from Libyan water measured 92.5 cm in total length (TL), 39.3 cm in disc width (DW), and 29.5 cm in disc length (DL), weighing 1519 g. *P. violacea* is characterised by its symmetry and dark colouration on both dorsal and ventral surfaces, along with a small snout and a tail featuring a membranous fold beneath the spine (Figure). These morphological characteristics were consistent with previous descriptions of the species in the North Sea and fisheries in the western and central Pacific Ocean, WITH The interorbital distance showed a small fluctuation, which could be the result of size and geographic differences [19, 20]. The Tripoli coastline is distinguished by a series of sand dunes. Habitats in this area have been identified, including seagrasses, rocky habitats, and a platform partially concealed by sandy deposits with a broad continental shelf. Consequently, this region provides a suitable habitat for many endangered species, such as large pelagic species like the bluefin tuna. This species has low commercial value and is mostly discarded, although it is retained and utilised in some areas, indicating a mixed approach to its management. The primary threat to the pelagic stingray is pelagic longline fisheries, which capture large numbers of this species. Between 2008 and 2011, it was noted as the fifth most commonly captured bycatch species in the Atlantic [21]. The superficial stingray injuries observed after capture and release by fishermen, as evidenced by the scars found on some individuals, challenge

the assumption that such injuries would lead to high mortality rates. This suggests that these fish may survive significant injuries and return to their habitats. These unexpected findings contribute to a deeper understanding of their behaviour, environment, and adaptability. [22].

There are significant challenges in managing chondrichthyan fish populations, including insufficient data on their current status and the lack of effective regulatory frameworks. These issues are further exacerbated by the increase in commercial fishing activities in Libyan waters.This study proposes the implementation of stricter regulations on fishing practices, including size limits and seasonal closures, to protect vulnerable species. It emphasises the need for collaboration between government agencies, fishermen, and conservation organisations to ensure the sustainability of cartilaginous fish populations. Continuous monitoring is essential to evaluate the effectiveness of conservation measures and to adapt management strategies as needed. This study is part of a series of studies conducted along the Mediterranean coastline, specifically in the city of Tripoli, with a focus on identifying rare fish species. It also involves analyzing the catch through field sampling, sample collection, and species identification[23]. The study recommends establishing a comprehensive monitoring framework that includes regular assessments of fish populations and habitats. Additionally, it underscores the importance of a national management plan for cartilaginous fish in Libya, aiming to balance environmental health with the economic needs of the fishing industry. By implementing these proposed strategies, Libya can work towards sustainable fisheries that benefit both the environment and local communities.

Table 1: Morphometric Characteristics of *Pteroplatytrygon violacea* captured off Libyan water.

Total weight(g)	1519
Total length (cm)	92.5
Disc width	39.3
Disc length	29.5
Pre-orbital length	4.9
Length of the eye	1.4
Inter-orbital distance	5.5
Pre spiracular distance	6.7
Length of the spiracle	2.2
Inter-spiracular distance	6.8
Pre-narial length	4.2
Inter-narial distance	3.7
Pre-oral distance	5.8
Mouth width	4.1
Interspace first gill slits	7.6
Interspace fifth gill slits	5.1
Snout to first gill opening	9.4
Snout to fifth gill opening	13.3
Snout to cloaca (anterior) distance	26.5

Figure. 1. Dorsal view of *Pteroplatytrygon violacea* (Bonaparte, 1832)

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