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CARTILAGINOUS FISHES OF THE MEDITERRANEAN AND TUNISIA:

IDENTIFICATION AND STATUS

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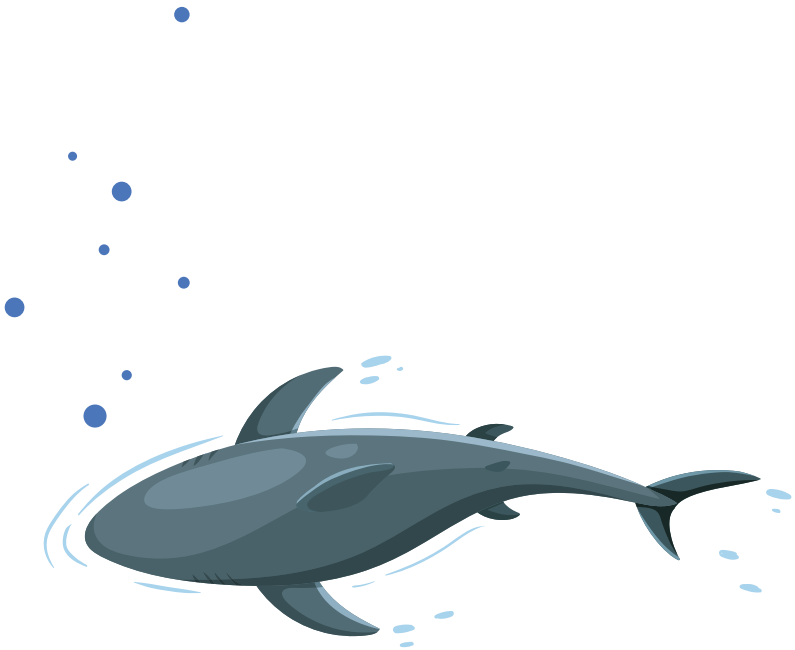

CARTILAGINOUS FISHES OF THE MEDITERRANEAN AND TUNISIA:

IDENTIFICATION AND STATUS

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FOREWORD

The Mediterranean Sea hosts a rich diversity of cartilaginous fishes-sharks, rays, and chimaeras-that play a vital role in maintaining the health and balance of marine ecosystems. Despite their ecological importance, these species have undergone alarming population declines driven by a range of human-induced pressures, including overfishing, habitat degradation, pollution, and the growing impacts of climate change. Safeguarding the future of cartilaginous fishes is essential not only for conserving marine biodiversity but also for securing the long-term sustainability of coastal communities across the Mediterranean region.

As an initial step toward their conservation, the Specially Protected Areas Regional Activity Centre (SPA/RAC), under the Mediterranean Action Plan of the United Nations Environment Programme (UNEP/MAP) - Secretariat of the Barcelona Convention, developed the Regional Action Plan for the Conservation of Chondrichthyan Species in the Mediterranean Sea, adopted in 2003. This plan has since undergone four assessments and updates to reflect evolving priorities and scientific knowledge. Aligned with the objectives of this Action Plan, advancing scientific knowledge, particularly in taxonomy, is essential to guiding effective conservation and management measures. Within this framework, SPA/RAC has supported the development and publication of the book "*Cartilaginous Fishes of the Mediterranean Sea and Tunisia: Identification and Status*." This publication provides a valuable tool for researchers, conservationists, and stakeholders, and contributes to efforts aimed at ensuring the long-term protection of these vulnerable species.

Mahmoud Elyes Hamza
SPA/RAC Director

PREFACE

The group of Cartilaginous fishes, including sharks, skates, rays, and chimaeras, is relatively diverse in the Mediterranean Sea and Tunisian waters. These species appeared around 500 million years ago, with some primitive forms still present today. They have survived five mass extinctions since their appearance and play a key role in maintaining the balance of marine ecosystems. Most sharks, along with some skates and rays, are apex predators and fulfill important trophic functions in the marine ecosystems.

Elasmobranchs are facing a global extinction crisis and are the most endangered group of marine fish in the Mediterranean Sea. The IUCN Red List clearly indicates the vulnerability of elasmobranchs and the lack of data; 53% of 73 assessed species (2016) are Threatened and 13 % are Data Deficient. Biological characteristics of chondrichthyans, such as low reproductive productivity due to late sexual maturity and low fecundity, make them particularly vulnerable to disturbances like fishing pressure, pollution and climate change.

The combined effects of irresponsible fishing, climate change, pollution and habitat destruction can result in changes in abundance, size structure and biological features, potentially leading to extinction. While all species are primarily fished as bycatch, many are sold in fish markets, with numerous species being threatened.

The decline of cartilaginous fishes' populations has become an international concern, prompting a growing number of organizations to call for urgent conservation measures. In response, the Specially Protected Areas Regional Activity Centre (SPA/RAC) was mandated by the Contracting Parties to the Barcelona Convention during their meeting in Monaco (November 2001) to develop a regional action plan for the conservation of chondrichthyan species in the Mediterranean Sea. The Action Plan was adopted at the 13th Meeting of the Contracting Parties (CoP13) in 2003. Since its initial adoption, the Action Plan has been revised to reflect evolving scientific knowledge and conservation priorities, with updates adopted in 2009, 2013, 2019, and 2025.

Following the last amendment in December 2023, thirty (30) species of cartilaginous fishes are currently listed in Annex II as endangered or threatened species of the SPA/BD Protocol. While twelve (12) species are currently listed in Annex III as species whose exploitation is regulated. Joint efforts are underway in the Mediterranean to protect these species. The General Fisheries Commission for the Mediterranean (GFCM), for example, protects twenty-four species listed in Annex II of the SPA/BD Protocol, based on Recommendation GFCM/42/2018/2.

Despite extensive Mediterranean cartilaginous fishes' studies, further scientific research is needed to further study the taxonomy, biology, ecology, population dynamics, and status of stocks of most species. This book compiles available data on sharks' biology and ecology, species identification, as well as threats impact and their mitigation. It aims to improve the conservation status of sharks in the Mediterranean by serving as an information tool on (1) the ecological importance of this taxon, (2) the threats they face, particularly bycatch, and the related mitigation measures, and (3) the identification

of Mediterranean cartilaginous species, which often present taxonomic confusion. This book provides a field guide covering 77 species, including 41 sharks, 34 batoids, and 2 chimeras.

“Cartilaginous Fishes of the Mediterranean and Tunisia: status and field guide” is organized into five chapters:

Chapter I: Introduction to cartilaginous fishes
Chapter II: The status of elasmobranchs in the Mediterranean Sea
Chapter III: Identification guide for Mediterranean cartilaginous fishes
Chapter IV: Overview of shark and ray fisheries in Tunisia
Chapter V: Checklist of Tunisian chondrichthyans

To enhance species recognition, the book presents on-board photos taken by the authors, illustrating the species in conditions users are likely to encounter. It can also serve as a practical resource for training sessions and awareness activities focused on cartilaginous fishes.

The authors acknowledge the Specially Protected Areas Regional Activity Centre (SPA/RAC) for supporting the preparation and the publication of this guide, developed in response to the recommendations of the Action Plan for the conservation of the chondrichthyan populations of the Mediterranean.

Indeed, the Action Plan recommends in its paragraph 13.8 to “develop training to ensure capacity-building at national and regional level, mainly in the following fields: taxonomy, biology, ecology, monitoring methods and stock assessment”, and in paragraphs 28 and 29 to “promote the training of specialists, fisheries officers and managers in the study and conservation of chondrichthyan fishes, and give priority to taxonomy, conservation biology, techniques for monitoring research programmes, data collection, stock assessment, and data analysis”.

A special thanks to the SPA/RAC team: Ms. Lobna Ben Nakhla, Ms. Imen Zribi, Mr. Wassim Gaidi, and Ms. Dorra Maaoui for their help in the edition of this book.

Pr. Mohamed Nejmeddine Bradai
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MOHAMED NEJMEDDINE BRADAI

is Professor of Higher Education, former researcher in National Institute of Marine Science and Technologies, head of Marine Biodiversity Laboratory. He got an engineer degree in marine living resource exploitation and prepared three post-graduate degrees (Master, Doctorate (PhD) and State Doctorate.

He is member of the Shark Specialist Group of the IUCN, former coordinator of the Sub Committee "Marine Environment and Ecosystems » of the Scientific Advisory Committee (SAC) of the GFCM-FAO. He is contributing in the Mediterranean Large Elasmobranchs Monitoring (MEDLEM) database. As consultant on elasmobranchs of the UNEP's Regional Activity Centre for Specially Protected Areas (SPA/RAC), he elaborated the Action Plan for the Conservation of Cartilaginous Fishes in the Mediterranean Sea (2020) and the action plan for the conservation of cartilaginous fishes (chondrichthyans) in the Mediterranean coast of Egypt (2021).

BECHIR SAIDI

is a marine biologist whose obtained his Ph.D from the university of Sfax (Tunisia) on the taxonomy, biology and fishery studies of sharks. Since 2002, he is a member of Marine Biodiversity Laboratory at the National Institute of Marine Sciencesand echnologies (INSTM) where he has been conducting research on elasmobranch, to assess the impact of anthropic related activities on their conservation. He has been involved in several national and international projects dealing with elasmobranch biology, taxonomy and fisheries interactions with the aim of producing comprehensive data to promote conservation action. He is member of the Shark Specialist Group of the IUCN.

SAMIRA ENAJJAR

is a marine biologist at the Marine Biodiversity Laboratory of the National Institute of Marine Sciences and Technology (INSTM) in Tunisia. Since 2000, she has been conducting research on biodiversity, fishery and systematic of elasmobranchs mainly in batoids in the Gulf of Gabès (southern-east Tunisia).

Her PhD thesis focused on the systematics, eco-ecology and fisheries of the Rhinobatids family. She has contributed to the development of training guides on vulnerable marine vertebrates. She was also member of the MedBycatch project as supervisor and expert on elasmobranchs group. She is regularly involved in training courses on ray systematics in many other national and regional projects. She participated in the elaboration of the Regional Action Plan of the Mediterranean Angel Sharks.

SPECIES INCLUDED IN THIS GUIDE

SHARKS

Order SQUATINIFORMES :

Family Squatinidae

Order ECHINORHINIFORMES :

Family Echinorhinidae

Order SQUALIFORMES

Family Oxynotidae

Family Squalidae

Family Etmopteridae

Family Centrophoridae

Family Dalatiidae

Family Somniosidae

Order HEXANCHIFORMES

Family Hexanchidae

Order CARCHARHINIFORMES

Family Sphyrnidae

Family Scyliorhinidae

Family Pentanchidae

Family Carcharhinidae

Order RAJIFORMES

Family Rajidae

CHIMAERAS

Order CHIMAERIFORMES

Family Chimaeridae

INTRODUCTION **TO CARTILAGINOUS FISHES**

I-1- History and evolution

Sharks, skates, rays and chimaeras, collectively referred as Chondrichthyans, are a very ancient fish group. They have been able to survive five mass extinctions since their appearance. They play a key role in maintaining the balance of marine ecosystems. About 500 million years ago, the first fishes had no jaws (agnaths). They were covered with dermal bone plates that can form a true breastplate (armoured fish).
Later, cartilaginous fishes emerged, with current representatives including rays and sharks. Around 460 million years ago, bony fish, such as coelacanths, appeared.
The largest predatory sharks emerged in the Miocene, around 25 million years ago, notably the *Isurus* group which gave rise to the great white shark, *Carcharodon carcharias* **(Figure I-1)**.

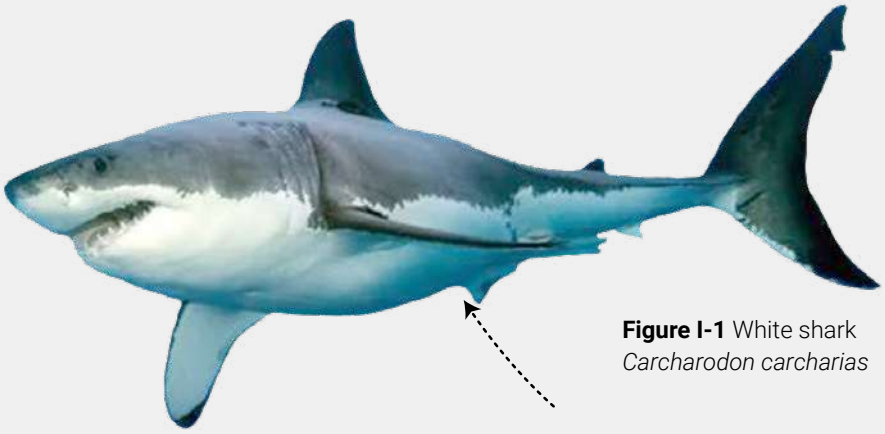


Figure I-1 White shark *Carcharodon carcharias*

The largest shark and the largest fish to have ever existed is *Carcharocles megalodon* (formerly called *Carcharodon megalodon*), which grew up to 15 m long, with teeth exceeding 15 cm. It disappeared at the beginning of the Eocene, about 3 million years ago, probably due to the scarcity of the large marine mammals on which it fed.
In the Jurassic appear the Hexanchid sharks represented in the current fauna by the six gill shark *Hexanchus griseus* and the perlon shark *Heptrancias perlo*; primitive forms of sharks recognizable by a unique dorsal fin, primitive teeth like comb and more than 5 slits gill; 6 and 7 respectively **(Figure I-2)**.

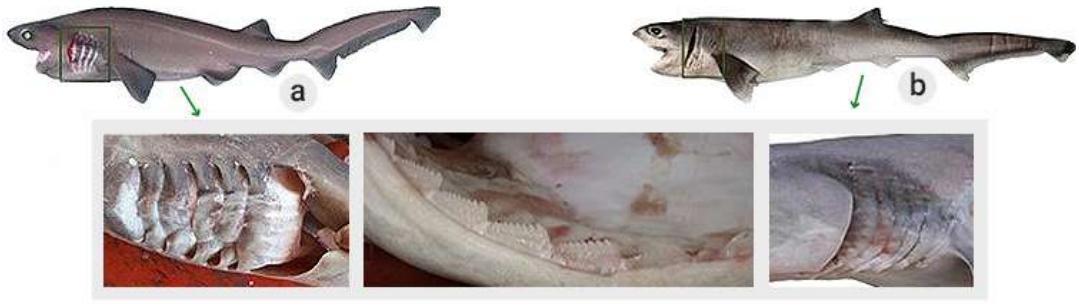


Figure I-2. Primitive forms of sharks: the six gill shark (a) and the Sharpnose seven gill shark (b), primitive teeth (in the middle)

Chondrichthyans grow slowly, mature late and give generally few babies. Because of these features, they are vulnerable to overexploitation and anthropogenic disturbance.

I-2 Taxonomy

Chondrichthyes is a class that contains sharks, skates, rays and chimeras. They are jawed vertebrates, with skeletons made of cartilage instead of bone. The mouth is usually ventral, teeth shape varies from on species to another and are used for species identification. Gill slits are not covered by an operculum as in bony fishes. They open directly outwards. **(Figure I-3)**.

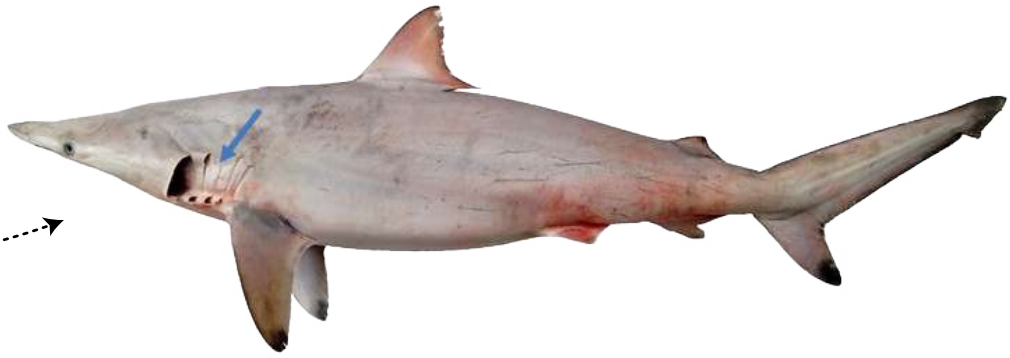
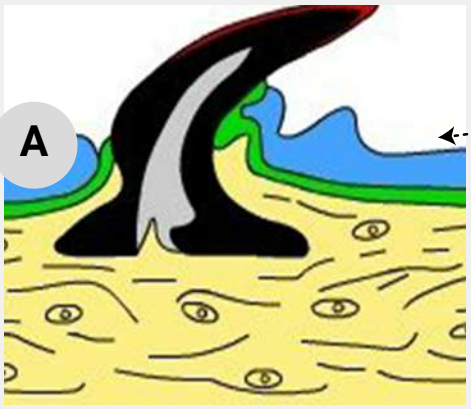


Figure I-3. Shark gills slits open directly outwards.

Cartilaginous scales are very characteristic of the taxon, called placoid scale and are implanted into the epidermis, the internal structure is identical to that of a tooth. It varies in shape depending on the species and the position it occupies on the body of the shark **(Figure I-4)**



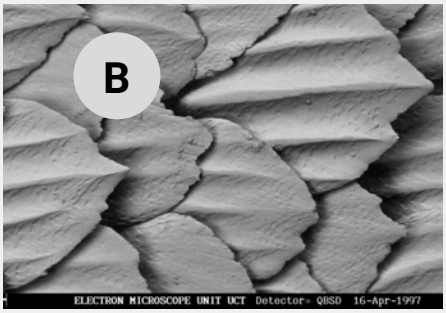


Figure I-4 Placoid denticles of shark skin. A: Diagram of a denticle / B: Denticle under electron microscope © Trevor Sewell/Electron Microscope Unit, University of Cape Town.

The class of Chondrichthyes is divided into two subclasses: Elasmobranchii (Sharks, rays and skates) and Holocephali (chimaeras).

In its mythological sense, the word chimera refer to a fabulous monster whose body was half lion, half goat and who had the tail of a dragon. Chimaeras form a group of fish that shares a cartilaginous skeleton and pterygopods (male copulative organs) with sharks, but otherwise bear no resemblance to them. They constitute a subclass (Holocephali) of the Chondrichthyans because their evolutionary history is linked to that of the sharks but they diverged very early and evolved little.

Elasmobranchii are a subclass of shark-like fish. They have 5 to 7 gill slits, fairly rigid fins, placoid scales, a spiracular opening behind the jaws, numerous teeth, and claspers on the ventral fins of the male.

The body is elongated in sharks while batoids are dorsoventrally flattened. The main differences between sharks and batoids are:

- Gill slits on the sides of the head in sharks and ventral in batoids;
- Pectoral fins fused to the head in batoids and separated in sharks **(Figure I-5)**.

Figure I-5. Main differences between sharks and batoids

The major difference between rays and skates lies in their reproductive strategies. Rays are live bearing (viviparous) while skates are egg layer (oviparous). Also, skates typically have a prominent dorsal fin while the dorsal fin is absent or significantly reduced in rays. Most rays have tails with one or two stinging spines while skates have fleshier tails and lack spines. Another difference is that rays are generally much larger than skates.
In this book the term shark is sometimes used to refer to elasmobranchs.

I-3 Role of sharks in the ecosystem

Sharks are apex predators in marine ecosystems, which means they have few natural predators and feed on lower animals in the food web. They target older, weaker and sick preys, helping to maintain healthy populations. By doing so, sharks promote the evolutionary "good health" of the prey populations

they feed on. No other predator can replace them in marine food chains **(Figure I-6)**.

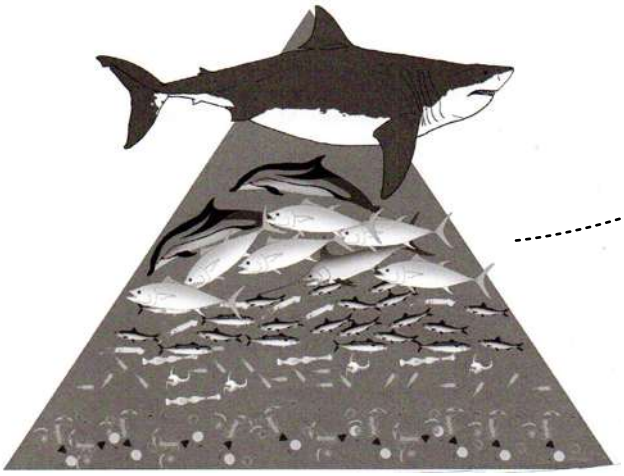


Figure I-6. Marine food chain (Bernvi 2021)

The decline of sharks leads to a decrease in small fish populations, which results in fewer corals and reduced oxygen production.

I-4 Anatomy and ethology adapted for predation

The entire anatomy and sensory system of sharks is adapted to predation. They detect prey mainly through:

- **Lateral line (Figure I-7)**

The arrangement and length of the lateral line make the shark to effectively detect electromagnetic waves emitted by all living creatures. Of all its means of detection, this is the one that allows sharks to locate prey from great distances. It detects any modification of the electric field produced by the movement of a body or an object.

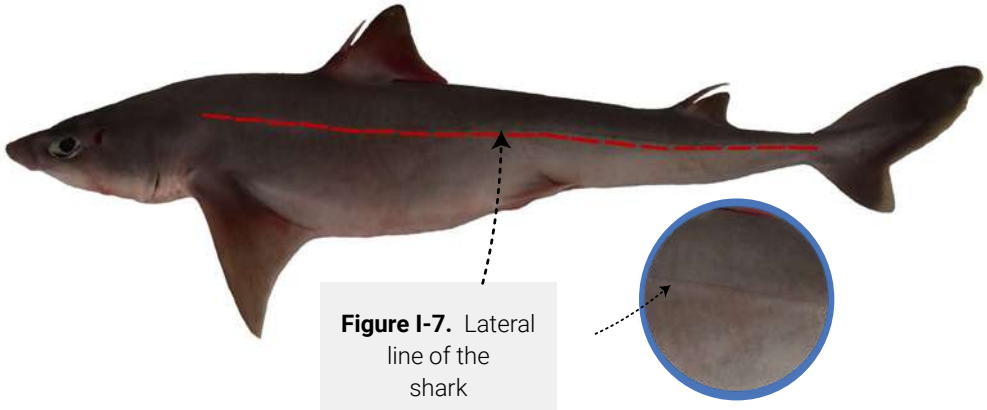


Figure I-7. Lateral line of the shark

- **Nostrils (olfactory detection) (Figure I-8)**

Olfaction allows the shark to detect infinitesimal quantities of a substance diluted in sea water. Some sharks are sensitive to dilutions of tuna extracts as low as 0.04 ppm (parts per million), and those

deprived of food respond positively to concentrations of 0.0001 ppm of grouper extracts. Olfaction is also involved in orientation, finding a sexual partner and migration.

Figure I-8. Nostril of guitar fish

- **Direct vision (Figure I-9)**

The vision of sharks, however, is adapted to their predatory habits. The sensitivity of sharks to low light is enhanced by a remarkable structure found in some vertebrates, including cats, called the *tapetum lucidum* which is located behind the retina. This system helps them to hunt at night.

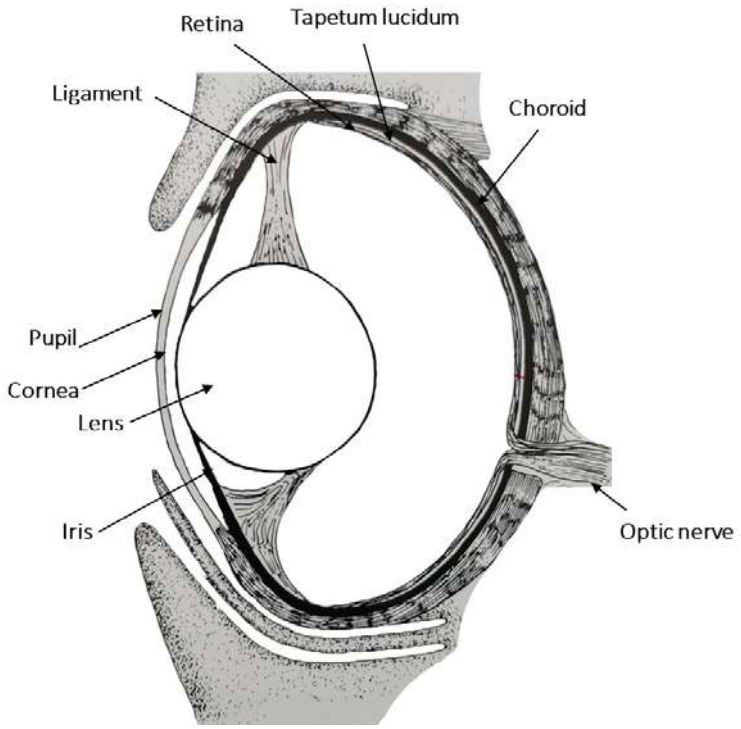


Figure I-9. Eyes of Sharks

- **Lorenzini ampoules (Electro-localization)** (Figure I-10)

sharks have the sense to detect small differences in electrical potentials coming from animal prey or a current from the Earth's magnetic field. The organ responsible for this function, in which the receptor cells are grouped, corresponds to the *ampullae of Lorenzini*. These ampoules are sensory receptors specific to sharks, rays and chimaeras.

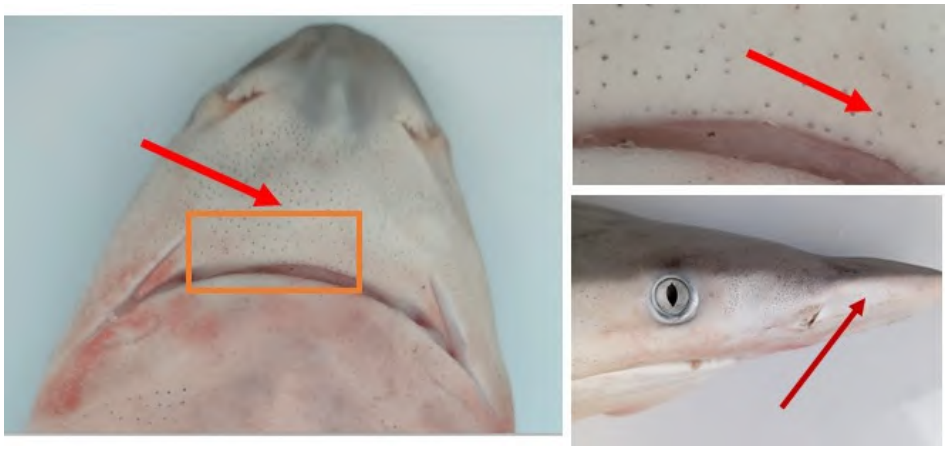


Figure I-10. Lorenzini ampoules

- **Jaws and teeth**

Teeth are constantly renewing themselves. Emerging under a gingival membrane on the inner side of each jaw, new rows of teeth appear, gradually becoming functional as the front teeth fall out (**Figure I-11**).

The replacement movement is continuous (renewal of jaw teeth lasts approximately 8 days in some sharks). Their number, arrangement on the jaws and especially their shape are excellent systematic criteria. They can be pointed, plain or multicuspid, in cobblestone or in the form of dental plates.

Figure I-11. (a) Renewal of jaw teeth of the Bluntnose six gill shark
(b) Tooth of the great white shark

In addition to the predatory body parts mentioned above, thresher sharks have a disproportionately long tail (**Figure I-12**), which they use to stun their prey.

Figure I-12. Thresher shark *Alopias vulpinus*

I-5 Feeding

Examination of stomach contents of elasmobranchs, all species combined, shows that they are essentially carnivorous and predatory, capturing live prey using their powerful jaws. There are, however, a few rare species that feed on plankton through specially adapted gill filters: the basking shark, *Cetorhinus maximus*, the whale shark, *Rhincodon typus* and the devil's rays or sea mantas. They occasionally ingest dead or decomposing prey and even the most heterogeneous objects. In fact, they opt for this solution only when the biological environment is poor, especially in species placed in captivity.

Pelagic species are clearly teleost-oriented while demersal and benthic species consume mostly zoobenthic organisms. Sponges, cnidarians and ascidians are of little or no interest to them. Elasmobranchs are therefore selective in their choice of prey.

The factors responsible for elasmobranchs attacks have been analysed. The starting point of the excitement would be olfactory or visual but the movements of the water cause tactile sensations. However, some species show a certain skill. The thresher shark, *Alopias vulpinus,* beats the water with its tail to gather as many individuals as possible before starting the scavenge.

Torpedoes send electric shocks that paralyse their prey when they pass nearby. Benthic species curve their pectorals inwards to create a current of water to bring prey within reach of the mouth.

Elasmobranchs are at the top of the marine food chain. Carnivorous sharks are hunters but kill primarily for food. They eat a wide variety of marine life, from plankton to marine mammals.

Contrary to their reputation as voracious animals, sharks are champions of food abstinence; the great white shark *Carcharodon carcharias* could fast for up to two months after a feast of whale meat. The basking shark *Cethorinus maximus* seems to spend the winter without feeding.

I-6 Reproduction of cartilaginous fishes

In elasmobranchs, fertilisation is internal and therefore requires copulation. The male has two cylindrical organs: the pterygopods, resulting from the modification of the pelvic fins, which extend into two fleshy parts coiled on themselves (**Figure I-13**). Soft in young individuals, they calcify and harden with age and sexual maturity to facilitate mating. The female has a simple slit, the cloaca which communicates with the internal genital organs.

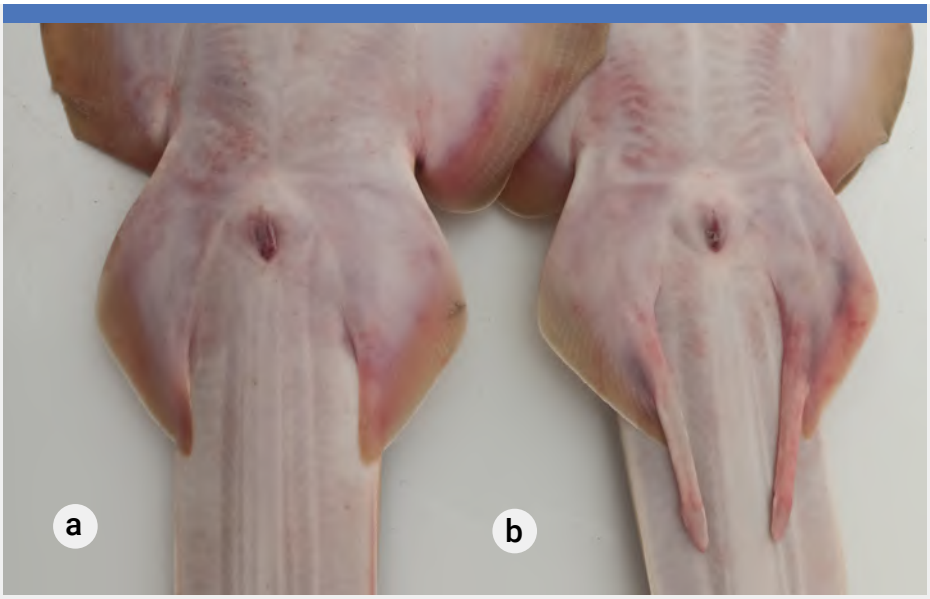


Figure I-13. Sex in cartilaginous fish (a) female (b) male

Mating results in the intromission of claspers (pterygopods) into the female's genital tract and the deposition of sperm which can trigger ovulation. A single pterygopod folded forward enters the genital opening. In some species, the female retains sperm for a long time.

- **The reproductive cycle**

The reproductive cycle varies from one species to another. For some it is linked to seasons for mating and giving birth, others are fertile throughout the year. They can have one or two litters per year while others reproduce every two years.

- **Modes of development**

Cartilaginous fishes, less prolific than bony fish, protect their offspring even better. Eggs are fertilized during copulation. There are three known modes of development:

By oviparity: The eggs laid are deposited by the mother on an appropriate substrate. The embryos live on the nutritional reserves contained in the yolk sac. This primitive mode of reproduction concerns more than 40% of cartilaginous fish. This is the case for several carcharhiniforms and most batoids and chimaeras (**Figure I-14**).

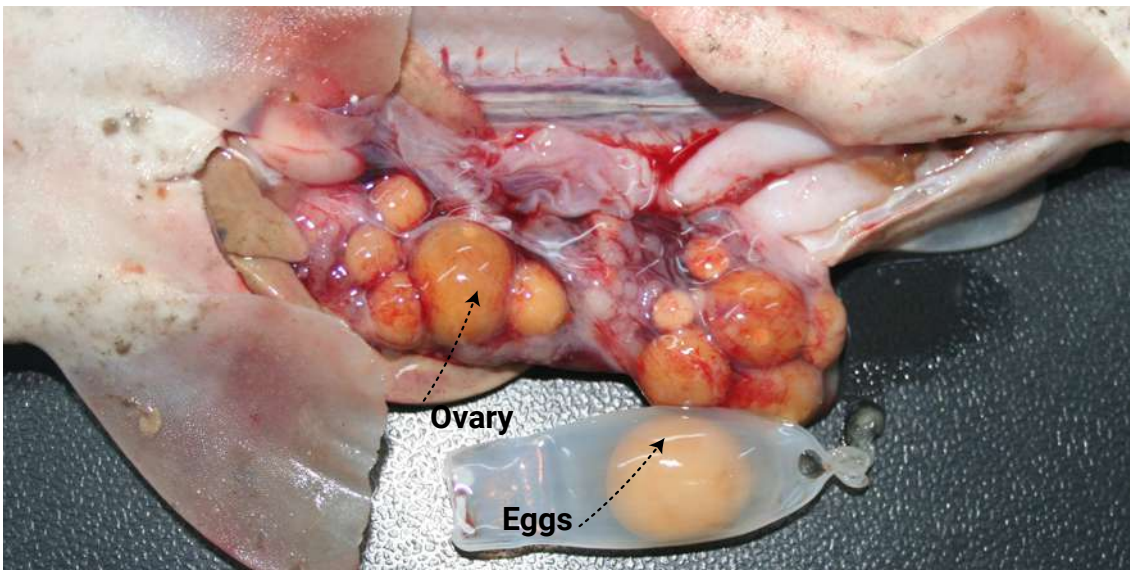


Figure I-14. Oviparity: Encapsulated eggs of the small spotted catshark *Scyliorhinus canicula*

This mode involves a protective envelope, a sort of horny sac, transparent or not, inside which the embryo develops thanks to a voluminous yolk sac. The yolk exhausted at the end of incubation. The little fish tears the envelope, frees itself and immediately begins looking for food. The shape of the sac can vary considerably from one species to another. Appendix I shows shark, ray and skate eggs known in Tunisia[1]

By ovoviviparity: The eggs hatch in the uterus and the fertilised eggs develop into embryos living in complete autonomy on their nutritional substances: the yolk **(Figure I-15)**.

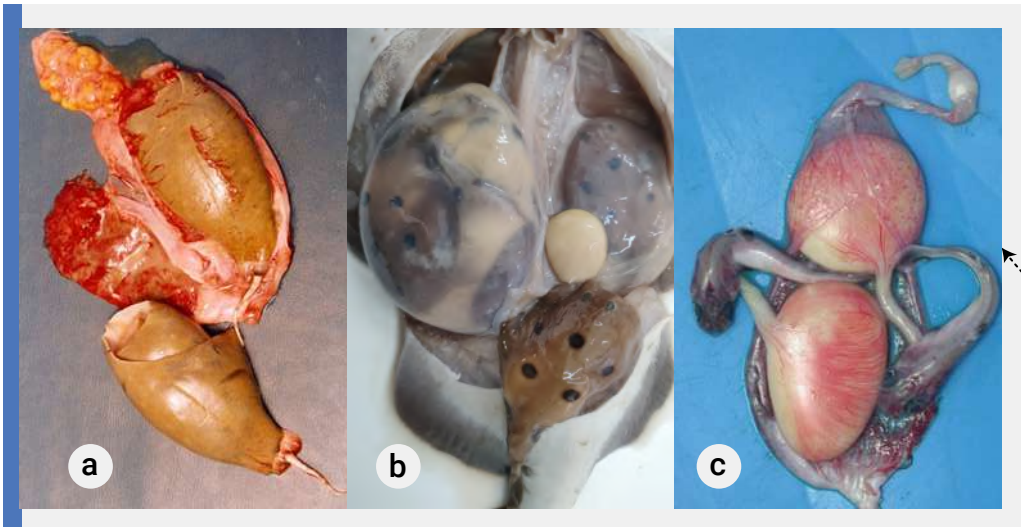


Figure I-15. Oviviparity: Embryos living on their yolk in the uterus.
a: Gymnura altavella;
b: Torpedo torpedo ,
c: Squalus megalops

1- This panel was developed by the NGO ASCOB-Syrtis and Shark Trust through data collection in the framework of citizen science programmes.

By viviparity: This mode of reproduction is also known as placental viviparity. It is the least widespread, known among all carcharhinids with the exception of the tiger shark.
The uterus is partitioned into distinct cells, each contains an embryo, initially with its yolk sac until the placenta is prepared. The embryo is nourished directly by the mother (**Figure I-16**).

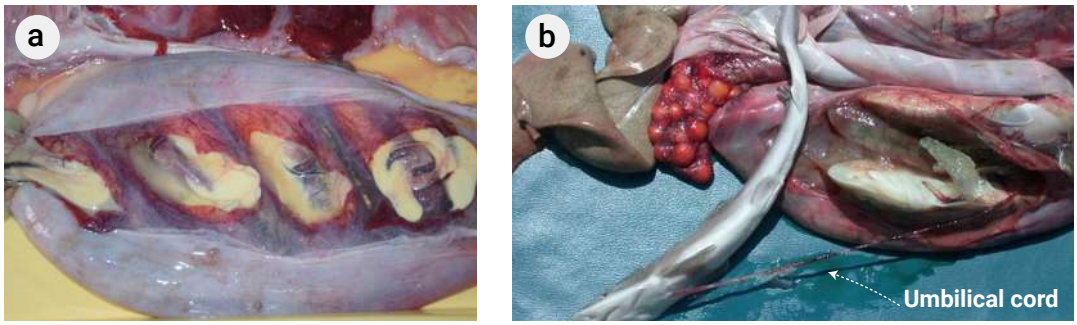


Figure I-16. Placental viviparity.
a: Uterus of the sandbar shark partitioned into distinct cells
b: Full term embryo of the common smooth hound shark showing umbilical cord.

THE STATUS
OF ELASMOBRANCHS IN THE MEDITERRANEAN SEA

II-1 Sharks diversity through Mediterranean Sea

The current diversity of chondrichthyans in the Mediterranean includes at least 48 species of sharks, representing 18 families and 27 genera, 38 species of batoids belonging to 11 families and 19 genera and 2 species of chimaeras, although some records require confirmation (Serena *et al.* 2020). Taxonomic issues remain significant in the region (Serena 2005; Ebert *et al.* 2013; Serena *et al.* 2020). The presence of 9 species of this list is questionable (Serena *et al.* 2020), namely: *Carcharhinus melanopterus, Centrophorus cf. uyato,Squalus megalops, Torpedo sinuspersici, Glaucostegus halavi, Dipturus batis, Leucoraja fullonica, Dasyatis tortonesei, Himantura leoparda*.The complete list of Mediterranean cartilaginous species is given in Appendices 2 and 3.
The detailed identification guide is presented in Chapter III.

II-2 Sharks landings through Mediterranean Sea

Sharks landings represent about 1.7 % of the total Mediterranean fishery landings (average for 2016-2020) (Bradai *et al.* 2022). According to FAO statistics, landings have been in continuous decline since 2000. The apparent increase observed after 2008 does not reflect higher catches, but rather the inclusion of data from new countries, such as Libya, in the official FAO statistics (Figure II-1).

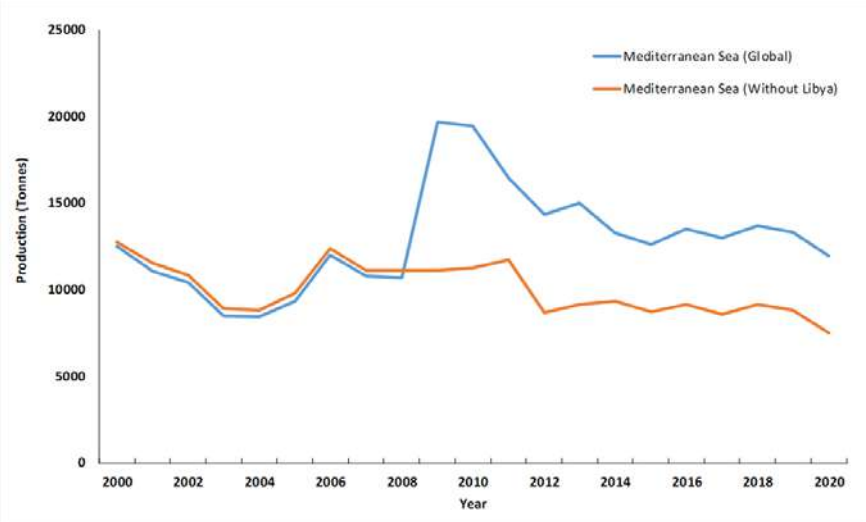


Figure II-1. Mediterranean trends of elasmobranchs catches from 2000 to 2020 according to FAO statistics

The collection of elasmobranch statistics should be improved. The analysis of FAO data shows that statistical information is missing for many priority species of the GFCM area and for species listed in Annexes II and III of the SPA/BD Protocol such as *Mobula mobular, Carcharodon carcharias, Gymnura altavella, Raja melitensis*.
The species of rays and sharks are usually grouped into the same statistical category without identification at the species level due to taxonomic confusion. The number of statistical categories should be enhanced.
Sharks are generally caught as bycatch, although in some marine areas they are targeted by small scale vessel.
Bycatch is considered one of the most important threats to the profitability and sustainability of

fisheries, and has therefore recently attracted the attention of most regional fisheries management organizations (RFMOs) and other fisheries management bodies.
Despite the numerous projects dealing with bycatch carried out in recent, there are important gaps in the knowledge of the actual extent of this problem in the Mediterranean.

The term “bycatch” is widely used to refer to that part of the catch ‘unintentionally’ captured during a fishing operation, in addition to target species, and consisting of discards and incidental catches of vulnerable species with or without commercial value.

Incidental catch of vulnerable species is defined as a subset of bycatch, which includes species that for some reason are considered vulnerable (i.e. long-lived vertebrates with low reproductive rates such as marine mammals, sea turtles, seabirds and elasmobranchs).

II-3 Threats to sharks

Sharks are vulnerable to overexploitation and any anthropogenic pressures because of their biological characteristics (very slow growth, late sexual maturity, low fecundity). Several species are currently threatened.
The main threats are:

- Fishing pressure
- Fin trade “fining”
- Global warming
- Pollution and degradation of the environment
- Other uses.

II-3-1 Fishing activities and degradation of the environment

There is clear evidence that the elasmobranchs of the Mediterranean are declining in abundance - landings decreased from about 26,000 tonnes in 1984 to about 12,000 in 2020 - diversity and range due to the intensive fishing pressure driven by the growing demand for shark fins, meat and cartilage. However, this direct fishing mortality is not the only impact on elasmobranchs populations. Fishing activities also damage habitats through the disturbance of biotic communities and seabed substrates. Shipping and underwater exploration, construction, mining, electrical installations and offshore aquaculture in cages contribute to habitat degradation. Furthermore, increasing levels of ambient noise, artificial light, electromagnetic fields, and chemical pollution interfere with the sensory systems of these species.

II-3-2 Global warming

Recent studies show that global warming is forcing white sharks to shift their habitats, which in turn endangers local wildlife.

Rising ocean temperatures also threaten shark pups, making them more vulnerable during early life stages. In addition, ocean acidification may critically affect shark feeding behaviour, as it can alter their olfactory perception.

II-3-3 Fin trade “fining”

Shark-finning is a practice where sharks are caught and their fins are cut off, then the body of the shark is discarded. This is a cruel and wasteful practice since only 2 to 5% of the shark is exploited. Shark fins are particularly sought after for traditional Chinese medicine and shark fin soup which is considered a delicacy in Asia.
Although the actual extent of shark fin trade in the Mediterranean is unknown, this practice is now a major global problem.
The International Commission for the Conservation of Atlantic Tuna (ICCAT) and the General Fisheries Commission for the Mediterranean (GFCM) recommended respectively in 2004 and 2005 full utilization of these animals and that landed fins don’t exceed 5 % of the sharks caught (in weight).
Later, in 2012, the GFCM banned finning practices following recommendation GFCM/36/2012/3 concerning conservation of elasmobranchs in the GFCM area.
This former recommendation was later, in 2018, amended by Recommendation GFCM/42/2018/2 mandating that sharks must be landed with their fins attached to the body. This measure reinforces the ban of “finning” consisting of fins cutting and body discarding.
Few Parties to the GFCM support finning prohibition by enacting national regulations and monitoring their implementation and enforcement.
According to the UN Food and Agriculture Organization (FAO), around 100 million sharks are killed each year worldwide and more than 97% of the shark population has disappeared over the last two centuries (Ferretti *et al.* 2008). According to the NGO Traffic, the fin trade is estimated at several hundred million dollars per year and Asia is the main culprit in this massive fishing.

II-4 Conservation status of Sharks in the Mediterranean Sea

More than 97% of the shark population has disappeared in the last two centuries. Currently, a high percentage is threatened, many are data deficient. Sharks face many threats, but fishing pressure seems to be most important.

The latest edition of the Global Red List (version 2022.1) mentioned that among 147,517 species studied, more than 41,000 species are threatened with extinction. This still represents 28% of all species assessed, 37 % of them are sharks and rays.
The summary of the red list status of chondrichthyans in the Mediterranean Sea (Dulvy *et al.* 2016) (table II-1) shows that more than 53 % of assessed species are vulnerable and endangered to critically endangered, 12.33 % are Near Threatened (NT) and more than 16 % are Data Deficient (DD). It seems that the Mediterranean has the highest percentage of endangered sharks in the world.
This assessment compared to data of the first assessment (Cavanagh and Gibson 2007) (table II-1) shows no sign of improvement in the status of Mediterranean Chondrichthyans, on the contrary the

situation seems to be fearful. The rate of threatened species (CR, EN and VU) passed from 42,25% to 53% during decade (2007 – 2016).

Table II-1: Summary of the red list status of chondrichthyans in the Mediterranean Sea (Dulvy *et al.* 2016). In brackets: Data of the first assessment (Cavanagh and Gibson 2007).

IUCN Red List Category	Number of Species
Extinct (EX)	0
Regionally Extinct (RE)	0
Critically Endangered (CR)	20 (13)
Endangered (EN)	11 (8)
Vulnerable (VU)	8 (9)
Near Threatened (NT)	9 (13)
Least Concern (LC)	12 (10)
Data Deficient (DD)	13 (18)
Total number of species assessed	73 (71)

Following this bad situation of this fish group, many conventions, RFMOs and NGOs are dealing with the conservation of cartilaginous fish, national and regional action plans were developed and mitigation measure are taken.

II-4-1 Tools for the conservation and management of sharks

To counteract the high vulnerability of sharks, international legal instruments applying for the conservation and management of sharks in the Mediterranean were developed to coordinate the management, conservation, exploration and exploitation of living resources of the riparian countries, with respect to the protection and preservation of the marine environment.

a- Conventions and recommendations

The Mediterranean Action Plan (PAM) in the context of United Nations Environment Programme (UNEP) established the "Convention for the protection of the marine environment and the coastal region of the Mediterranean" (Barcelona Convention).

The Barcelona Convention and its Protocols constitute a unique and advanced multilateral legal framework for the protection of the marine and coastal environment and sustainable use of their

resources in the Mediterranean. The Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean (SPA/BD) is of particular importance for shark conservation. To this end, a Regional Action Plan has been developed, setting out specific measures to protect, preserve, and manage the cartilaginous fish species listed under the SPA/BD Protocol and its annexes.
In the field of fisheries, the conservation of sharks is implemented within the framework of the General Fisheries Commission for the Mediterranean (GFCM). The need for a precautionary approach to the management of sharks and rays has been widely emphasized over the past 23 years:

- In 1999, the FAO adopted the IPOA-Sharks and since then it has undertaken several initiatives to better manage the exploitation of these taxa;
- In 2010 and 2011, the GFCM adopted ad hoc measures to reduce the bycatch of pelagic sharks such as thresher sharks, shortfin mako sharks and hammerhead sharks;
- In 2012, the GFCM banned finning practices and also banned the capture and sale of shark and ray species listed in Annex II of the SPA/BD Protocol of the Barcelona Convention (See appendix II).

Recommendation GFCM/42/2018/2 on fisheries management measures for the conservation of sharks and rays in the GFCM area of application recommends makes the following recommendations to Contracting Parties regarding the ban on finning:

- it is prohibited to remove shark fins onboard vessels and to retain, transship or land shark fins;
- in order to facilitate onboard storage, shark fins may be partially sliced through and folded against the carcass, but they shall not be removed from the carcass before landing;
- beheading and skinning of specimens onboard and before landing are prohibited, and beheaded and skinned sharks shall not be marketed at first sale after landing;
- it is prohibited to purchase, offer for sale or sell shark fins which have been removed, retained onboard, transshipped or landed in contravention of this recommendation.

The same recommendation stipulates, for species conservation, that:

- CPs shall ensure a high protection from fishing activities for elasmobranch species listed in Annex II of the SPA/BD Protocol of the Barcelona Convention, which must be released unharmed and alive, to the extent possible.
- Specimens of shark species listed in Annex II of the SPA/BD Protocol shall not be retained on board, transshipped, landed, transferred, stored, sold or displayed or offered for sale.

Beside the GFCM, the International Commission for the Conservation of the Atlantic Tuna (ICCAT) is dealing with species fished in association with tuna, such as sharks.
In addition to the GFCM and ICCAT, the Convention on the law of the sea (UNCLOS), the Convention on the conservation of migratory species of wild animals (CMS convention) and the Convention on international trade of endangered species (CITES) contain some provisions that are relevant for the shark's issue.

b-Regional action plans

Although, non-binding instruments, Action Plans for the conservation and management of sharks, contribute for the protection of these species; at global level, the FAO International Plan of Action (IPOA-Shark) and at regional level, the Action Plan for the conservation of the cartilaginous fishes (Chondrichthyans) in the Mediterranean. The Action Plan is aimed at promoting the general conservation of the chondrichthyan populations of the Mediterranean, by supporting and promoting

national and regional programmes on reducing bycatch and all other kind of disturbance. Recently and with the aim of protecting the three Mediterranean angel sharks, the second most threatened family of sharks in the world and listed in annex II, the Shark Trust and the IUCN Shark Specialist Group (SSG), with regional and international experts developed in 2019 for the Mediterranean Angel Sharks, the Regional Action Plan (RAP) (Gordon *et al.* 2019) and sub-regional Action plans are under elaboration in some Mediterranean countries such as Libya, Greece and Tunisia.

c-Mitigation measures for incidental catches

As explained previously, bycatch occurring in fisheries represents one of the major threats to long-lived marine species worldwide. In this context, Chondrichthyans are particularly vulnerable to bycatch due to their biological characteristics (slow growth, late sexual maturity, low fecundity).

For this purpose and to improve conservation measures, we focus particularly on mitigation bycatch that could be performed mainly by:

- Modification of fishing gear
- Changing fishing practices
- Management and development measures:
  - Limitation of fishing effort
  - Spatio-temporal closure and marine protected areas

On this basis, here is a review of some measures applied for mitigation sharks bycatch and their effectiveness.

For trawlers:

-Trawler by-catch reduction devices

This is a grid installed at the front of the codend with a trapdoor at the top or bottom, allowing large animals to escape while target species pass through the grids.

Successfully tested in Australian fisheries, these escape systems placed before the trawl codend (Figure II-2) consist of a rigid sorting grid that forces sharks and rays downward to a covered escape opening and a guiding funnel, which helps the target species pass through the grid.

In the Mediterranean, this device was tested in the Tyrrhenian Sea for *Galeus melastomus* (2012). The results were not conclusive enough. Many other experiments have been carried out as part of projects on this subject, but no effective use of this measure in commercial fisheries has been noted.

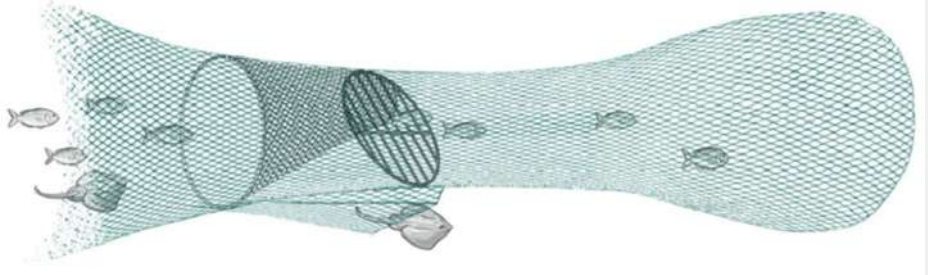


Figure II-2. Selective device enabling benthic species (including rays and sharks) to escape (Brewer *et al.* 1998).

Among the advantages of this device are the reduction of shark and ray bycatch and the resulting improvement in crew safety. However, the device requires extensive testing and may also affect the capture of target species. Its effectiveness worldwide varies from one fishery to another. A thorough understanding of the fishery, fishing gear, vessels, and the extent of bycatch is necessary to design such a device.
Additional modifications can be applied to this system, such as extending the trawl codend mesh size to 40 mm square mesh, in order to comply with GFCM regulations on minimum mesh size for bottom trawls.

For longlines:

-Change in hook size
Reduced hook size could lead to potential reduction of bycatch of large sharks with potential loss of large individuals of other commercial species. The increase in hook size could lead to possible reduction of incidental catches of unwanted species with potential reduction in catches of certain target species.

-Circle hooks
According to different studies comparing the efficacy of circle hooks and J-hooks in pelagic longline fisheries in reducing shark and ray bycatch, there is no significant differences between the two types of hooks on bycatch and mortality of sharks and rays. Some authors indicate that certain species of sharks are captured more frequently with circle hooks compared to J-hooks.
The results of a recent study in the Gulf of Gabès (Saidi *et al.* 2020) indicate that the use of circle hooks has significantly increased the catch rates of the primary species, sandbar sharks, while the catch rates of other species remained almost unchanged. In addition, catch rates of shortfin mako increased much more with circle hooks than with J-hooks.
The anatomical hooking location represents an indicator of the degree of injury and the probability of post-release survival. In the study of Saidi *et al.* (2020), the hooking location observed varied among species and hook types while the proportion of external hooking increased significantly with circle hooks. These results are consistent with the idea that circle hooks reduce deep hooking and result in higher external hooking frequency because of their round shape.

-Modification of the bait
The nature of the bait has a stronger influence than the hook style on shark catch. Bait used for longline fishing must be attractive to the target fish. Mackerel, sardines and squid are the primary baits used for longlining. Several field experiments have attempted to determine their selective effects on non-target species such as sharks and rays and the effect of other kind of bait to reduce bycatch.
In the Gulf of Gabès (Tunisia), the use of pieces of salema (*Sarpa salpa*) as bait reduces bycatch of many elasmobranchs such as *Carcharhinus brevipinna*, *Isurus oxyrinchus* and *Pteroplatytrygon violavea*. The use of pieces of stingray increases CPUE (Capture per Unit Effort) for example for the sandbar shark; the CPUE increases from 5.45 with mackerel to 14.17 with stingray. Stingray is used as bait when there is a penury of other baits. This bait is very attractive to sharks and should be banned.

-Magnetic hook/olfactory repellent

Permanent magnets have been demonstrated to produce a repellent effect on sharks by creating an abnormally strong electrical stimulus, which overwhelms the sharks' acute electro-sensory system. Magnetic hooks have potential reduction in bycatch of shark species but these devices are fragile, expensive and the method can be difficult to implement and acclimatization may occur.

For fishing nets:

-Mesh

The mesh, the nature and the dimension of the thread as well as the morphology and the behavior of the fish can influence the capture of the fish.

Mesh size regulation can be an effective tool to manage bycatch of threatened species.

-Tighter net

The modification consists of increasing the tension of the gillnet by means of larger floats on the head cable and increasing the weight of the lead line.

Changing fishing practices:

-Reduced soak time

Reduced interaction with elasmobranchs and reduction of mortality. However, increase in fishing effort (number of sets) and negative economic impact on the fishery could be registered.

d-Management and development measures

-Spatio-temporal closure and marine protected areas

Such measure reduces shark bycatch and mortality but may induce an increase in expenses to reach other fishing grounds and could increase the impact of fishing on other areas and species.

Knowledge of the fishery, fishing gear, vessels and the extent of the bycatch is necessary to select which measure to adopt. See (Sacchi 2021) for more information and details. https://doi.org/10.4060/cb5049en).

IDENTIFICATION GUIDE **FOR MEDITERRANEAN CARTILAGINOUS FISHES**

III-I Introduction

This guide is designed to help researchers, fisheries statisticians, marine observers and fishers to better identify Mediterranean cartilaginous fishes. This guide contains simple, easy-to-use keys that highlight mainly external characteristics for identification purposes. It also contains some information on the description, biology and distribution of each species.

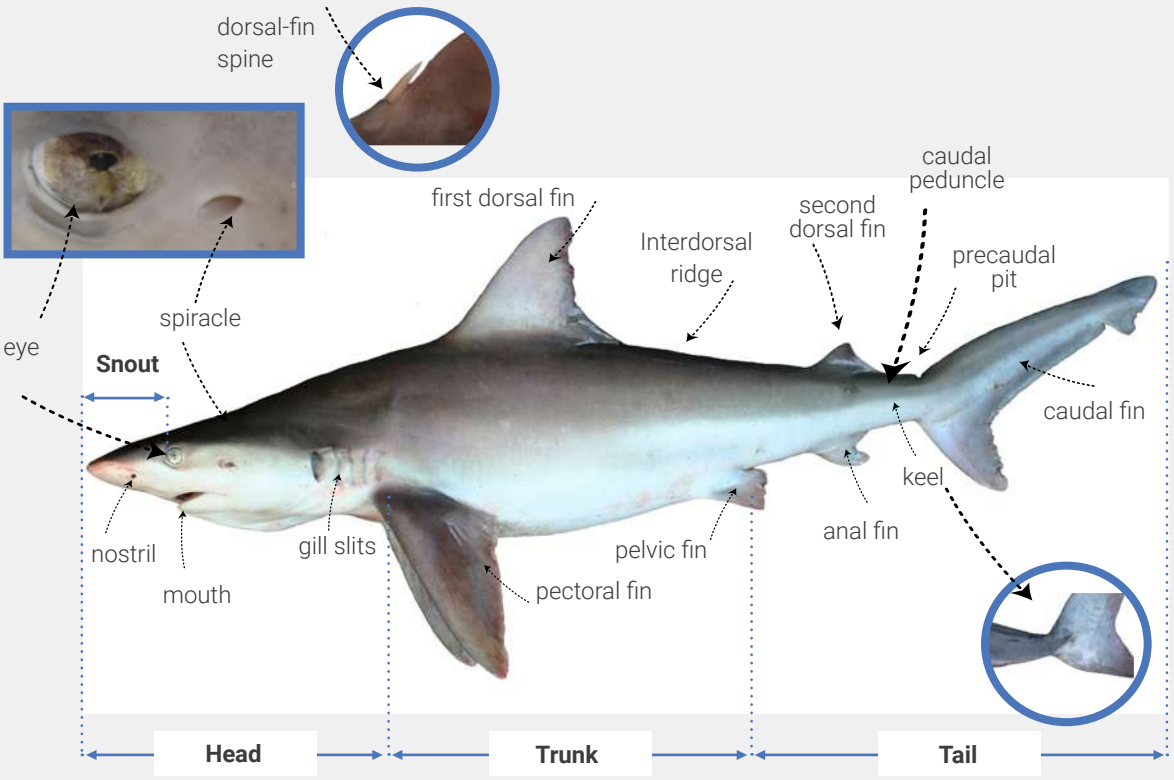
III-2 Classification and systematic arrangement

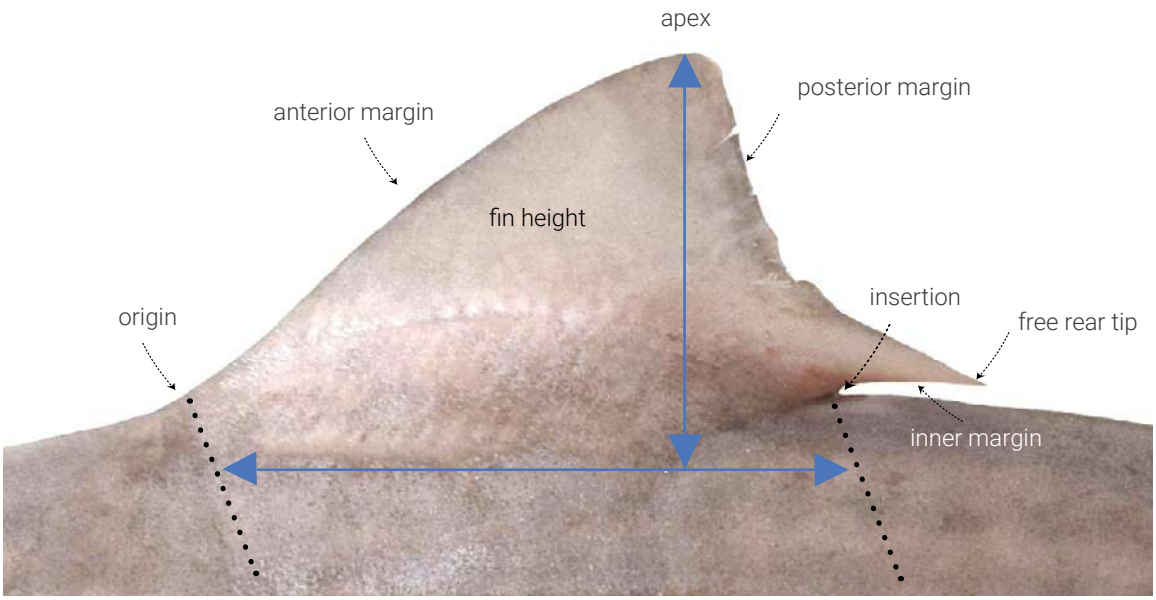
The nomenclature and classification of the chondrichthyan fishes largely follows the arrangement of Compagno (2005), Ebert and Stehmann (2013) and Ebert (2015). The following classification to order is maintained in this guide.

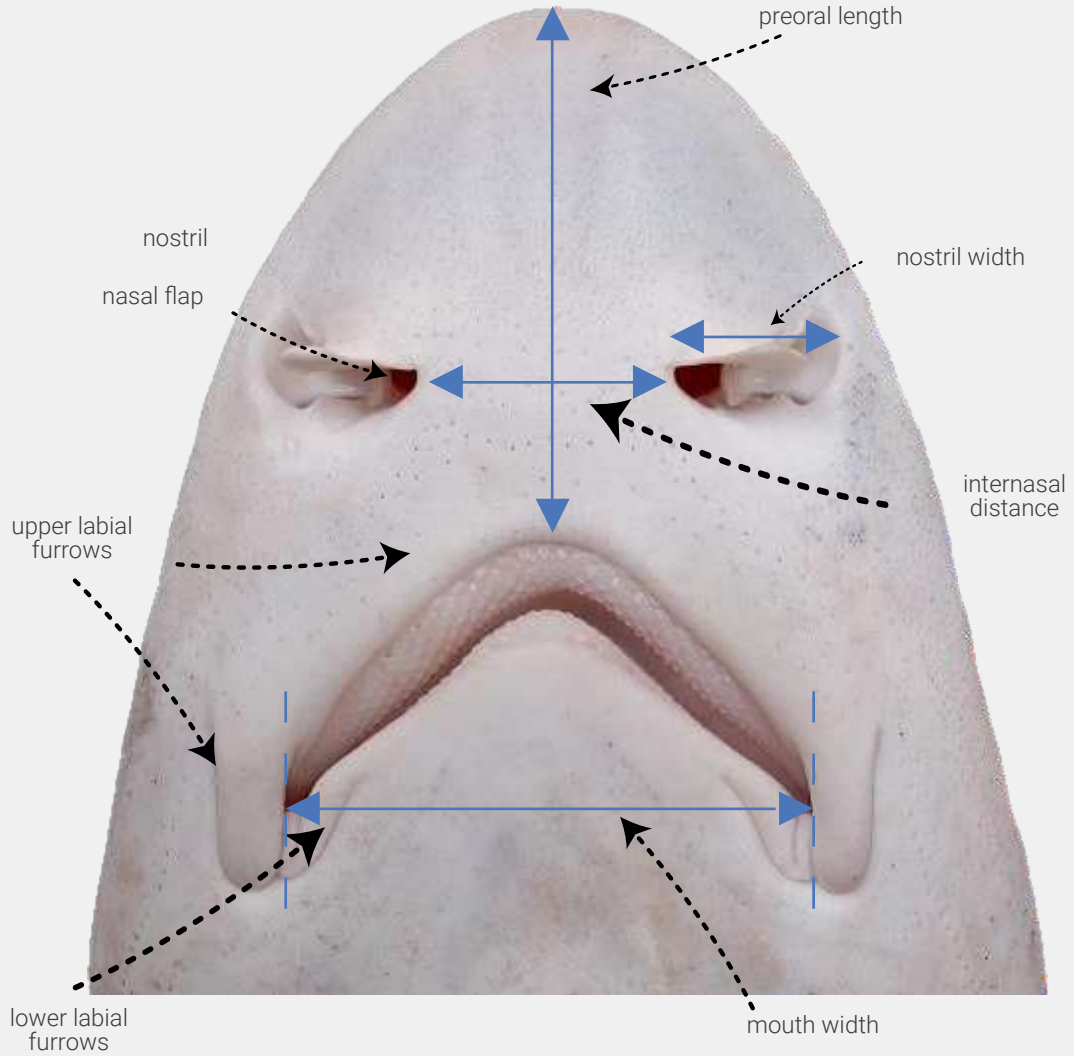
Class Chondrichthyes (cartilaginous fishes)
- Subclass Holocephali
  - Order Chimaeriformes
- Subclass Neoselachii (Modern sharks and batoids)
  - Cohort Selachii
    - Superorder Squalomorphii
      - Order Hexanchiformes
      - Order Squaliformes
      - Order Squatiniformes
      - Order Pristiophoriformes
    - Superorder Galeomorphii
      - Order Heterodontiformes
      - Order Lamniformes
      - Order Orectolobiformes
      - Order Carcharhiniformes
    - Cohort Batoidea
      - Order Torpediniformes
      - Order Rhinopristiformes
      - Order Rajiformes
      - Order Myliobatiformes

III. 2.1.SHARKS

III. 2.1.1 EXTERNAL TERMINOLOGY USED FOR SHARKS






preoral length
nostril
nasal flap
nostril width
internasal distance
upper labial furrows
lower labial furrows
mouth width

III. 2.1.2 GLOSSARY OF TECHNICAL TERMS

- **Anterior margin:** In fins, the margin from the fin origin to its apex.
- **Caudal keels:** A dermal keel on each side of the caudal peduncle that may extend onto the base of the caudal fin, and may, in a few sharks, extend forward as a body keel to the side of the trunk.
- **Caudal peduncle:** That part of the precaudal tail extending from the insertions of the dorsal and anal fins to the front of the caudal fin.
- **Claspers:** The paired copulatory organs present on the pelvic fins of male cartilaginous fishes, for internal fertilization of eggs.
- **Cusp:** A usually pointed large distal projection of the crown.
- **Multicuspid:** refers to oral teeth or denticles with more than one cusp. In lateral trunk denticles, the posterior ends of the crown may have medial and lateral cusps, sharp or blunt projections associated with the medial and lateral ridges.
- **Cusplet:** As with a cusp, but a small projection in association with a cusp, and usually mesial and distal but not medial on the crown foot.
- **Free rear tips:** The pectoral, pelvic, dorsal, and anal fins all have a movable rear corner or flap, the free rear tip, which is separated from the trunk or tail by a notch and an inner margin. In some sharks the rear tips of some fins are very elongated.
- **Head:** That part of a cartilaginous fish from its snout tip to the last or (in chimaeras) only gill slits.
- **Inner margin:** In precaudal fins including the pectoral, pelvic, dorsal and anal fins, the margin from the fin insertion to the rear tip.
- **Insertion:** The posterior or rear end of the fin base in precaudal fins. The caudal fin lacks insertions except with many batoids and some chimaeroids that have a caudal filament that extends posterior to the fin. See **origin**.
- **Interdorsal ridge:** A ridge of skin on the midback of sharks, in a line between the first and second dorsal fins; particularly important in identifying grey sharks (genus *Carcharhinus*, family Carcharhinidae).
- **Labial furrows or labial grooves:** Grooves around the mouth angles on the outer surface of the jaws of many cartilaginous fishes, isolating the labial folds. Primitively there is a distinct upper labial furrow above the mouth corner and a lower labial furrow below it.
- **Nictitating lower eyelid:** In the ground sharks (order Carcharhiniformes), a movable lower eyelid that has special posterior eyelid muscles that lift it and, in some species, completely close the eye opening (or palpebral aperture).
- **Origin:** The anterior or front end of the fin base in all fins. The caudal fin has upper and lower origins but no insertion. See **insertion**.
- **Posterior margin:** In precaudal fins, the margin from the fin apex to either the free rear tip (in sharks with distinct inner margins) or the fin insertion (for those without inner margins).
- **Precaudal pit:** A depression at the upper and sometimes lower origin of the caudal fin where it joins the caudal peduncle.
- **Snout:** That part of a cartilaginous fish in front of its eyes and mouth, and including the nostrils.
- **Subterminal notch:** On the caudal fin of most non–batoid sharks and at least one batoid, the notch in the lower distal end of the caudal fin, between the postventral and subterminal margins, and defining the anterior end of the terminal lobe.

GUIDE TO THE SHARK ORDERS OF MEDITERRANEAN SEA

Sharks: Gill slits on sides

- No anal fin
  - Body flattened, ray–like, mouth terminal → **SQUATINIFORMES** P: 45

  - Body fusiform, not ray like, mouth ventral,
    - 1st dorsal fin **behind** pelvic fins → **ECHINORHINIFORMES** P: 49

    - 1st dorsal fin **before** pelvic fins → **SQUALIFORMES** P: 51

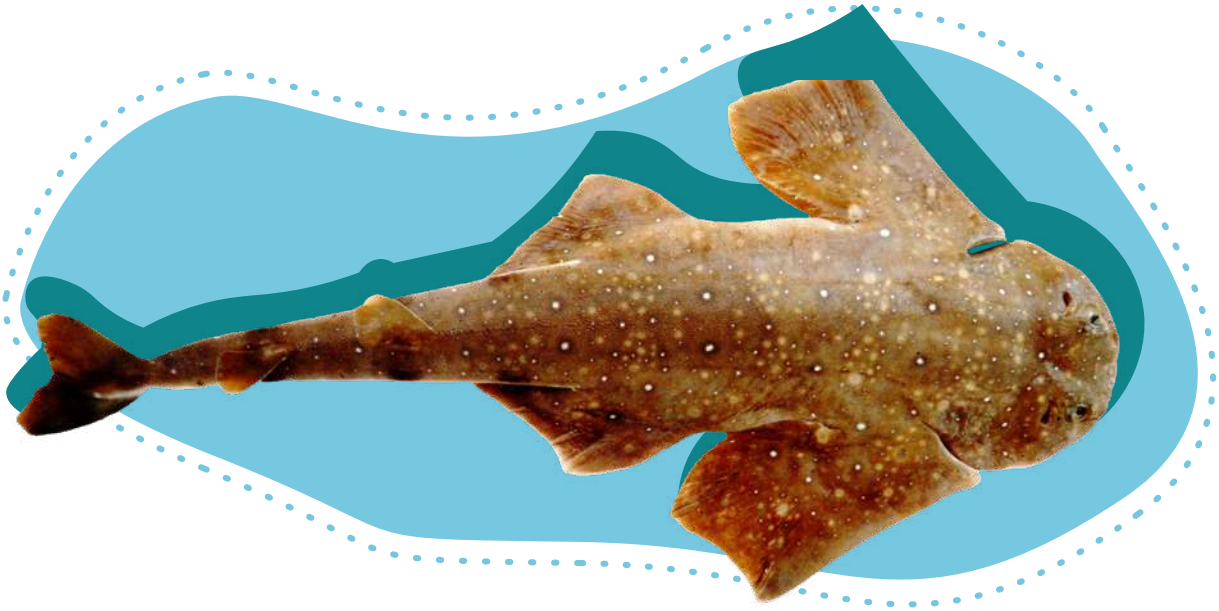
- Anal fin present
  - 6-7 gillslits, 1 dorsal fin → **HEXANCHIFORME** P: 61

  - 5 gill slits, 2 dorsal fins, mouth behind front of eyes
    - Nictitating eyelids → **CARCHARHINIFORMES** P: 64

    - **No** nictitating eyelids → **LAMNIFORMES** P: 83

Order SQUATINIFORMES
Mediterranean families

Squatinidae



Body flattened, ray-like; 5 pairs of gill slits; mouth terminal; without anal fin.

1 family

Squatinidae

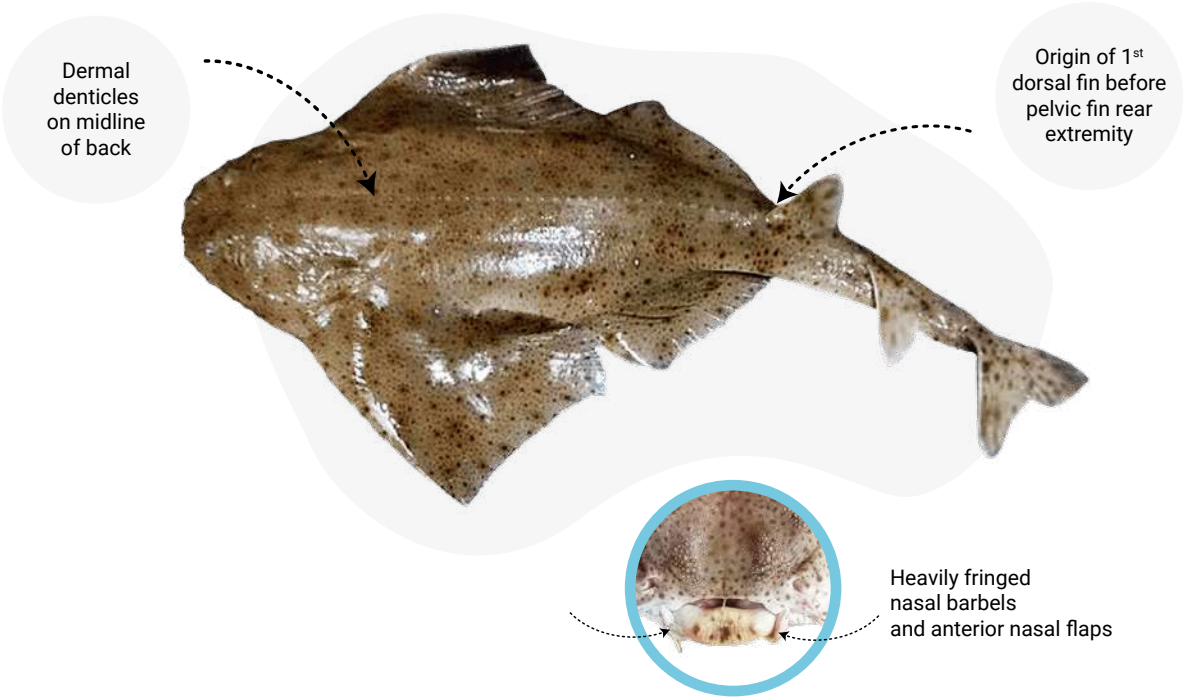
1 genus

Squatina

Squatinidae

Squatina aculeata Cuvier, 1817

EN Sawbak angelshark **FR** Ange de mer épineux **AR** سفن/وقاص



Description

Medium-sized shark in the shape of a ray. An angel shark with prominent thorns on midback and head, heavily fringed nasal barbels and anterior nasal flaps. First dorsal fin usually over pelvic fin rear tips.

Size and biology

Maximum: 200 cm
Common: 50-150 cm
Maturity: 120-122 cm (males); 137-143 cm (females).
Size at birth: 30-35 cm
Aplacental Viviparous : with both ovaries functional.
Gestation : is about 12 months, but possibly with a biennial reproductive cycle.
Uterine fecundity : ranges from 8 to 12.

Habitat

An offshore angelshark of the outer continental shelf and uppermost slope of the warm-temperate and tropical eastern Atlantic and Mediterranean Sea, on or near the bottom at depths of **30 to 500 m**. It apparently prefers muddy bottom.

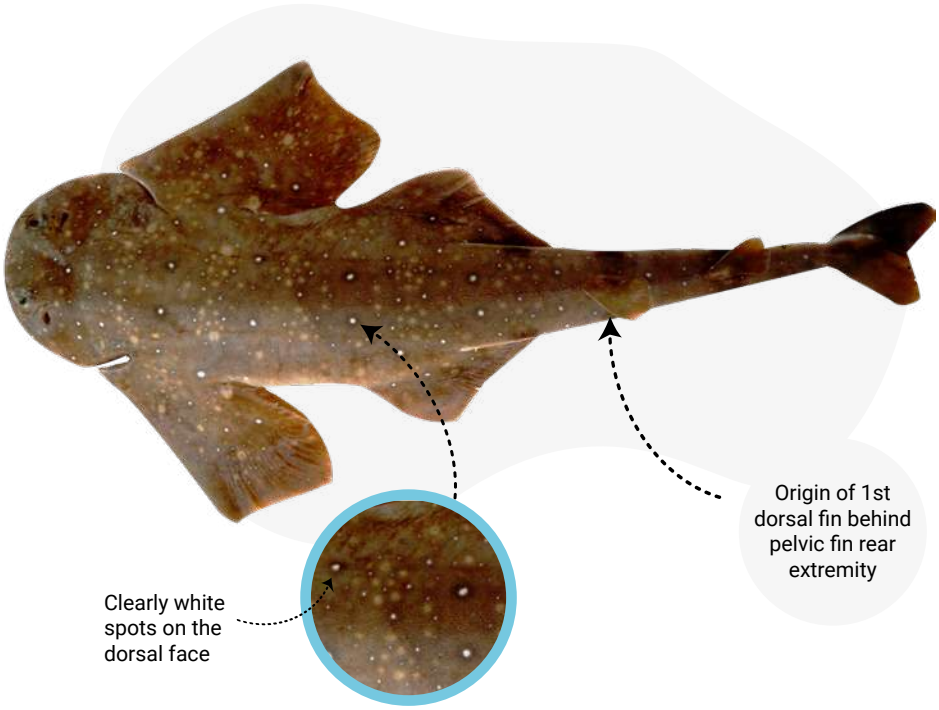
Status : UICN: Critically Endangered, **SPA/BD Protocol**: Annex II

Similar species : *Squatina oculata* (Page 47), *Squatina squatina* (Page 48)

Squatinidae

Squatina oculata Bonaparte, 1840

EN Smoothback angelshark **FR** Ange de mer ocellé **AR** سفن/وقاص



Description

An angel shark with large thorns on snout and above eyes but not do midback, weakly bifurcated nasal barbels and weakly fringed anterior nasal flaps; the first dorsal origin usually well behind the pelvic rear tips, and clearly white spots on body.

Size and biology

Maximum: 160 cm
Common: 40-120 cm
Maturity: 71 cm (males); 90 cm (females).
Size at birth: 24-27 cm
Aplacental Viviparous : with both ovaries functional
Gestation : is about 12 months, but possibly with a biennial reproductive cycle
Uterine fecundity : ranges from 5 to 8.

Habitat

A warm-temperate and tropical angelshark of the eastern Atlantic and Mediterranean Sea continental shelves and upper slopes from **20 to 500** or more metres, mostly between **50 and 100 m.**

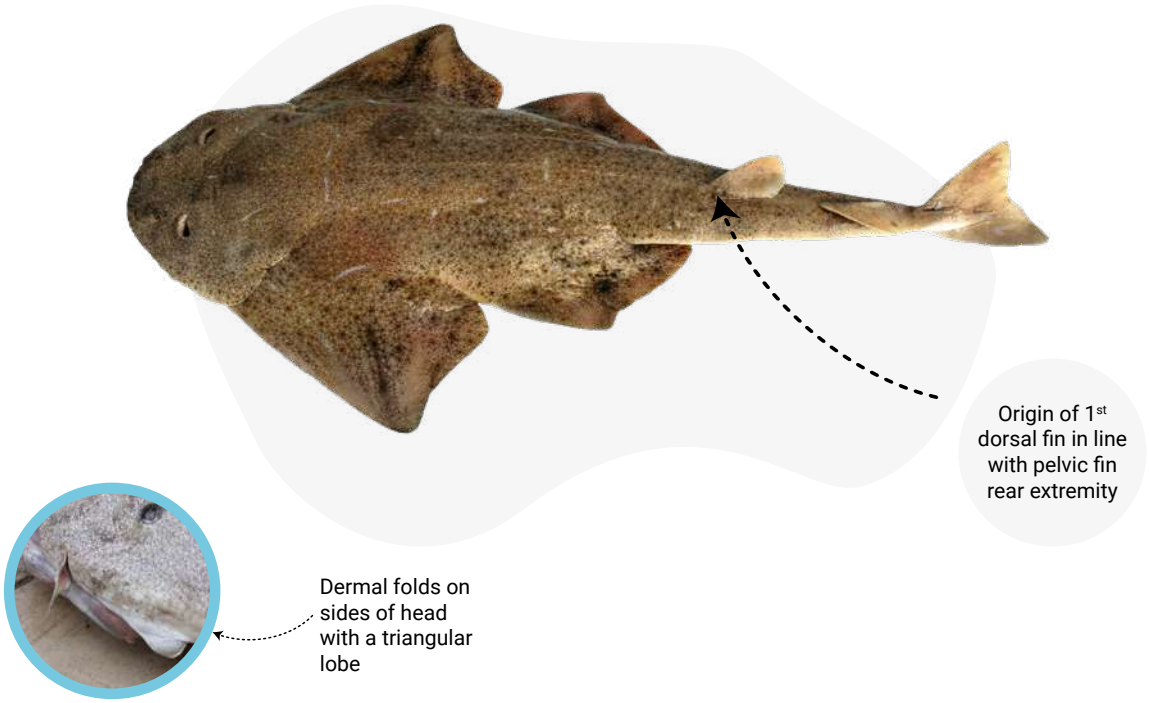
Status : UICN: Critically Endangered, **SPA/BD Protocol:** Annex II

Similar species : *Squatina aculeata* (Page 46) ; *Squatina squatina* (Page 48)

Squatinidae

Squatina squatina (Linnaeus, 1758)

EN Angelshark **FR** Ange de mer commun **AR** سفن/وقاص



Description

An angel shark with a broad trunk, simple nasal barbels with a simple, straight or spatulate tip, smooth or weakly fringed anterior nasal flaps. First dorsal fin origin usually above pelvic fin free rear type.

Size and biology

Maximum: 183 cm
Common: 40-150 cm
Maturity: 80-132 cm (males); 126-143 cm (females)
Size at birth: 24-30 cm
Aplacental Viviparous with both ovaries functional.**Gestation :** is 8 to 10 months, born in December to February in the Mediterranean.
Uterine fecundity : ranges from 7 to 25.

Habitat

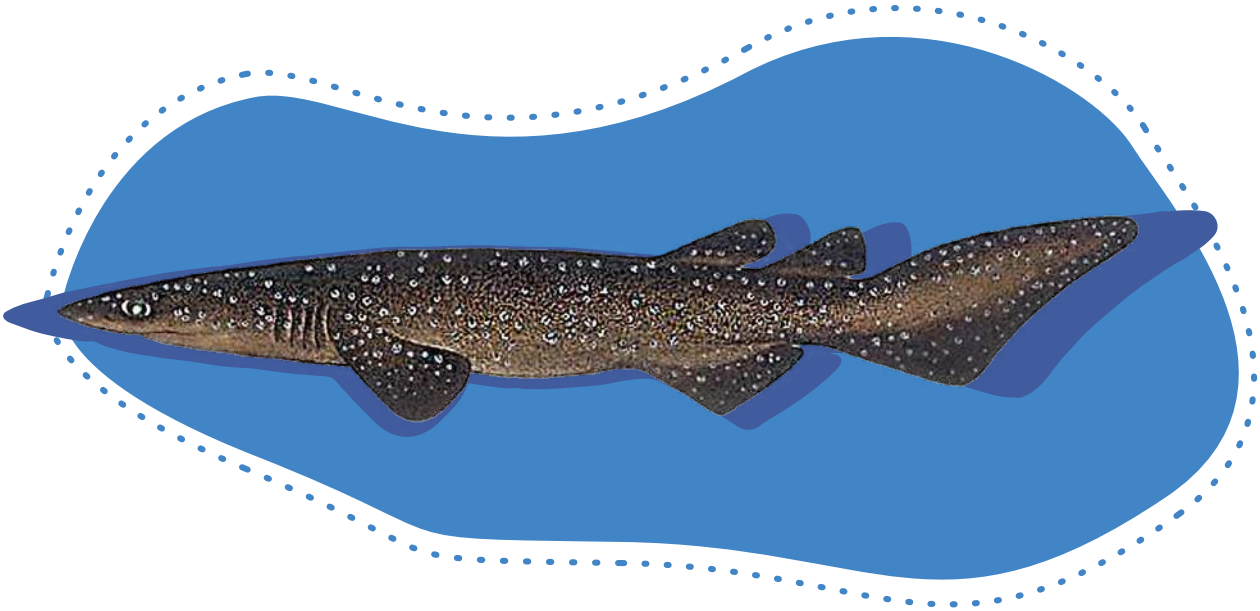
Temperate–water bottom–dwelling angelshark of the European and North African continental shelves, on or near the bottom from close inshore in the intertidal or subtidal to at least **150 m** depth. This shark prefers mud or sandy bottom.

Status : UICN: Critically Endangered, **SPA/BD Protocol:** Annex II

Similar species : *Squatina aculeata* (Page 46), *Squatina oculata* (Page 47)

Order ECHINORHINIFORMES
Mediterranean families

Echinorhinidae



1 family

Body not flattened; 5 pairs of gill slits; First dorsal fin originating posterior to pelvic–fin origins

Echinorhinidae

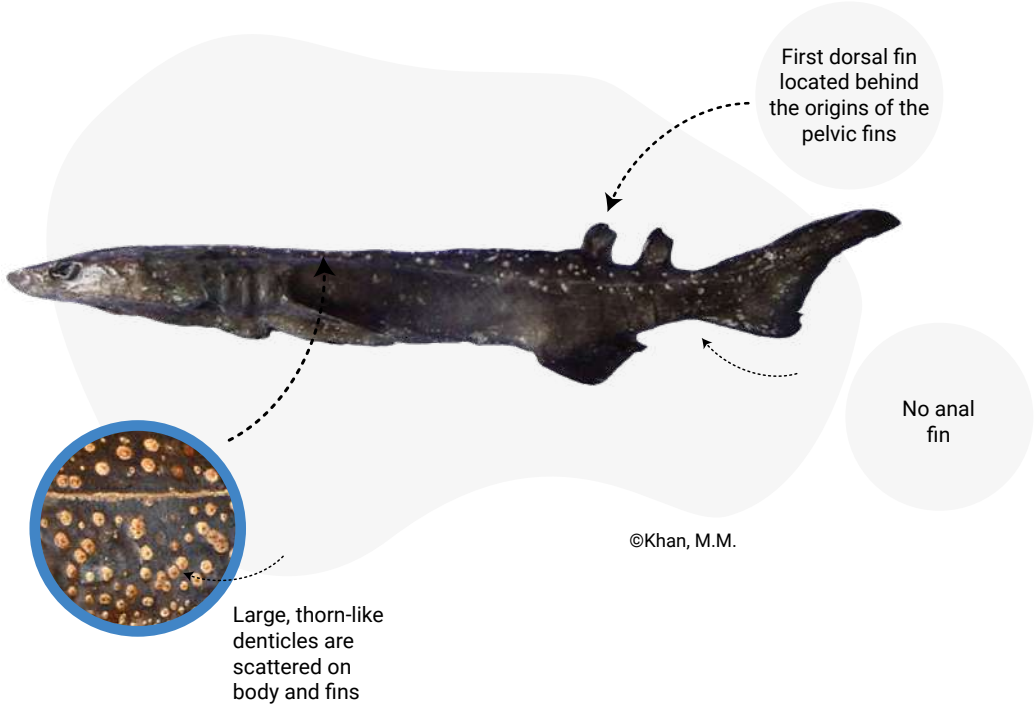
1 genus

Echinorhinus

Echinorhinidae

Echinorhinus brucus (Bonnaterre, 1788)

EN Bramble shark **FR** Squale bouclé **AR** كلب بحر



Description

A large, short–nosed and flat–headed, cylindrical, heavy–body shark. No anal fin, two spineless dorsal fins, the origin of the first set far posterior, originating behind the pelvic–fin origins. Body covered with large conspicuous, irregularly scattered denticles.

Size and biology

Maximum: 305-310 cm

Common: 40-150 cm

Maturity: 150-175 cm (males); 213 cm (females).

Size at birth: 45-50 cm

Aplacental Viviparous litter size ranging from 15 to 26.Nothing is known of its reproductive cycle in the mediterranean Sea, but it may breed in the spring months.

Habitat

A bottom–dwelling shark, occurring from **18 m to 1200 m**, mainly from **200 to 900 m** depth. it is a deep–water species, occurring on the continental and insular shelves and the upper slopes. It is found in cold–temperate areas and in places with upwelling.

Status : UICN: Endangered

Similar species : None

Order SQUALIFORMES
Mediterranean families

First dorsal fin originating anterior to pelvic–fin origin

Body very high and compressed. Dorsal fins extremely high — **Yes** → Oxynotidae

No

Teeth similar in both jaws. Upper precaudal pit usually present; subterminal notch absent from caudal fin — **Yes** → Squalidae

No

Underside of body, flanks, and tail usually with black markings and light organs (photophores) — **Yes** → Etmopteridae

No

Upper teeth relatively broad and bladelike, lowers low and wide — **Yes** → Centrophoridae

No

Head moderately broad and somewhat flattened or conical. Both dorsal fins either with or without fin spines) — **Yes** → Somniosidae

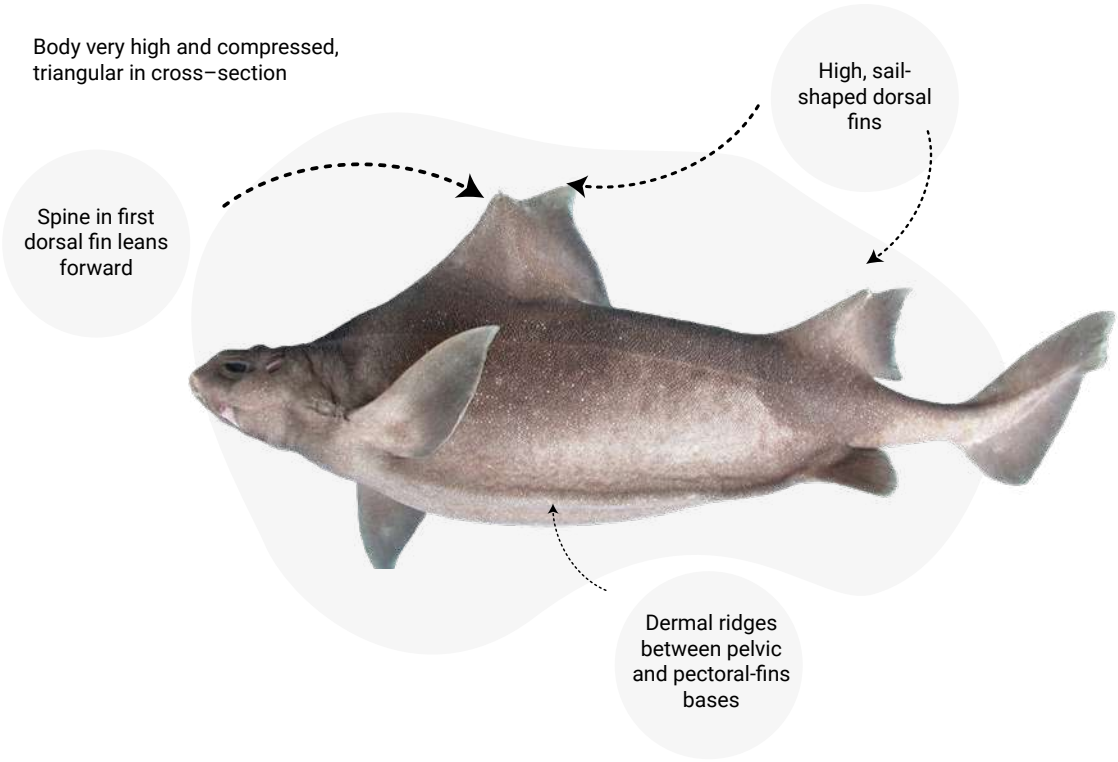
No

Head narrow and rounded–conical; no dorsal–fin spines — **Yes** → Dalatiidae

Oxynotidae

Oxynotus centrina (Linnaeus, 1758)

EN Angular rough shark **FR** Centrine commune **AR** بهيم بحر / عجة



Description

A shark with short, blunt snout, high, sail–like dorsal fins with spines, no anal fin, first dorsal spine inclined forwards, thick, triangular body with large, rough denticles, massive knobs on supraorbital ridges, vertically elongated spiracles.

Size and biology

Maximum: 150 cm.
Common: <100 cm
Maturity: 60 cm (males); 65 cm (females).
Size at birth: 21-24 cm
Aplacental Viviparous Litters of 7 to 23. ovarian eggs may be up to 40 to 60 mm in diameter. Birth appears to occur in the spring.

Habitat

A rare to uncommon bottom shark of the continental shelves and upper slope at depths of **50 to 777 m**, mostly below **100 m**. Found mostly on coral, algal and muddy bottoms.

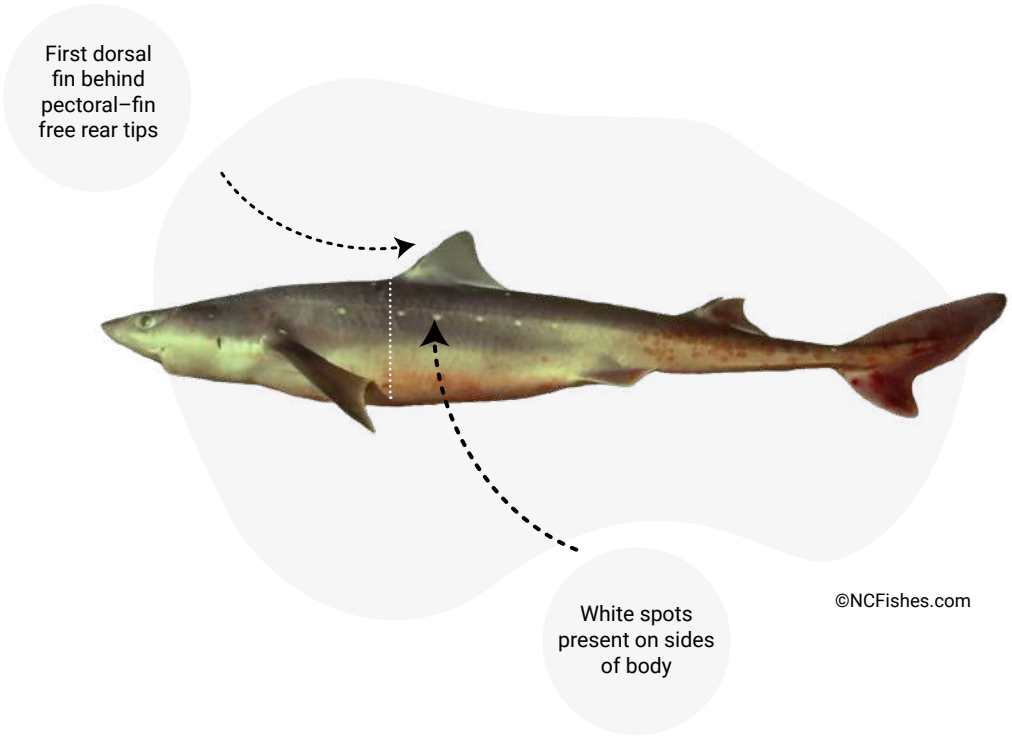
Status : UICN: Critically Endangered , **SPA/BD Protocol:** Annex II,

Similar species : None

Squalidae

Squalus acanthias Linnaeus, 1758

EN Picked dogfish **FR** Aiguillat-chagrin commun **AR** قطاط بوشوكة



Description

A moderate–sized dogfish, with a moderately long, narrow, subangular snout, two dorsal fins each preceded by a spine, with fin origin usually behind pectoral–fin rear tips, no anal fin, and no subterminal notch on caudal fin. White spots present on sides.

Size and biology

Maximum: 121 cm.
Common: 60 -105 cm
Maturity: 52 to 70 cm (males); 66 to 82 cm (females).
Size at birth: 18 and 30 cm
Aplacental Viviparous : The gestation period is reported as 18 to 24 months and may vary in different areas.
Mating may occur in the winter with birth primarily during the cold months.
Litters size: vary from 1 to 32 young.

Habitat

This dogfish is found from boreal to warm–temperate waters, it is an offshores of the outer continental shelf and upper slope. It occurs from the surface down to the bottom, possibly to **1446 m** on the deep slopes, but mostly on the shelf and upper slope above **600 m**.

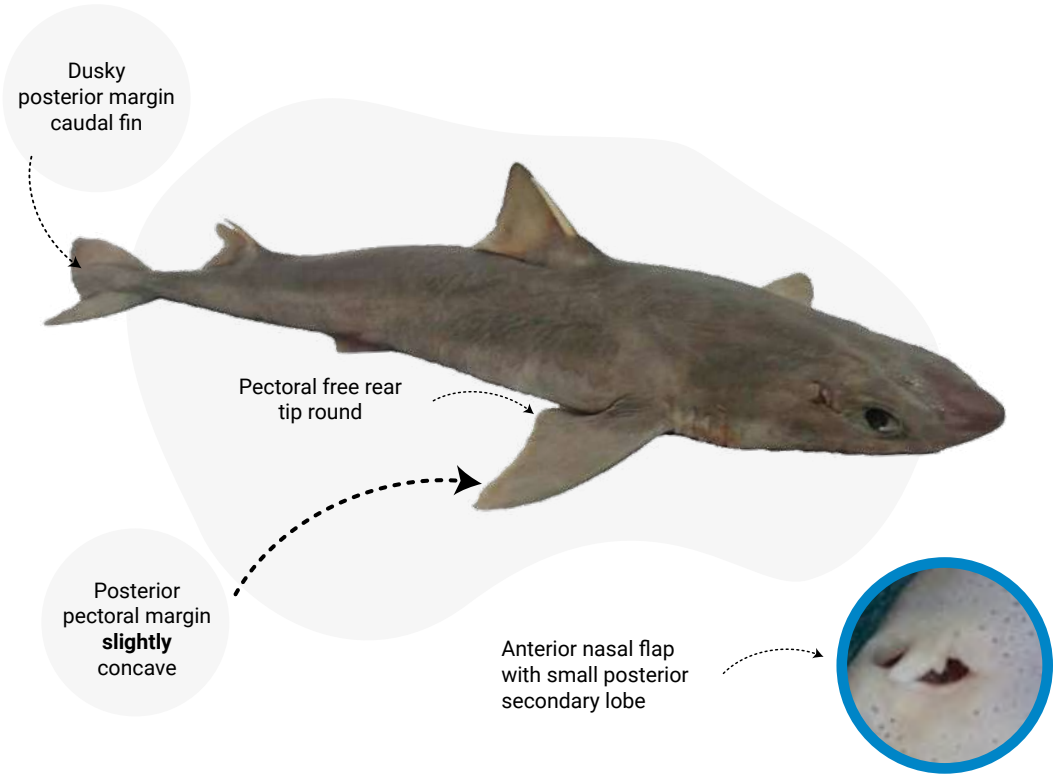
Status : **UICN:** Endangered, **SPA/BD Protocol:** Annex III, **CMS:** Appendix II

Similar species : *Squalus blainville* (Page 54), *Squalus megalops* (Page 55)

Squalidae

Squalus blainville (Risso, 1827)

EN Longnose spurdog **FR** Aiguillat-coq **AR** قطاط بوشوكة



Description

A large dogfish with a wide head. Moderately long, rounded–parabolic mouth. Preoral length about 1.0 to 1.3 times mouth width.
Pectoral fins are broad, with slightly concave posterior margins. No anal fin or subterminal notch on caudal fin.
Dusky posterior margin caudal fin.

Size and biology

Maximum: 105 cm.
Common: 60 -80 cm
Maturity: 43 to 56 cm (males); 52 to 56 cm (females).
Size at birth: 19-22 cm
Aplacental Viviparous with a two-year reproductive cycle.
Litters size: 1 to 9 (1 to 6 in the Eastern Mediterranean Sea).

Habitat

Squalus blainville is nominally recorded from the continental shelves and upper slopes, at or near the bottom at depths of **50** to at least **400 m** and probably deeper.

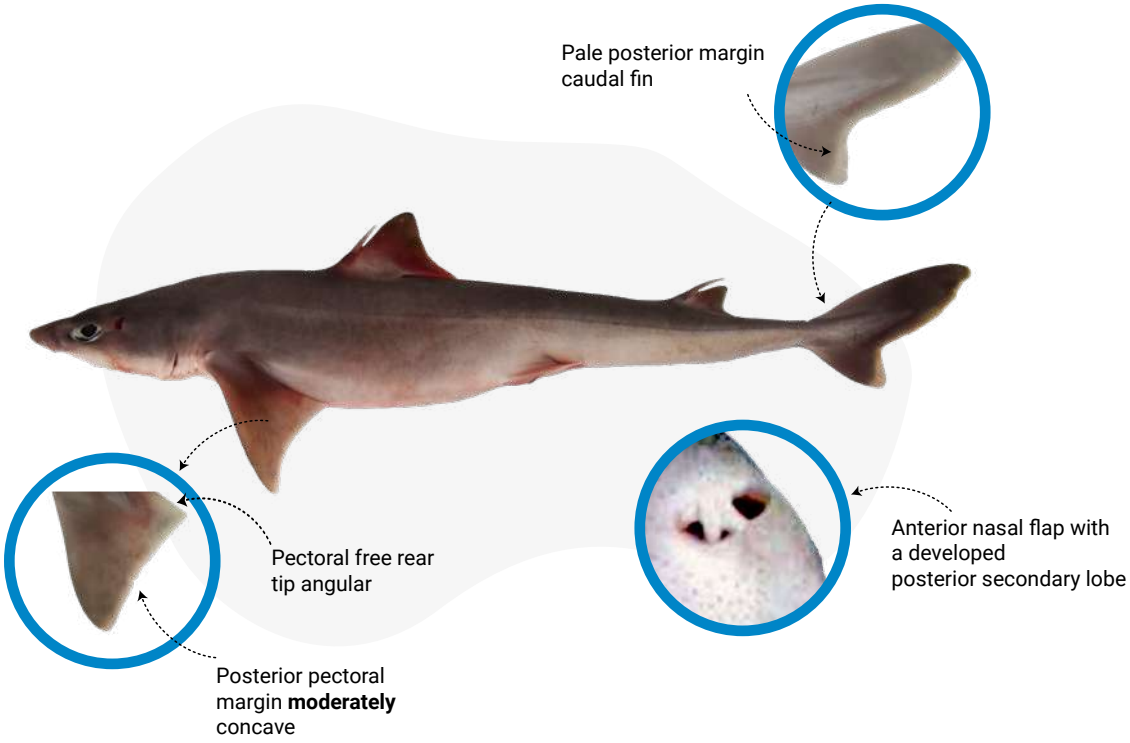
Status : UICN: Data Deficient

Similar species : *Squalus megalops* (Page 55), *Squalus acanthias* (Page 53)

Squalidae

Squalus megalops (Macleay, 1881)

EN Shortnose spurdog **FR** Aiguillat nez court **AR** قطاط بوشوكة



Description

A small species with a wide head, a short, broad, rounded–parabolic snout. Preoral length about 1.2 to 1.4 times mouth width. Pectoral fins broad and falcate, with moderately concave posterior margins. No anal fin. Caudal fin with white posterior margin.

Size and biology

Maximum: 77 cm.
Common: 40 -65 cm
Maturity: 37 to 51 cm (males); 48 to 62 cm (females).
Size at birth: 23 and 30 cm.
Aplacental Viviparous with the number of young per litter ranging from 1 to 6, but generally 2 or 3.
The gestation period is uncertain, although it has been estimated as two years.

Habitat

A common to abundant small species of temperate and tropical seas, found on the inner and outer continental shelves and upper slopes. Generally found on or near the bottom at depths from close inshore and the intertidal down to **732 m.**

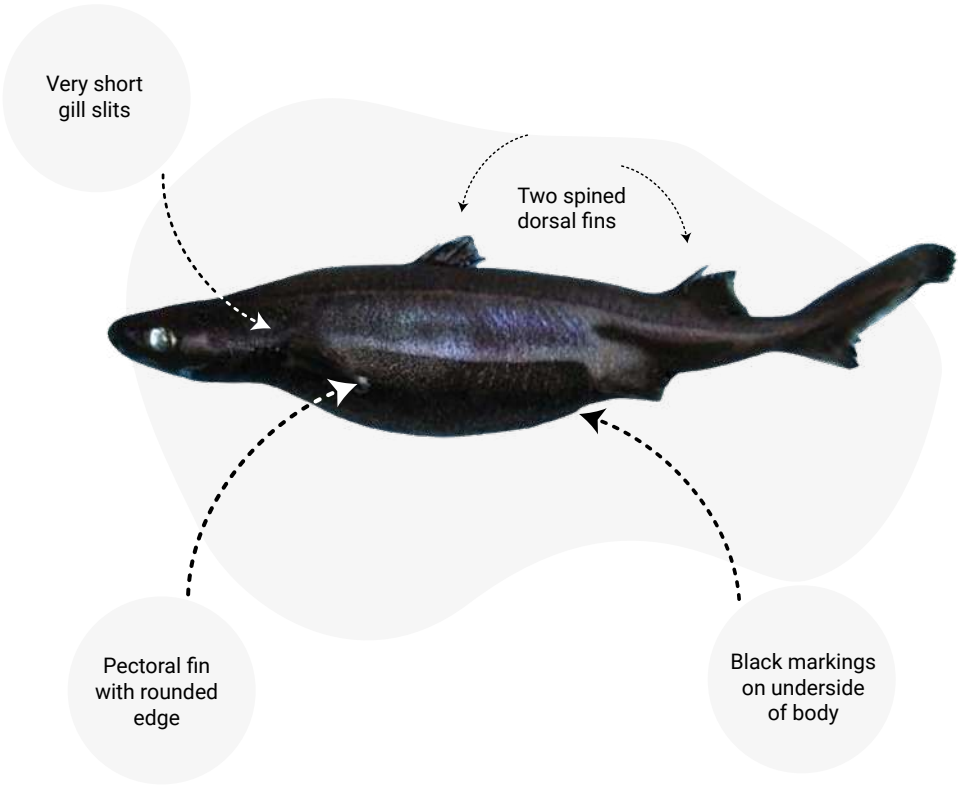
Status : UICN: Data Deficient

Similar species : *Squalus acanthias* (Page 53), *Squalus blainville* (Page 54)

Etmopteridae

Etmopterus spinax (Linnaeus, 1758)

EN Velve belly **FR** Sagre commun **AR** كلب اسود البطن



Description

A small-sized shark with relatively long abdomen, broad flattened head, short tail, black markings on underside of body and sides of tail prominent. Two spined dorsal fins. No anal fin.

Size and biology

Maximum: 45 cm.
Common: 20-30 cm.
Maturity: 25-35 cm (males); 31-41cm (females).
Size at birth: 8-14 cm
Aplacental Viviparous : with litter sizes from 1 to 21 (mean7-8).
Reproductive cycle undefined; a 2–3 years cycle is possible.
Females in various maturity stages, are found throughout the year.

Habitat

A common species found on, near or well above the bottom on the outer continental shelves and upper slopes at depths of **70 to 2000 m**, mostly between **200 to 500 m**.

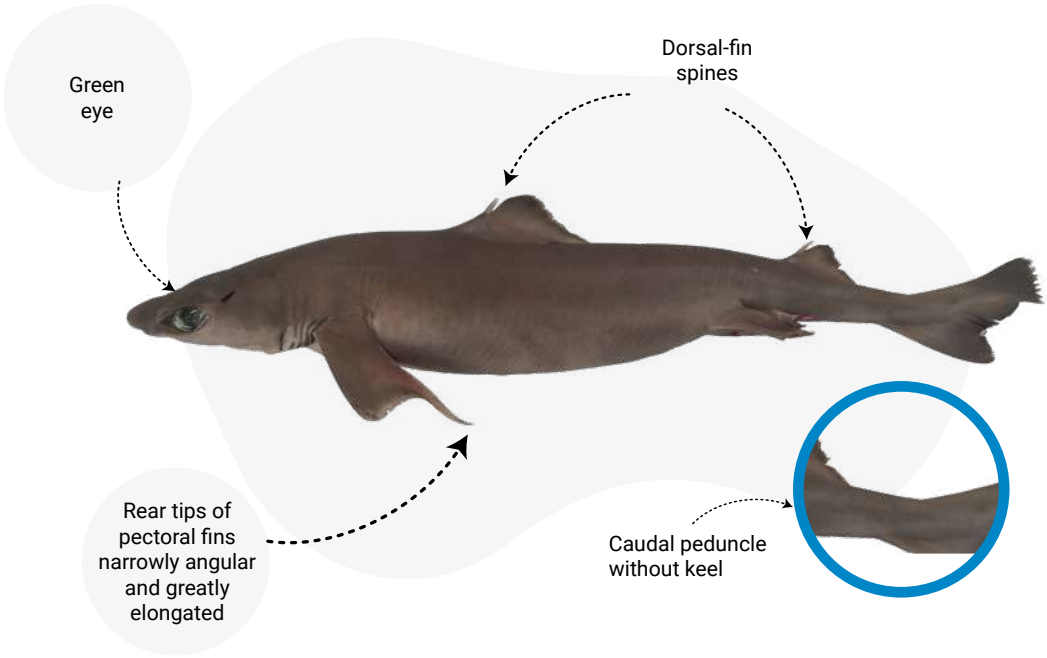
Status : UICN: Least Concern

Similar species : None

Centrophoridae

Centrophorus uyato (Rafinesque, 1810)

EN Gulper shark **FR** Squale-chagrin commun **AR** قطاط بوشوكة



Description

A medium-sized shark with a pointed snout and large green-reflective eyes. Rear tips of pectoral fins narrowly angular and greatly elongated. Two dorsal fins with grooved spines. No anal fin. Brownish grey above, light grey below.

Size and biology

Maximum: 110 cm.
Common: 50-90 cm.
Maturity: 75 to 90 cm (males & females).
Size at birth: 40 and 50 cm.
Aplacental Viviparous with 1-2 pups per litter.
Reproductive : cycle undefined.

Habitat

A common deepwater dogfish of the outer continental shelves ans upper slopes, on or near the bottom at depths from **50 to 1440 m**, but most records between **200 to 600 m**.

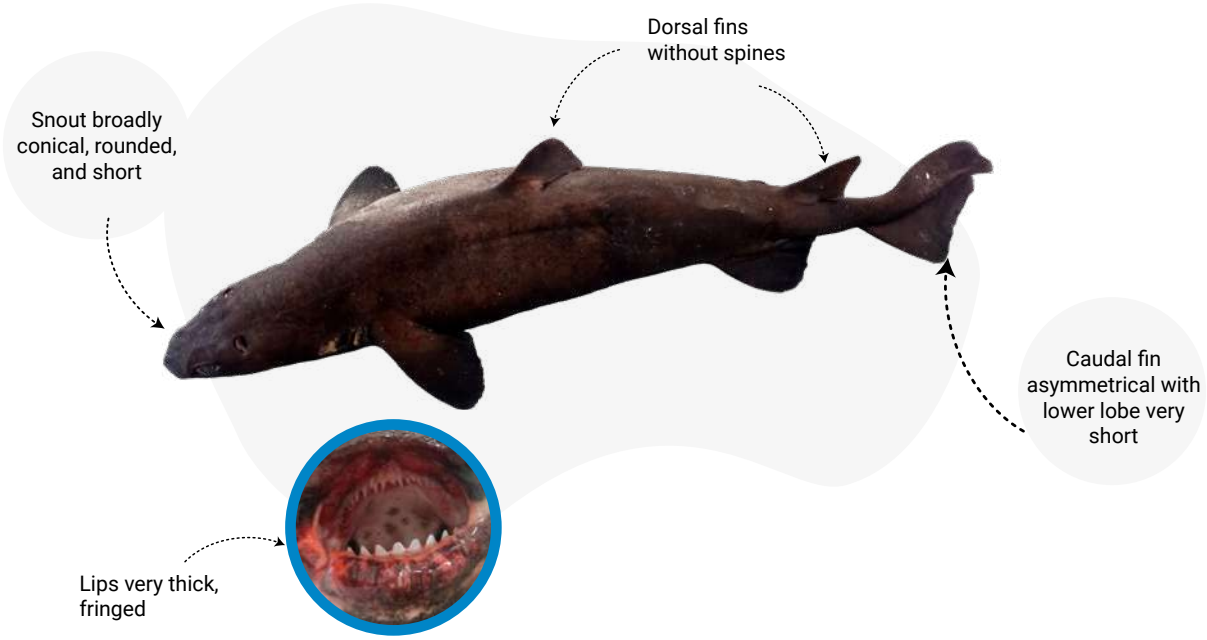
Status : UICN: Vulnerable, **SPA/BD Protocol:** Annex III,

Similar species : None

Dalatiidae

Dalatias licha (Bonnaterre, 1788)

EN Kitefin shark **FR** Squale liche **AR** قرش شراعي الزعنفة



Description

A moderate–sized, short and blunt–snouted shark with two almost equal– sized spineless dorsal fins, no anal fin, papillose thick lips. First dorsal fin on back with its origin behind the pectoral rear tips and caudal fin with the ventral lobe not expanded.

Size and biology

Maximum: 182 cm.
Common: 60 -120 cm.
Maturity: 100 cm (males); 120 cm (females).
Size at birth: 30-40 cm.
Development is aplacental viviparous, with litters of 3 to 16 young, but nothing is known about its reproductive cycle and gestation period.

Habitat

A common but sporadically distributed deepwater, warm–temperate and tropical shark of the outer continental and insular shelves and slopes from 37 to at least **1800 m** depth, but commonest below **200 m**.

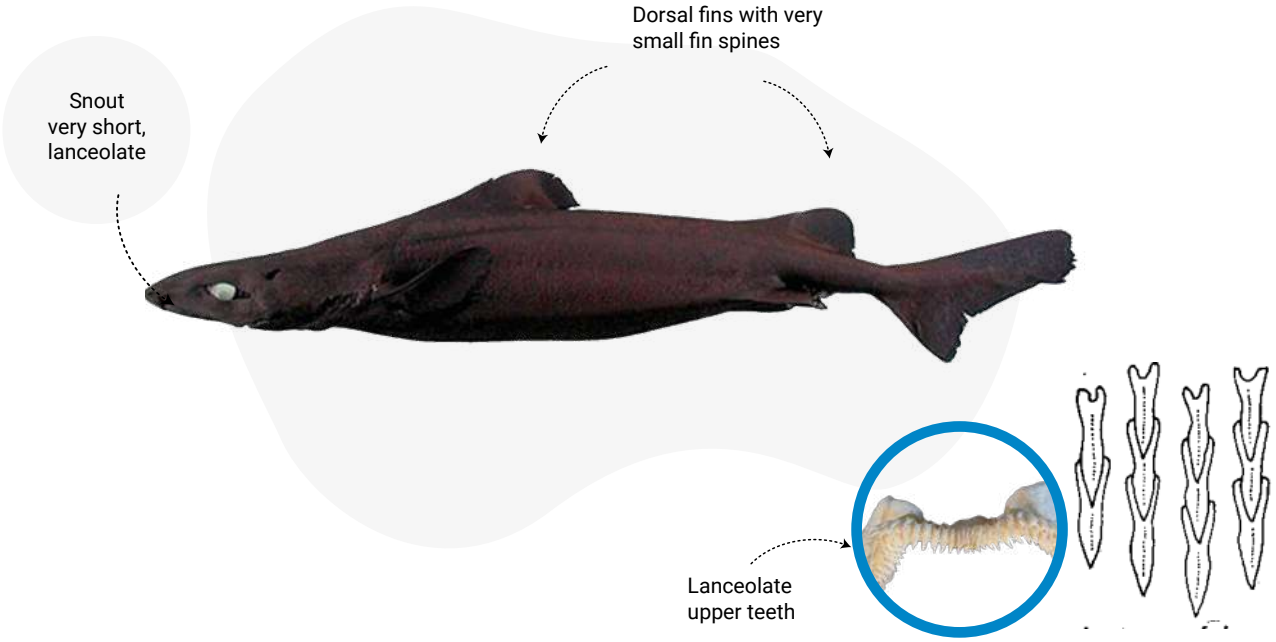
Status : UICN: Vulnerable

Similar species : *Somnious rostratus* (Page 60), *Centroscymnus coelopis* (Page 59)

Somniosidae

Centroscymnus coelolepis
Bocage & Capello, 1864

EN Portuguese dogfish **FR** Pailona commun **AR** كلب بحر



Description
Body stocky, not tapering abruptly from pectoral region, snout very short, lanceolate upper teeth and bladelike lower teeth with short, oblique cusps, dorsal fins with very small fin spines, no anal fin.

Size and biology
Maximum: 121 cm.
Common: 60 -105 cm.
Maturity: 85-100 cm (males); 95-110 cm (females).
Size at birth: 23-35 cm.
Aplacental viviparous: with 1 to 29 young per litter, but mostly from 12 to 14.
There does not appear to be a defined reproductive cycle as females give birth year–round.

Habitat
common, wide–ranging but little–known deepwater shark, on or near the bottom on the continental slopes and upper and middle rises. Occurs mostly at depths below **400 m**, but with a depth range of **128 to 3675 m**.

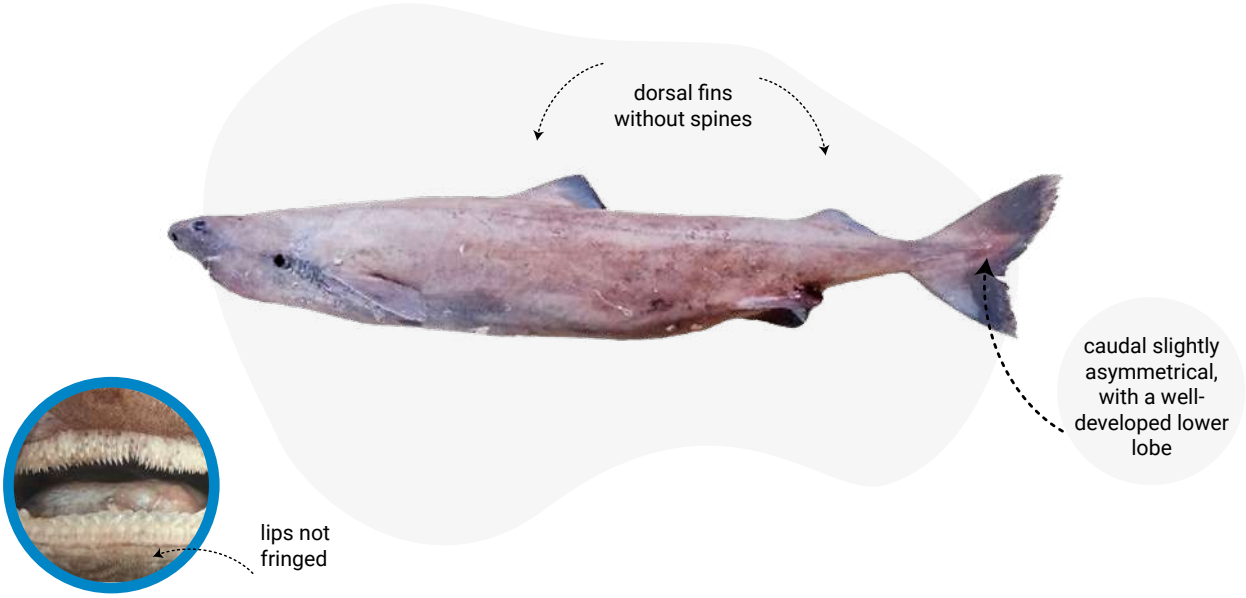
Status : UICN: Least Concern.

Similar species : *Somniosus rostratus* (Page 60), *Dalatias licha* (Page 58)

Somniosidae

Somniosus rostratus (Risso, 1827)

EN Little sleeper shark **FR** Laimargue de la Méditerranée **AR** كلب بحر



Description

Short, rounded snout, two spineless, equal–sized dorsal fins, no anal fin, long ventral caudal lobe, first dorsal fin on back closer to pectoral fins than pelvic fins, short keels on base of caudal fin.

Size and biology

Maximum: 143 cm.

Common: 60 -105 cm.

Maturity: 71 cm (males); 82-134 cm (females).

Size at birth: 21-28 cm.

Aplacental viviparous: shark with litters of 6 to 9, but nothing is known about its reproductive cycle and gestation period.

Habitat

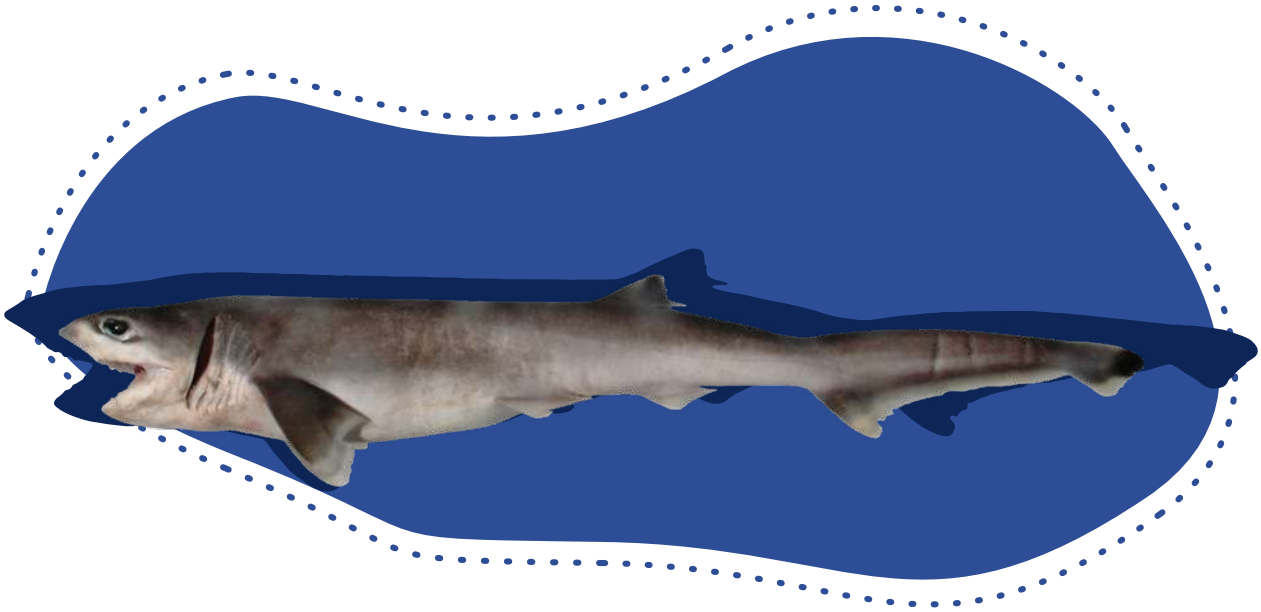
A rare to sporadically common, little–known small sleeper shark of the outer continental shelves and upper slopes, occurring on or near the bottom at depths of **180 to 2200 m**.

Status : UICN: Data Deficient

Similar species : *Centroscymnus coelolepis* (Page 59), *Dalatias licha* (Page 58)

Order HEXANCHIFORMES
Mediterranean families

Hexanchidae



1 family

Sharks with 6-7 pairs of gill slits single dorsal fin without spines → **Hexanchidae**

Key to genus

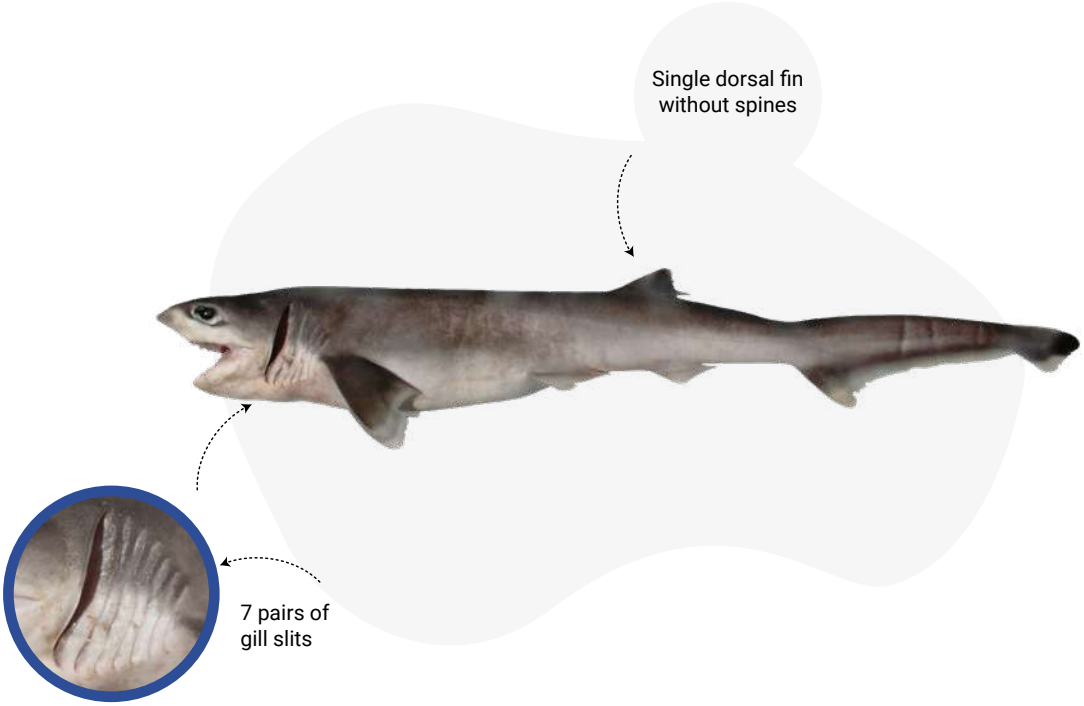
7 pairs of gill slits → *Heptranchias*

6 pairs of gill slits → *Hexanchus*

Hexanchidae

Heptranchias perlo (Bonnaterre, 1788)

EN Sharpnose seven-gill shark **FR** Requin perlon **AR** حوجوة/قطاط



Description

A narrow–headed, big–eyed, small seven–gilled shark with one dorsal fin, no dark spots, and a black blotch on the dorsal fin

Size and biology

Maximum: 137 cm.
Common: 80 -100 cm.
Maturity: 75 to 105 cm (males); 89 to 99 cm (females).
Size at birth: 26 – 27 cm.
Yolk–sac viviparous, with 6 to 20 young per litter.
In the Mediterranean Sea the shark seems to be reproductively active throughout the entire year.

Habitat

A primarily deepwater benthic and epibenthic species on the continental and insular shelves and upper slopes.
Possibly moving well off the bottom but details little known. Depth mostly between **27 to 720 m**, but could be down to **1000 m**.

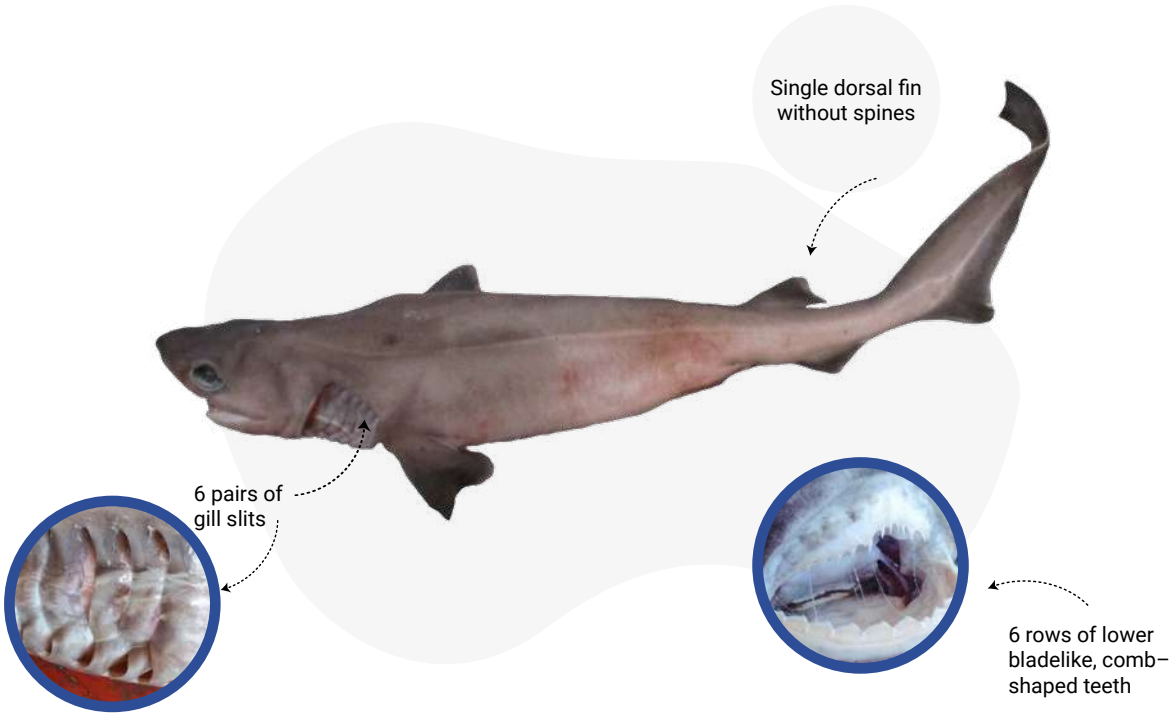
Status : UICN: CR, **SPA/BD Protocol:** Annex III,

Similar species : *Hexanchus griseus* (Page 63)

Hexanchidae

Hexanchus griseus (Bonnaterre, 1788)

EN Bluntnose six-gill shark **FR** Requin-griset **AR** ضبغ



Description

A heavy–bodied, broad–headed six gill shark with a ventral mouth with 6 rows of lower bladelike, comb– shaped teeth on each side, one dorsal fin

Size and biology

Maximum: 482 cm.
Common: 200-400 cm.
Maturity: 309 to 330 cm (males); 350 to 420 cm (females).
Size at birth: 61 – 74 cm.
Yolk–sac viviparous, with litters from 47 to 108.
Reproductive cycle may be biannual with 12 months resting phase followed by 12 months gestation period.

Habitat

Hexanchus griseus is mainly a deep water shark, rarely found at depths of less than **100 m**. These sharks are diel vertical migrators; they are nocturnal and remain in the deep oceans during the day but rise towards the surface at night.

Status : **UICN:** Data Deficien, **SPA/BD Protocol:** Annex III,

Similar species : *Heptranchias perlo* (Page 62)

Order CARCHARHINIFORMES
Mediterranean families

Head with lateral bladelike, expansions or hammer like

Yes — Sphyrnidae

Head normal

No

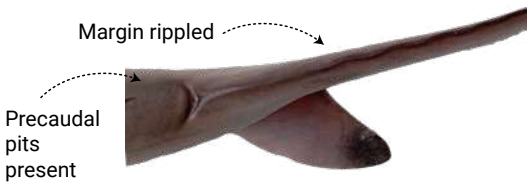
First dorsal–fin base opposite or behind pelvic–fin bases

Yes — Scyliorhinidae & Pentanchidae

No

Precaudal pits present. Dorsal caudal–fin margin undulated

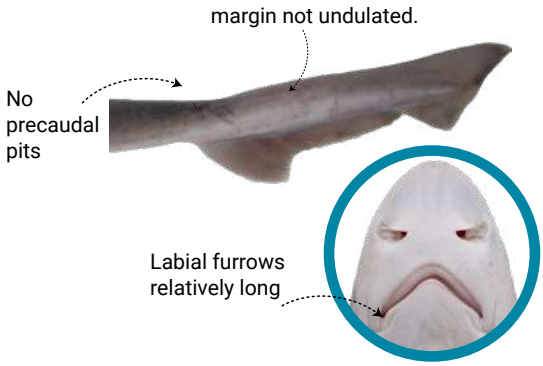
Yes — Carcharhinidae



No

Precaudal pits absent. Dorsal caudal–fin margin not undulated. Labial furrows relatively long with uppers extending partway or all the way anterior to level of symphysis

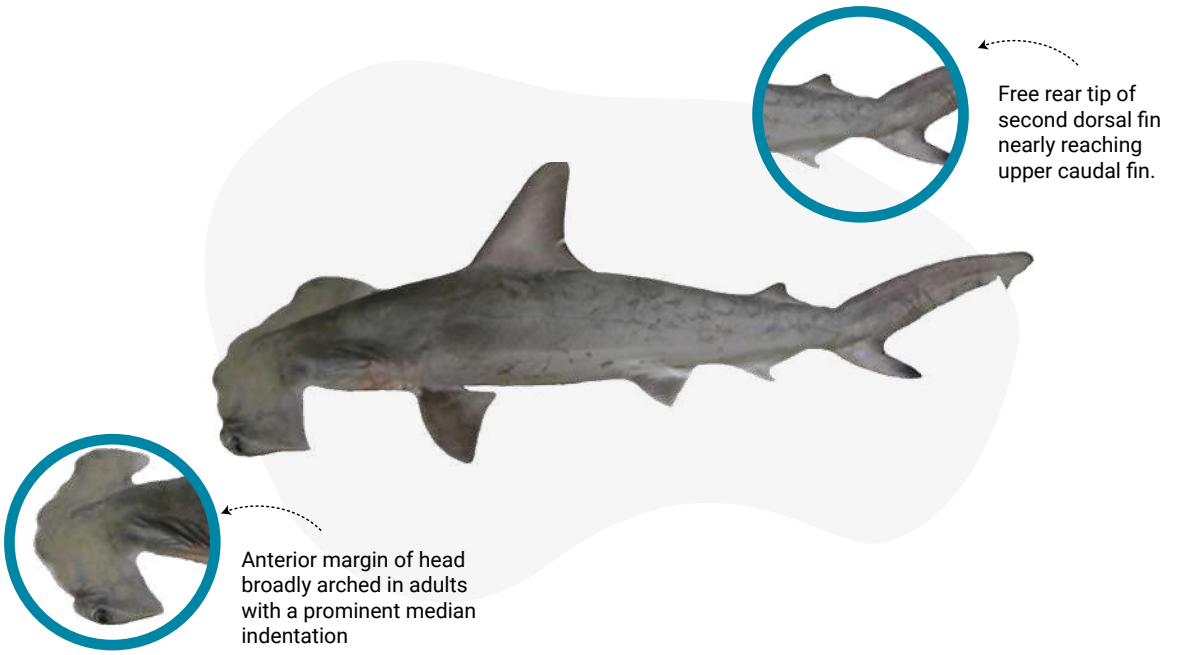
Yes — Triakidae



Sphyrnidae

Sphyrna lewini (Griffith & Smith, 1834)

EN Scalloped hammerhead **FR** Requin-marteau halicorne **AR** قرش المطرقة



Description

A large shark with a broad, narrow-bladed head, anterior margin of head very broadly arched in adults and with a prominent median indentation, second dorsal fin with long free rear tip nearly or quite reaching upper caudal–fin origin.

Size and biology

Maximum: 370-400 cm.
Common: 200-300 cm.
Maturity: 140-165 cm (males); 212-250 cm (females).
Size at birth: 38 – 56 cm
A placental viviparous species, gestation is about 9-10 months with 13-41 pups per litter. Reproductive cycle may be biannual with a year resting phase followed by a year gestation period.

Habitat

A coastal-pelagic, semioceanic warm-temperate and tropical species occurring over continental and insular shelves and in deepwater adjacent to them. Occurs from the intertidal and surface down to at least **275 m** depth.

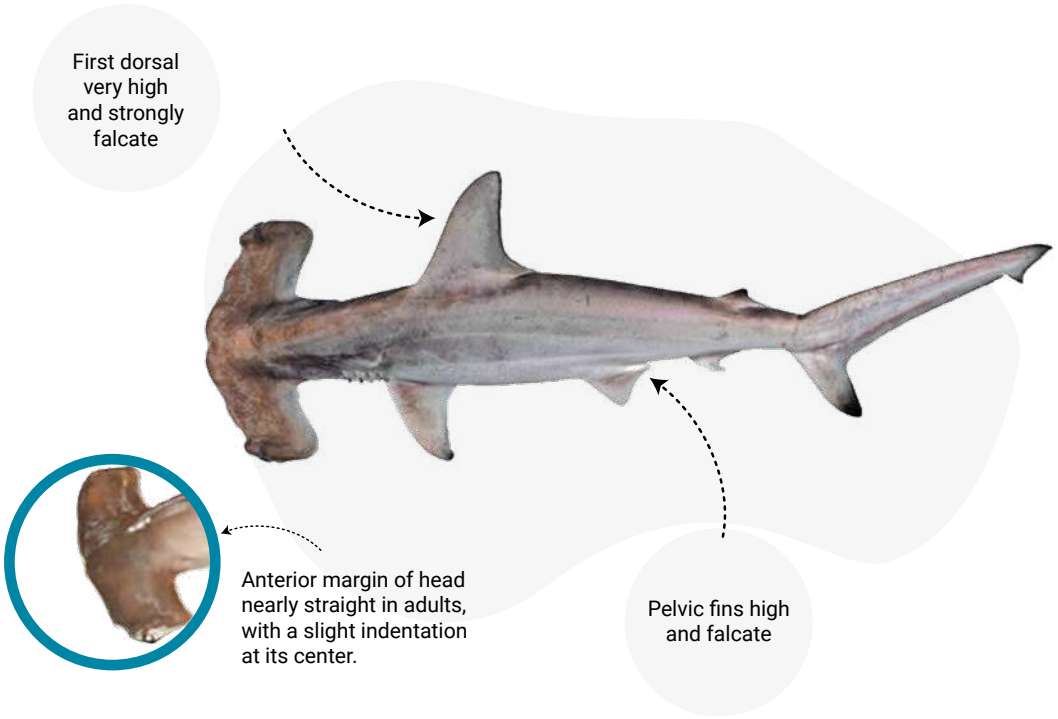
Status : **UICN:** Data Deficient, **SPA/BD Protocol:** Annex II, **CITES:** Appendix II

Similar species : *Sphyrna zygaena* (Page 67), *Sphyrna mokarran* (Page 66)

Sphyrnidae

Sphyrna mokarran (Rüppell, 1837)

EN Great hammerhead **FR** Grand requin-marteau **AR** قرش المطرقة



Description

A large hammerhead with anterior margin of head nearly straight in adults and with a median indentation, strongly falcate first dorsal fin with rear tip in front of pelvic–fin origins, falcate pelvic fin.

Size and biology

Maximum: 550 -610 cm.
Common: 200-300 cm.
Maturity: 234-269 cm (males); 250-300 cm (females).
Size at birth: 50 – 70 cm.
Viviparous, with a yolk-sac placenta.
Birth occurs after an 11-month gestation period with pups ranges from 6 to 42per litter. Birth occurs in late spring or summer

Habitat

A coastal-pelagic and semi- oceanic tropical shark occurring close inshore and well offshore, over the continental shelves. Depths range from near the surface and in water about a meter deep to over **300 m**.

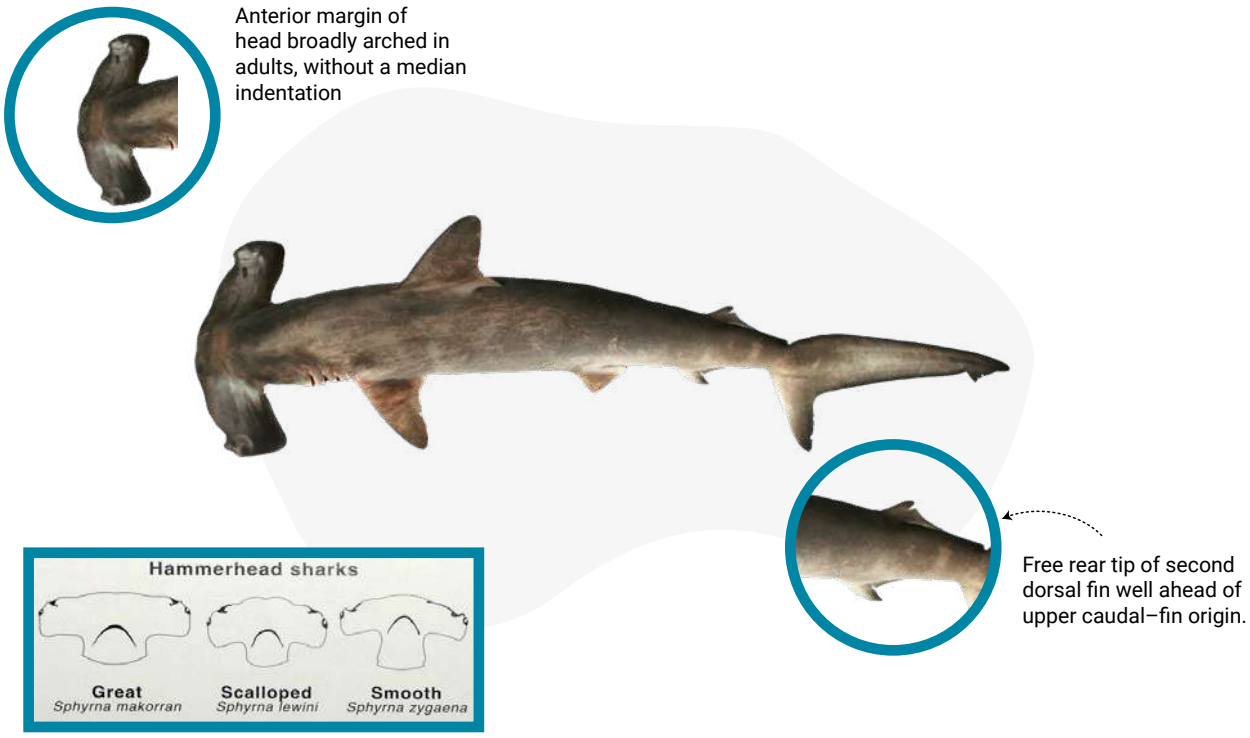
Status : **UICN:** Data Deficient, **SPA/BD Protocol:** Annex II, **CITES:** Appendix II

Similar species : *Sphyrna zygaena* (Page 67) , *Sphyrna lewini* (Page 65)

Sphyrnidae

Sphyrna zygaena (Linnaeus, 1758)

EN Smooth hammerhead **FR** Requin-marteau commun **AR** قرش المطرقة



Description

A large hammerhead with a broad, narrow-bladed head, anterior margin of head broadly arched in adults and without a median indentation at any stage. Free rear tip of second dorsal fin well ahead of upper caudal–fin origin.

Size and biology

Maximum: 370-400 cm.
Common: 200-300 cm.
Maturity: 210 to 240 cm (males & females).
Size at birth: 50 – 61 cm.
Viviparous, with a yolk-sac placenta.
The number of pups per litter is between 20 and 50.
Birth occurs after a 10-11 month gestation in the spring and early summer.

Habitat

An active swimming coastal- pelagic and semi-oceanic hammerhead is found close inshore and in shallow water over continental and insular shelves to well offshore, at depths from the surface down to at least **200 m** along the edge of the continental shelf.

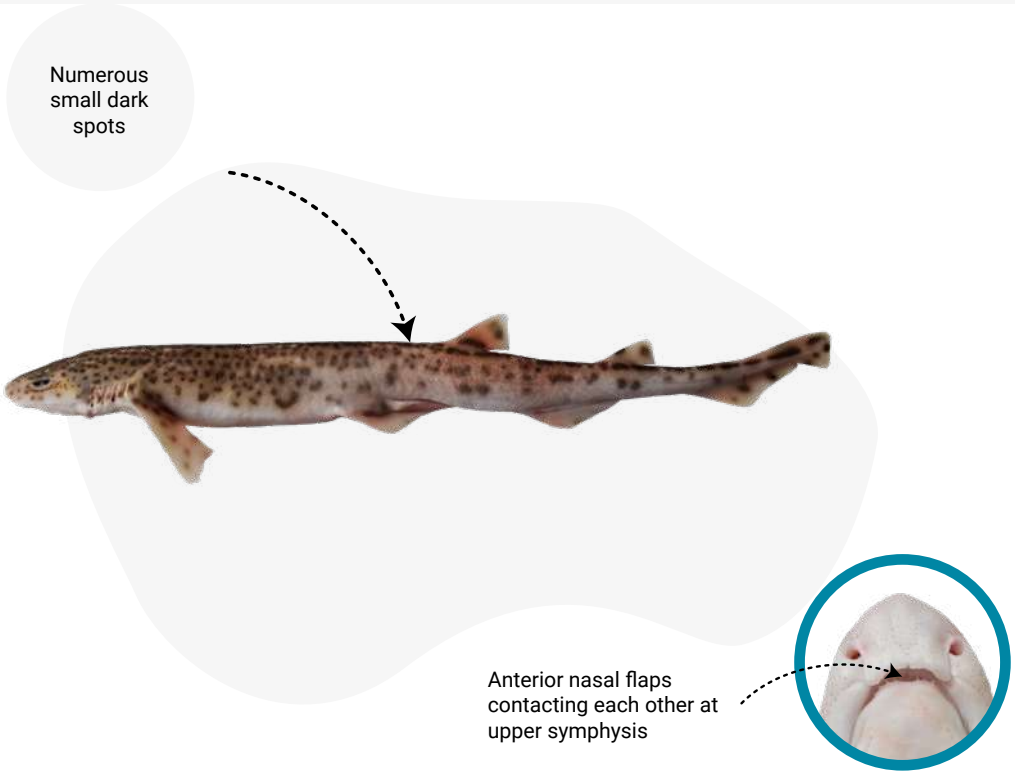
Status: **UICN:** Critically Endangered, **SPA/BD Protocol:** Annex II, **CITES:** Appendix II

Similar species : *Sphyrna mokarran* (Page 66), *Sphyrna lewini* (Page 65)

Scyliorhinidae

Scyliorhinus canicula (Linnaeus, 1758)

EN Small-spotted catshark **FR** Petite roussette **AR** كاتارلي / نمر



Description

A slender, dark-spotted shark with greatly expanded anterior nasal flaps, reaching mouth and covering shallow nasoral grooves, labial furrows on lower jaw only, second dorsal fin much smaller than firs. Pattern of numerous small dark spots.

Size and biology

Maximum: 85 cm.
Common: 20-50 cm.
Maturity: 40-44 cm (males); 35-47 cm (females).
Size at birth: 9-10 cm.
Oviparous with 90 to 115 egg-cases per year; egg-cases are deposited on algal substrates and hatch after 9 to 11 months incubation.

Habitat

An abundant temperate bottom species of the European continental shelves and uppermost slopes, on sandy, coralline algal, gravelly or muddy bottoms at depths from a few meters commonly down to **110 m** and exceptionally to **400 m**.

Status: **UICN:** Least Concern

Similar species : *Scyliorhinus stellaris* (Page 69)

Scyliorhinidae

Scyliorhinus stellaris (Linnaeus, 1758)

EN Nursehound **FR** Grande roussette **AR** كاتارلي / نمر

Description

Large, fairly stocky species with large and small black spots and sometimes white spots covering dorsal surface, small anterior nasal flaps that don't reach mouth.

Size and biology

Maximum: 162 cm.
Common: 110-125 cm.
Maturity: 77-80 cm (males & females).
Size at birth: 10-16 cm.
Oviparous egg-laying (two egg-cases at time) all year round, mainly from spring to summer; egg-cases are deposited on algal substrates and hatch after 9 months incubation.

Habitat

A common inshore and offshore shark of the continental shelf, benthic over rough, rocky or coralline grounds from **20 m** to about **100 m**, but commonest in depths of less than **60 m**.

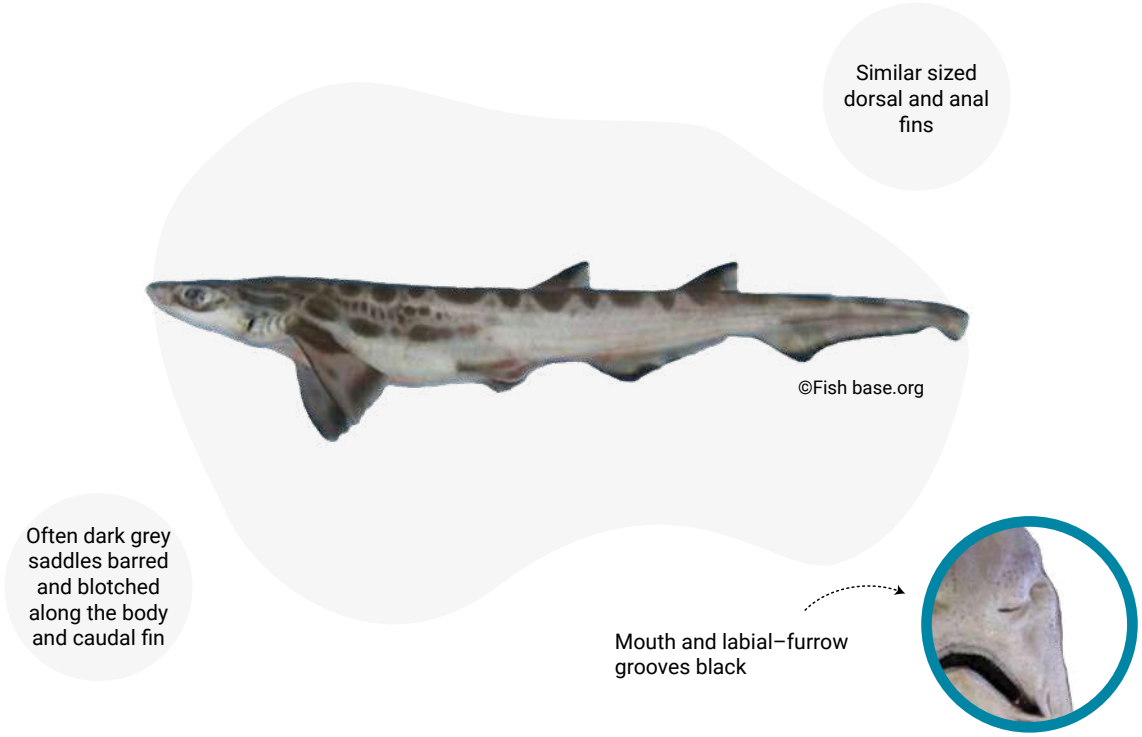
Status: **UICN:** Near Threatened

Similar species : *Scyliorhinus canicula* (Page 68)

Pentanchidae

Galeus atlanticus (Vaillant, 1888)

EN Atlantic sawtail catshark **FR** Chien atlantique **AR** قط اسود الفم



Description

Shark with a body moderately slender, long and bell-shaped snout, mouth cavity and labial grooves black, eyes lateral on edges of head, and a long, distinct crest of enlarged dermal denticles along upper caudal margin.

Size and biology

Maximum: 46 cm.
Common: 34-44 cm.
Maturity: 33-42 cm (males) 37-44 cm (females).
Size at birth: 15 cm.
Oviparous egg-laying (two egg-cases at time) all year round, mainly from spring to summer; egg-cases are deposited on algal substrates and hatch after 9 months incubation.

Habitat

A demersal species of the continental slope from **330** to **790 m**, but mostly common between **400 m** to **600 m**.

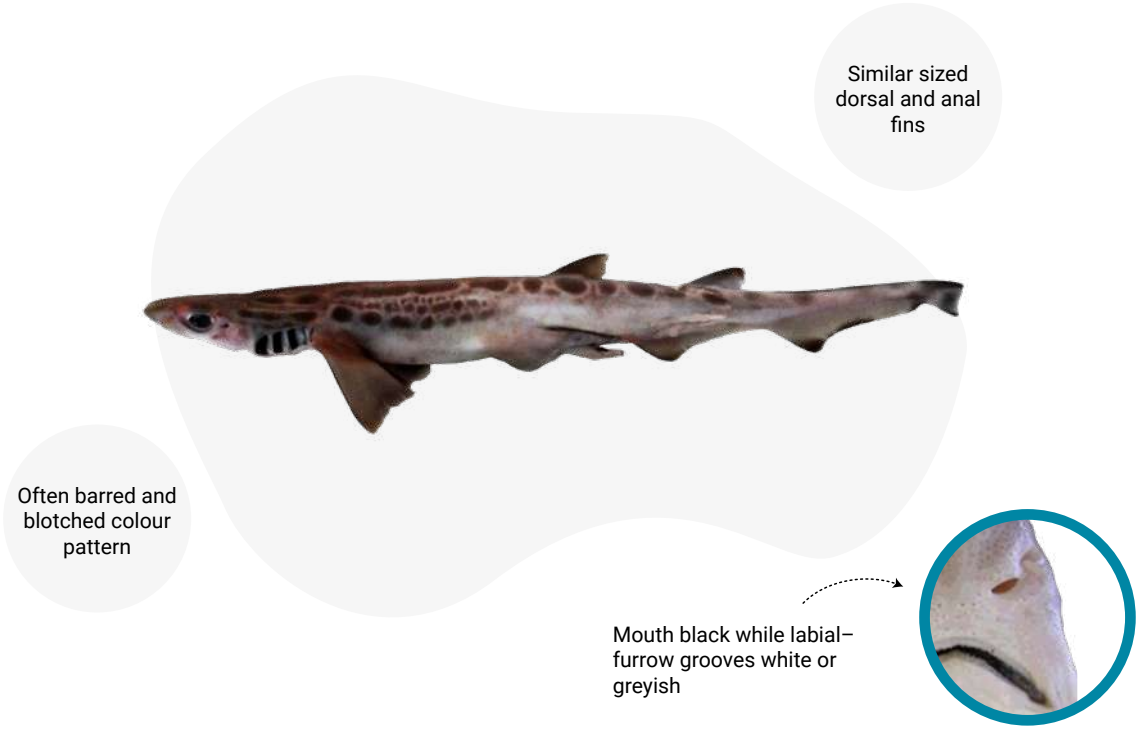
Status: **UICN:** Near Threatened

Similar species : *Galeus melastomus* (Page 71)

Pentanchidae

Galeus melastomus Rafinesque, 1810

EN Blackmouth catshark **FR** Chien espagnol **AR** قط اسود الفم



Description

Moderately large Galeus with long and pointed snout, mouth cavity and dark, labial furrows white or greyish. Long anal fin and compressed precaudal tail.

Size and biology

Maximum: 52 cm.
Common: 20-40 cm.
Maturity: 34-42 cm (males), 38-45 cm (females).
Size at birth: 15 cm.
Oviparous, spawning all year round with a peak in spring and summer, with up to 13 eggs present in the oviducts of a female; egg case dimensions about 6 by 3 cm.

Habitat

A common deepwater bottom shark found on the outer continental shelves and upper slopes, mainly between **200** to **500 m** but occasionally up to **55 m** and down to **2000 m**.

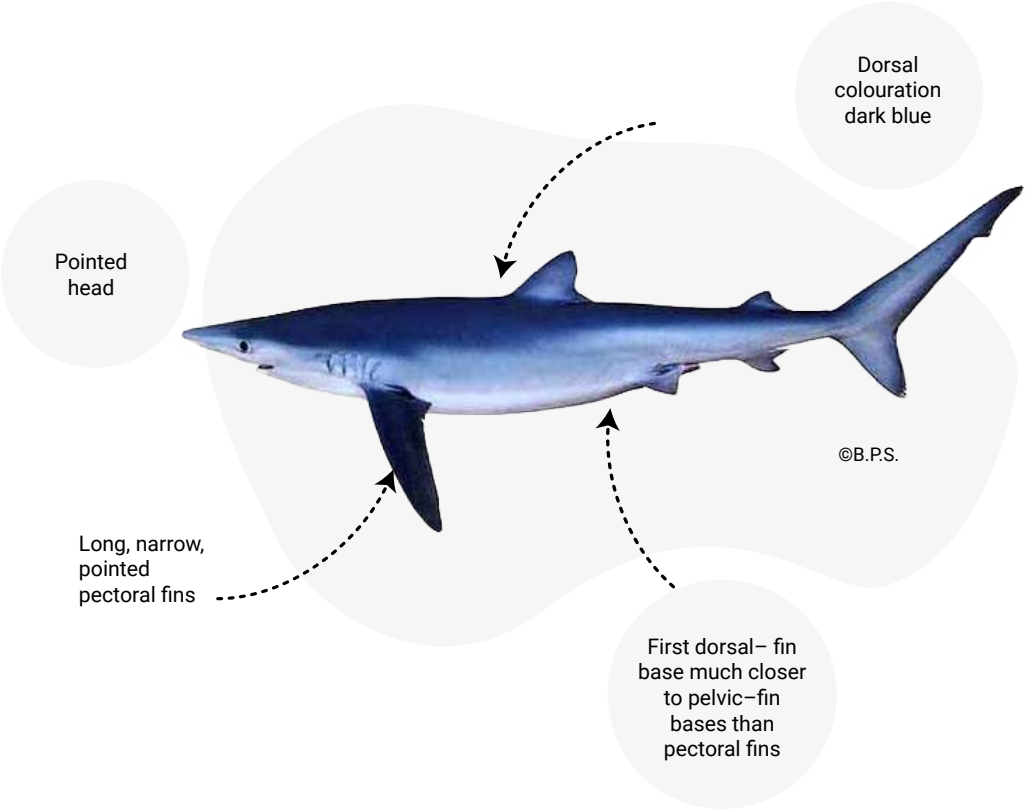
Status: **UICN:** Least Concern

Similar species : *Galeus atlanticus* (Page 70)

Carcharhinidae

Prionace glauca (Linnaeus, 1758)

EN Blue shark **FR** Peau bleue **AR** قرش ازرق



Description

Dorsal colouration dark blue, bright blue on sides and abruptly white on the undersides, usually slender body, long snout, large eyes, gill raker papillae, long, narrow, pointed pectoral fins, first dorsal fin on back but closer to the pectoral–fin bases than the pelvic fins.

Size and biology

Maximum: 400 cm.
Common: 180-300 cm.
Maturity: 181-281 cm (males), 173-221 cm (females).
Size at birth: 35-45 cm.
Viviparous placental species with number of young 4 to 135 per litter. The species have a seasonal reproduction with a gestation period of 9–12 months.

Habitat

A wide-ranging, oceanic epipelagic and littoral shark, occurring from the surface to at least **350 m** depth. Although an offshore species it may venture inshore, especially at night, and often in areas with a narrow continental shelf or off oceanic islands.

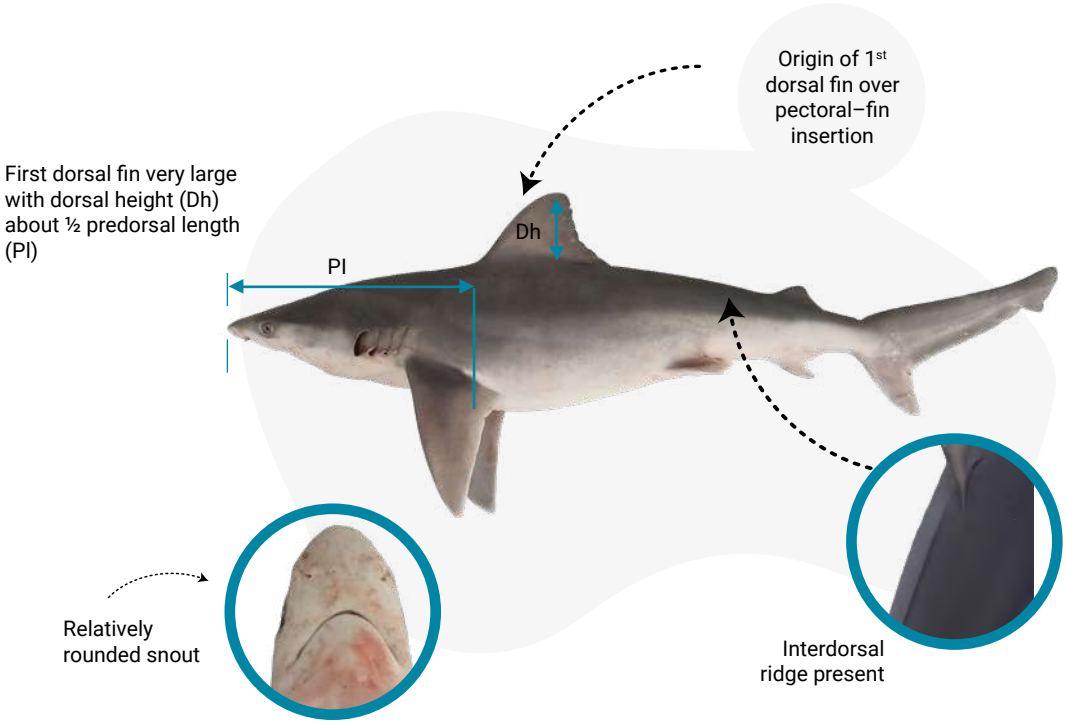
Status: UICN: Critically Endangered, **SPA/BD Protocol**: Annex III

Similar species : *Carcharhinus spp*, *Isurus oxyrinchus* (Page 87)

Carcharhinidae

Carcharhinus plumbeus (Nardo, 1827)

EN Sandbar shark **FR** Requin gris **AR** كلب بحر



Description

A medium-sized grey shark with short, rounded snout, an extremely high triangular first dorsal fin with its origin over or anterior to the pectoral–fin insertions, an interdorsal ridge and no conspicuous markings on fins.

Size and biology

Maximum: 300 cm.
Common: 80-160 cm.
Maturity: 131-178 cm (males), 144-183 cm (females).
Size at birth: 56-75 cm.
A placental viviparous: number of young 1 to 14 per litter, with 5 to 12 common. Gestation period 11 to 12 months and parturition occurs in coastal waters.

Habitat

An abundant coastal-pelagic shark of temperate and tropical waters, found on continental and insular shelves and in deep water adjacent to them, and oceanic banks, common at bay mouths, inside shallow muddy or sandy bays. Depths range from **5 to 300 m**.

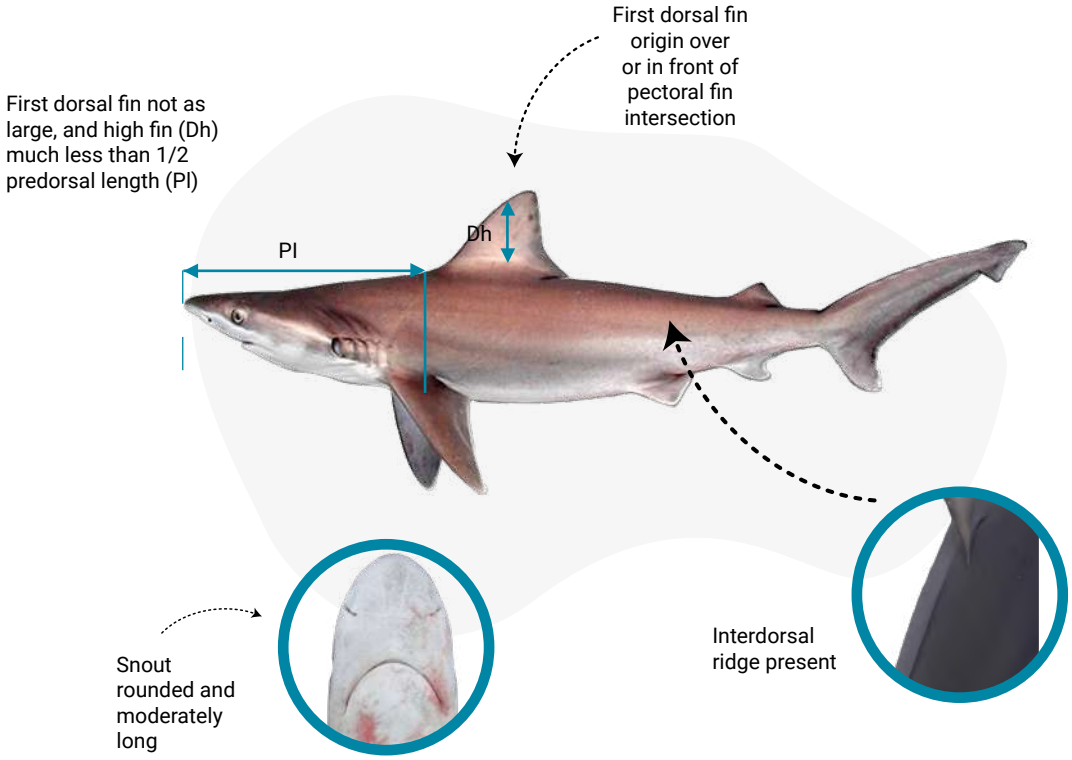
Status: **UICN:** Endangered, **SPA/BD Protocol**: Annex III

Similar species : *Carcharhinus spp*

Carcharhinidae

Carcharhinus altimus (Springer, 1950)

EN Bignose shark **FR** Requin babosse **AR** كلب بحر



Description

Large, cylindrical heavy bodied shark with a long rounded or bluntly pointed snout, moderately high first dorsal fin with origin in front or over pectoral fin insertion, a high interdorsal ridge, a second dorsal fin with a short rear tip and no conspicuous markings.

Size and biology

Maximum: 300 cm.
Common: 180-300 cm.
Maturity: 190 cm (males), 225 cm (females).
Size at birth: 60-75 cm.
Viviparous placental with number of young 4 to 15 per litter. Gives birth every second year. Mediterranean sharks give birth in August and September.

Habitat

A common, large, offshore, bottom-dwelling warm temperate and tropical shark usually found in deeper water near the edge of continental and insular shelves and the uppermost slopes, at depths of **80 m** or more down to at least **250 to 430 m.**

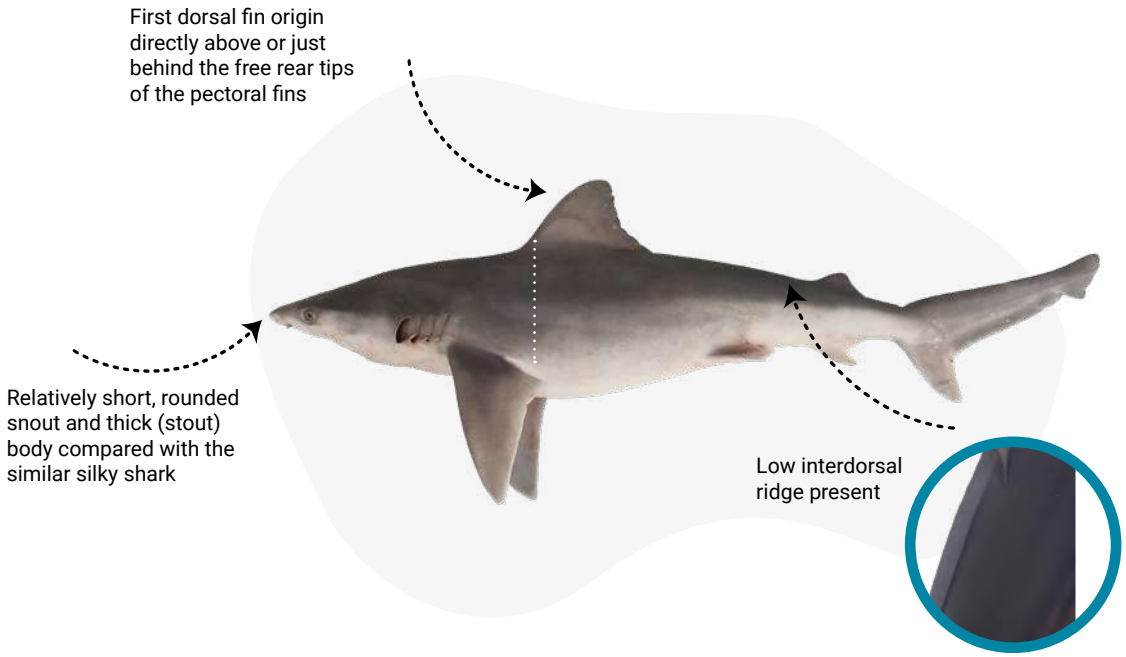
Status: **UICN:** Data Deficient

Similar species : *Carcharhinus spp*

Carcharhinidae

Carcharhinus obscurus (Lesueur, 1818)

EN Dusky shark **FR** Requin sombre **AR** كلب بحر



Description

A large grey shark with a fairly short broadly rounded snout, a low interdorsal ridge, a moderate-sized first dorsal fin and origin directly above or just behind the free rear tips of the pectoral fins and no conspicuous markings on fins.

Size and biology

Maximum: 400 cm.
Common: 200-300 cm.
Maturity: 280-290 cm (males), 257 -300 cm (females).
Size at birth: 69-100 cm.
Viviparous placental with number of young 3 to 14 per litter. Females apparently mate in alternate years with a gestation period of 8 or 9 months.

Habitat

A common, coastal-pelagic, inshore and offshore warm-temperate to tropical shark species of continental and insular shelves and oceanic waters adjacent to them. Juveniles tend occupy a more coastal habitat, but as they grow and mature, they move offshore and take up a more oceanic habitat.

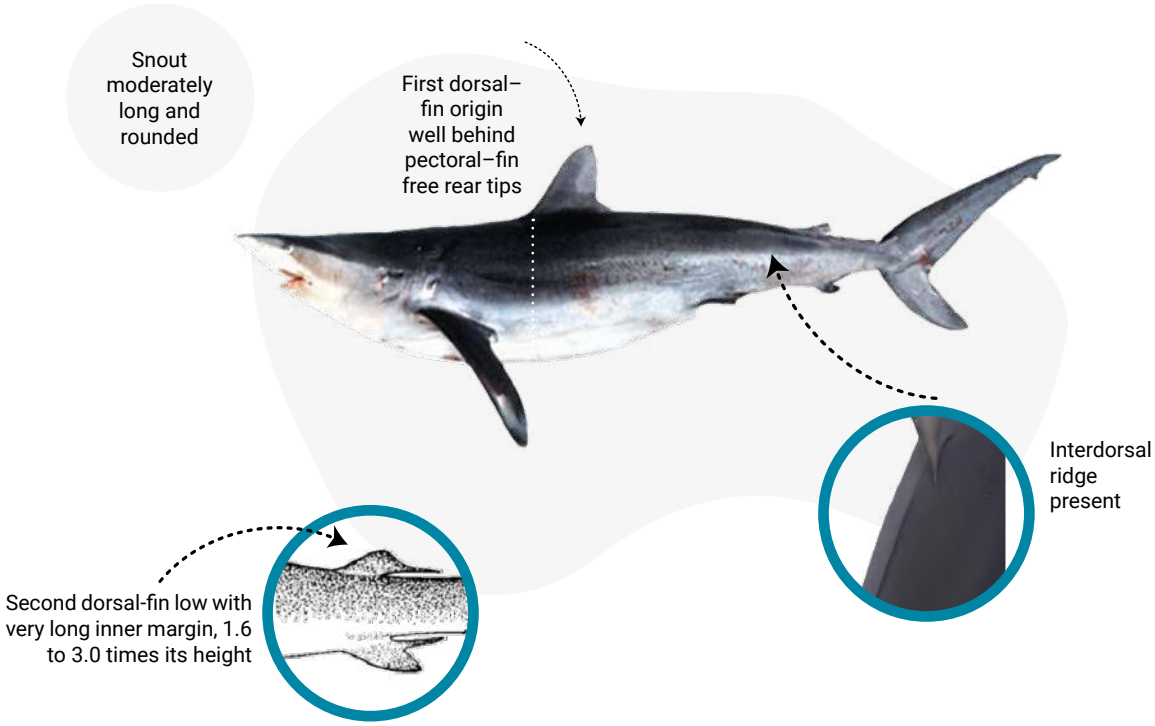
Status: **UICN:** Data Deficient

Similar species : *Carcharhinus spp*

Carcharhinidae

Carcharhinus falciformis (Bibron, 1839)

EN Silky shark **FR** Requin soyeux **AR** كلب بحر



Description

A medium-sized grey shark with short, rounded snout, an extremely high triangular first dorsal fin with its origin over or anterior to the pectoral–fin insertions, an interdorsal ridge and no conspicuous markings on fins.

Size and biology

Maximum: 300 cm.
Common: 80-160 cm.
Maturity: 131-178 cm (males), 144-183 cm (females).
Size at birth: 56-75 cm.
A placental viviparous: number of young 1 to 14 per litter, with 5 to 12 common. Gestation period 11 to 12 months and parturition occurs in coastal waters.

Habitat

An abundant coastal-pelagic shark of temperate and tropical waters, found on continental and insular shelves and in deep water adjacent to them, and oceanic banks, common at bay mouths, inside shallow muddy or sandy bays. Depths range from **5 to 300 m**

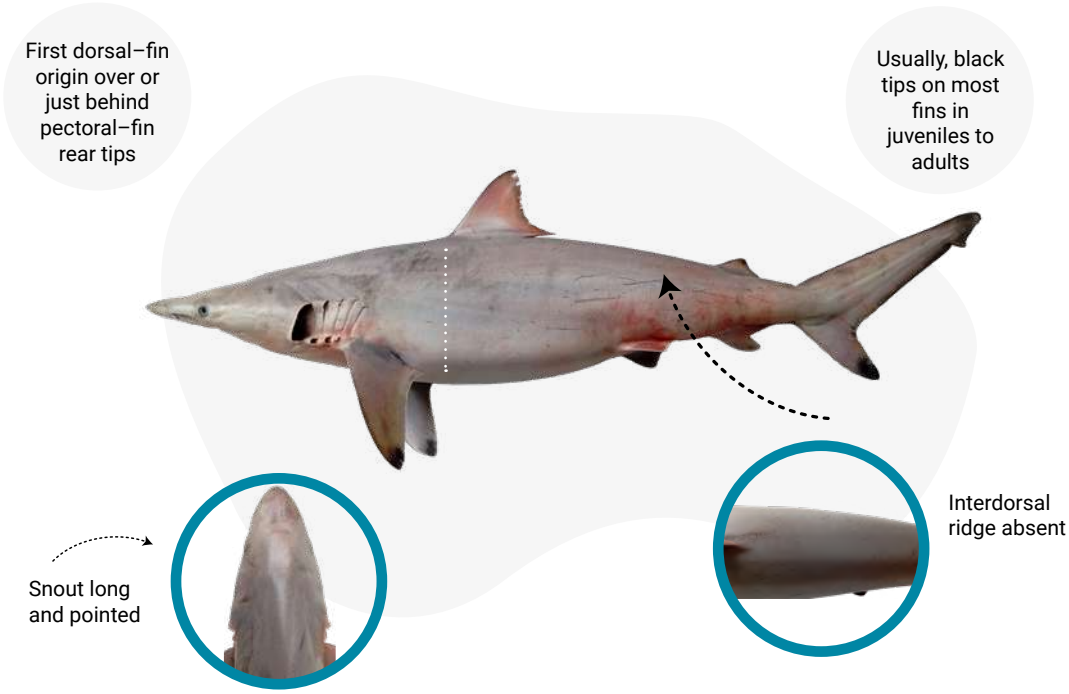
Status: **UICN:** Data Deficient

Similar species : *Carcharhinus spp*

Carcharhinidae

Carcharhinus brevipinna (Müller & Henle, 1839)

EN Spinner shark **FR** Requin tisserand **AR** وشة / بومنقار



Description

A medium-sized grey shark with short, rounded snout, an extremely high triangular first dorsal fin with its origin over or anterior to the pectoral–fin insertions, an interdorsal ridge and no conspicuous markings on fins

Size and biology

Maximum: 300 cm.
Common: 80-160 cm.
Maturity: 131-178 cm (males), 144-183 cm (females).
Size at birth: 56-75 cm.
A placental viviparous: number of young 1 to 14 per litter, with 5 to 12 common. Gestation period 11 to 12 months and parturition occurs in coastal waters.

Habitat

An abundant coastal-pelagic shark of temperate and tropical waters, found on continental and insular shelves and in deep water adjacent to them, and oceanic banks, common at bay mouths, inside shallow muddy or sandy bays. Depths range from **5 to 300 m**.

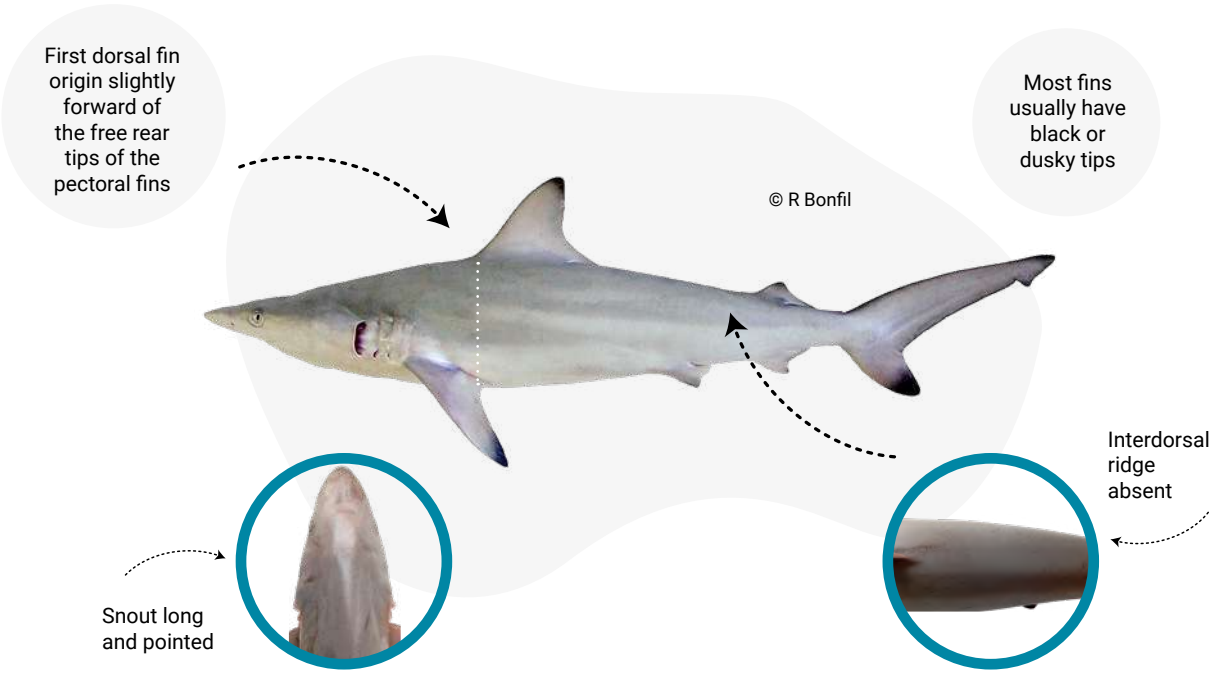
Status: **UICN:** Data Deficient

Similar species : *Carcharhinus limbatus* (Page 78)

Carcharhinidae

Carcharhinus limbatus (Müller & Henle, 1839)

EN Blacktip shark **FR** Requin bordé **AR** بومنقار / وشة



Description

A medium-sized grey shark with short, rounded snout, an extremely high triangular first dorsal fin with its origin over or anterior to the pectoral–fin insertions, an interdorsal ridge and no conspicuous markings on fins.

Size and biology

Maximum: 300 cm.
Common: 80-160 cm.
Maturity: 131-178 cm (males), 144-183 cm (females).
Size at birth: 56-75 cm.
A placental viviparous: number of young 1 to 14 per litter, with 5 to 12 common. Gestation period 11 to 12 months and parturition occurs in coastal waters.

Habitat

An abundant coastal-pelagic shark of temperate and tropical waters, found on continental and insular shelves and in deep water adjacent to them, and oceanic banks, common at bay mouths, inside shallow muddy or sandy bays. Depths range from **5 to 300 m.**

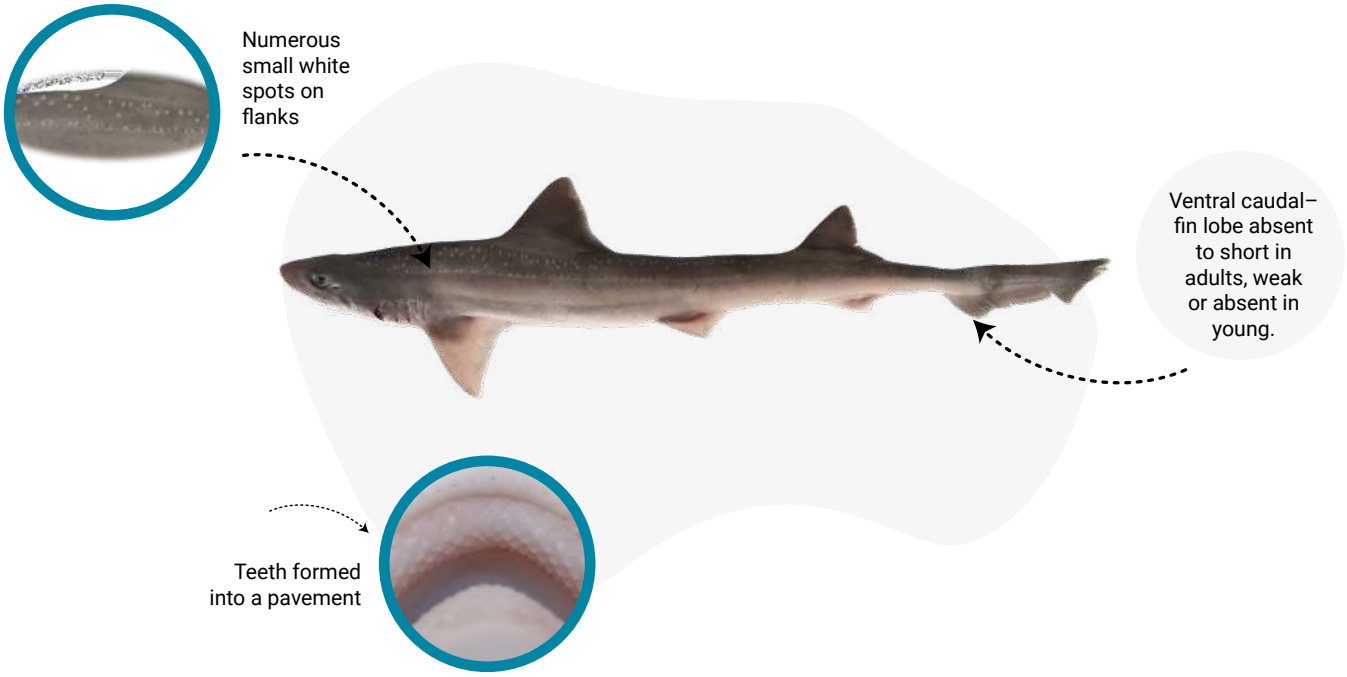
Status: **UICN:** Data Deficient

Similar species : *Carcharhinus brevipinna* (Page 77)

Triakidae

Mustelus asterias Cloquet, 1821

EN Starry smooth-hound **FR** Emissole tachetée **AR** قطاط



Description

A large slender bodied, white-spotted smooth- hound with moderately long snout, buccopharyngeal denticles covering almost entire oral cavity. It is the only white-spotted smoothhound in European waters, although these spots are often faint or even lacking.

Size and biology

Maximum: 140 cm.
Common: 50-100 cm.
Maturity: 72-85 cm (males), 83-96 cm (females).
Size at birth: 34-42 cm.
A placental viviparous: species with litters 4-22. The gestation period is 12 months. mating and parturition occur during Summer.

Habitat

A common inshore and offshore shark of the continental shelves, on or near bottom at depths from the intertidal down to at least **100 m**. Prefers sandy and gravelly bottoms.

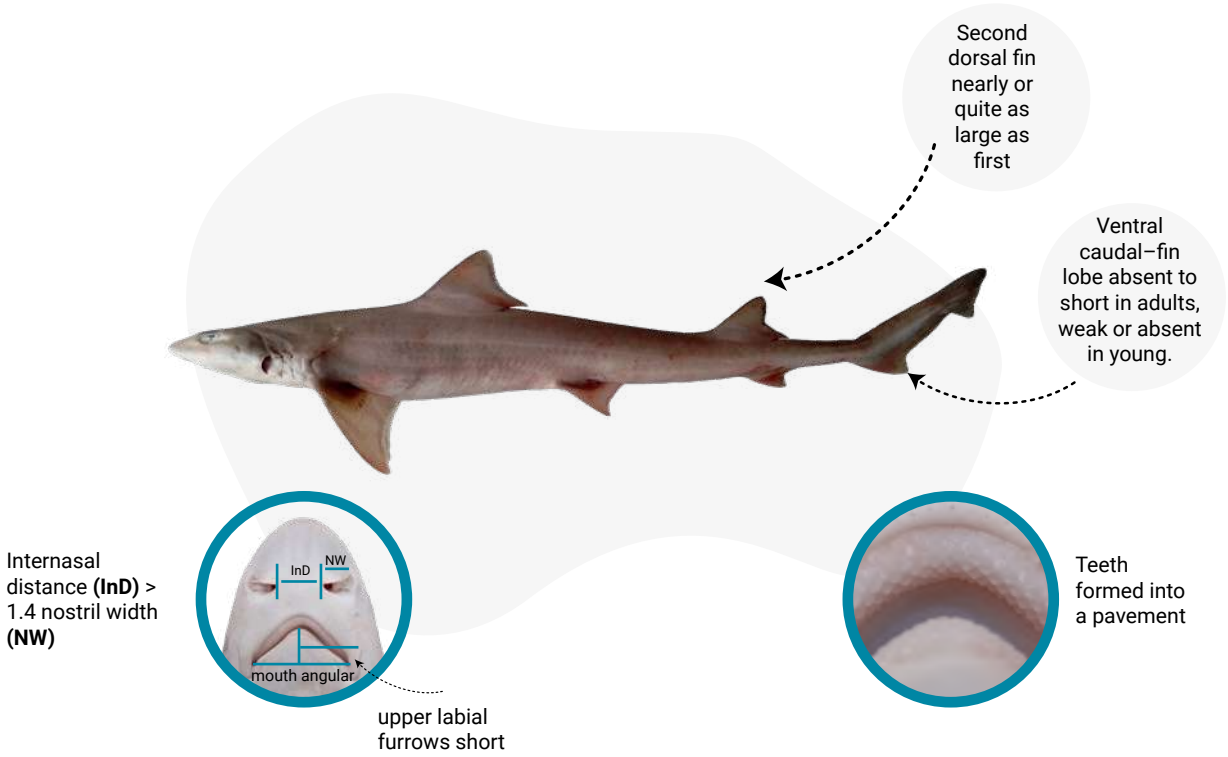
Status: UICN: Vulnerable, **SPA/BD Protocol:** Annex III

Similar species : *Mustelus mustelus* (Page 80), *Mustelus puctulatus* (Page 80), *Galeorhinus galeus* (Page 82)

Triakidae

Mustelus mustelus (Linnaues, 1758)

EN Smooth-hound **FR** Emissole lisse **AR** قطاط



Description

A usually unspotted, large *Mustelus* with a short head and snout, broad internarial space, large eyes, angular mouth with upper labial furrows slightly longer than lowers, low-crowned molar-like teeth with weak cusps.

Size and biology

Maximum: 164 cm.
Common: 60-120 cm.
Maturity: 88-112 cm (males), 107-123 cm (females).
Size at birth: 34-42 cm.
A placental viviparous: species with litters 4-22. The gestation period is 10-11 months. Mating and parturition occur during early summer.

Habitat

A common to abundant shark, where it occurs, of the contimental shelves and uppermost slopes, most commonly found in shallow water at depths from **5 to 50m**, but often in the intertidal and ranging to least **350 m** depth.

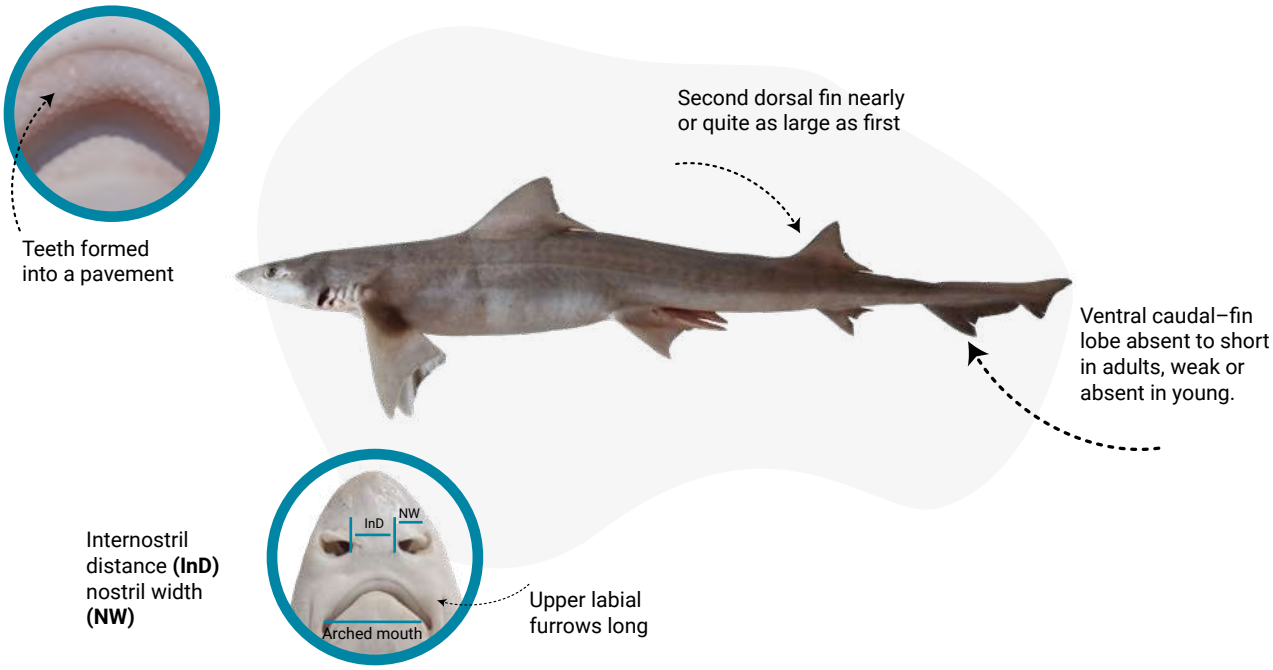
Status: **UICN:** Vulnerable, **SPA/BD Protocol:** Annex III

Similar species : *Mustelus punctulatus* (Page 81), *Mustelus asterias* (Page 79), *Galeorhinus galeus* (Page 82)

Triakidae

Mustelus punctulatus Risso, 1826

EN Blackspotted smoothhound **FR** Émissole pointillée **AR** بلطوس



Description

A small Mustelus with slender body, a short head and snout, narrow head and internarial space, large eyes, upper labial furrows longer than lowers, low- crowned molar-like teeth with weak cusps.

Size and biology

Maximum: 140 cm.
Common: 50-80 cm.
Maturity: 75-88 cm (males), 88-100 cm (females).
Size at hatching: 24-31 cm.
A placental viviparous: species with litters 12-27. The gestation period is 11 months, parturition and mating occur in late spring and early summer.

Habitat

A common inshore smooth- hound of the continental shelves, on or near bottom at depths from the intertidal down to at least **200 m**. Prefers sandy and gravelly bottoms.

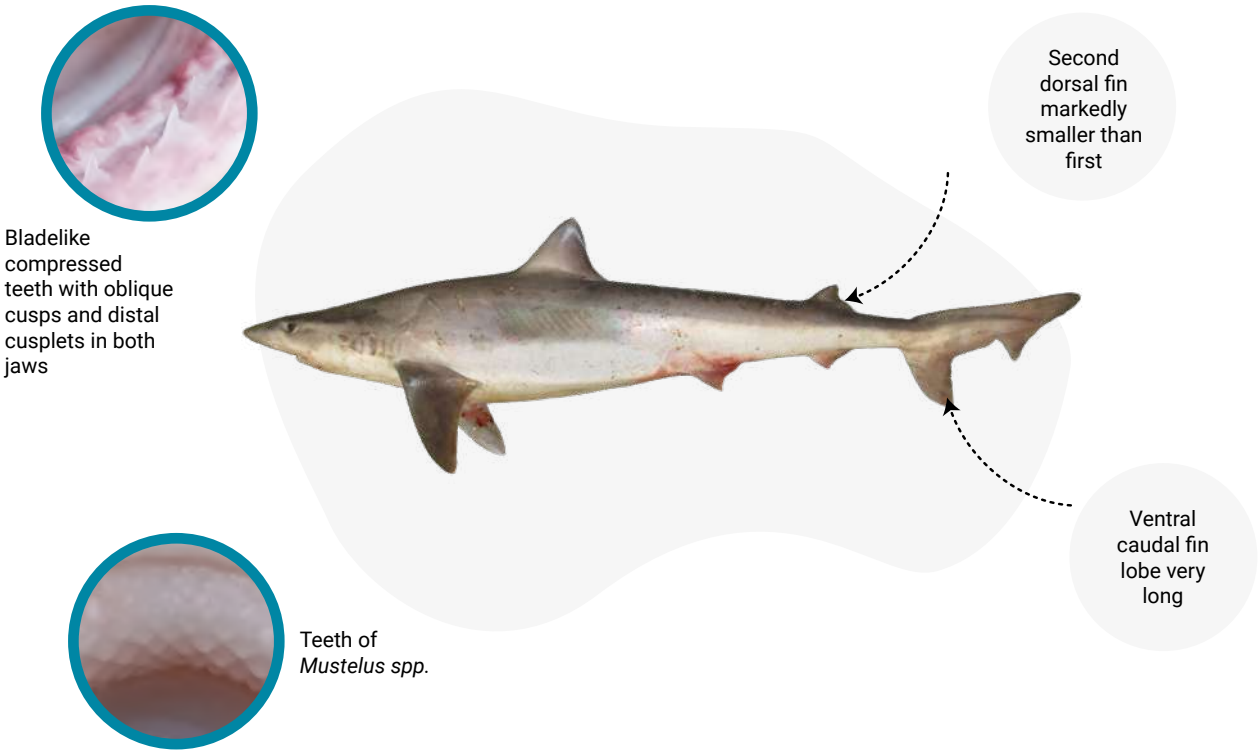
Status: **UICN:** Vulnerable, **SPA/BD Protocol:** Annex III

Similar species : *Mustelus mustelus* (Page 80), *Mustelus asterias* (Page 79), *Galeorhinus galeus* (Page 82)

Triakidae

Galeorhinus galeus (Linnaeus, 1758)

EN Top shark **FR** Requin hâ **AR** قطا



Description

A slender-bodied, long-nosed houndshark, large horizontally oval eyes, an arched mouth, bladelike compressed teeth with oblique cusps and distal cusplets in both jaws, second dorsal fin much smaller than first, and an extremely long terminal caudal–fin lobe.

Size and biology

Maximum: 195 cm.
Common: 80-120 cm.
Maturity: 120-170 cm (males), 130-185 cm (females).
Size at hatching: 30-40 cm.
An aplacental viviparous species with litters of 6-52. The gestation period is 12 months. mating and parturition occur during Summer.

Habitat

A coastal-pelagic shark of continental and insular waters, often found well offshore as well as at the surfline, in shallow bays, and in submarine canyons; often occurs near the bottom, at depths of **2 to 471 m**.

Status: **UICN:** Vulnerable, **SPA/BD Protocol:** Annex III

Similar species : *Mustelus mustelus* (Page 80), *Mustelus punctulatus* (Page 81), *Mustelus asterias* (Page 79)

Order LAMNIFORMES
Mediterranean families

Caudal fin about as long as trunk of body

Yes — Alopiidae

No

Upper precaudal pits and strong lateral keel present; caudal fin crescent shaped, gill slits extremely large, extend dorsally onto surface of head.

Yes — Cetorhinidae

No

Upper precaudal pits and strong lateral keel present; caudal fin crescent shaped, gill slits extremely large, extend dorsally onto surface of head.

Yes — Lamnidae

No

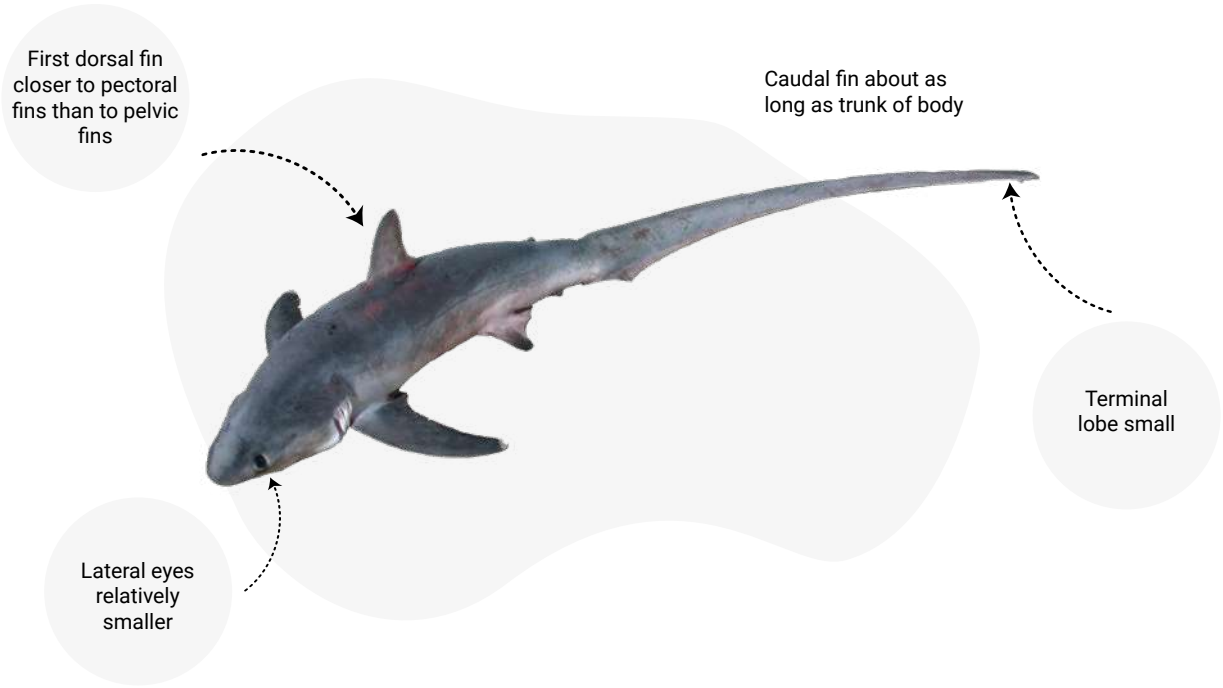
Upper precaudal pit present; lateral keels absent; caudal fin heterocercal, not crescent shaped

Yes — Odontaspididae
Carcharhiidae

Alopiidae

Alopias vulpinus (Bonnaterre, 1788)

EN Thresher shark **FR** Renard de mer **AR** كلب بحر/ثعلب البحر



Description

A large bodied shark with long curving dorsal caudal– fin lobe about as long as rest of shark, relatively small eyes, falcate pointed pectoral fins, white colour of abdomen extending over pectoral–fin bases.

Size and biology

Maximum: 575 cm.
Common: 200-300 cm.
Maturity: 260-420 cm (males), 260-465 cm (females).
Size at hatching: 120 -150 cm.
An aplacental viviparous species with Oophagous, litters of 2 to 7; gestation appears to be about nine months with birth occurring in the spring and summer.

Habitat

Coastal over the continental and insular shelves including inshore areas and epipelagic, appears to be most abundant within 70 km of land; young often close inshore and in shallow bays. They are usually found at or near the surface but have been taken down to nearly **400 m** deep.

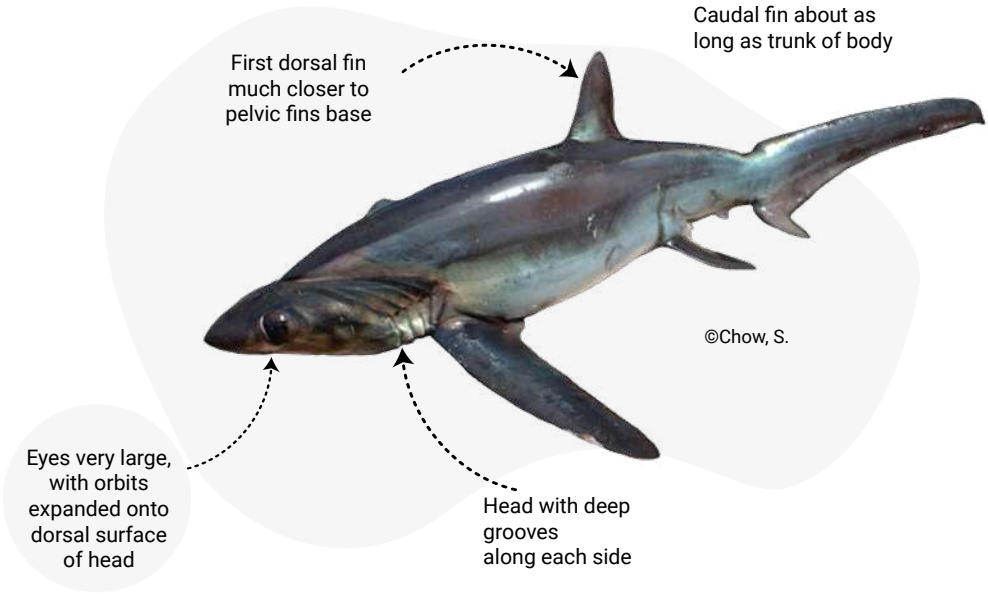
Status: **UICN:** Endangered, **SPA/BD Protocol:** Annex III, **CMS:** Appendix II, **CITES:** Appendix II

Similar species : *Alopias superciliosus* (Page 85)

Alopiidae

Alopias superciliosus Lowe, 1841

EN Bigeye thresher **FR** Renard à gros yeux **AR** كلب بحر/ثعلب البحر



Description

A large thresher shark with extremely large eyes extending onto the dorsal head surface; head with distinct lateral grooves extending from above the eyes to behind the gill slits. Pectoral fins with curved anterior margin and broadly tipped at the apices.

Size and biology

Maximum: 480 cm.
Common: 200-300 cm.
Maturity: 270-290 cm (males), 330-360 cm (females).
Size at hatching: 100 -140 cm.
An aplacental viviparous species with Oophagous, litters of 2 to 4; gestation appears to be 12 months.

Habitat

Bigeye threshers are usually found over continental shelves, but also on the high seas in the open ocean far from land. They may occur at the surface and down to at least **723 m** over very deep water. They are usually found in areas where the surface temperature ranges from 16 to 25 °C.

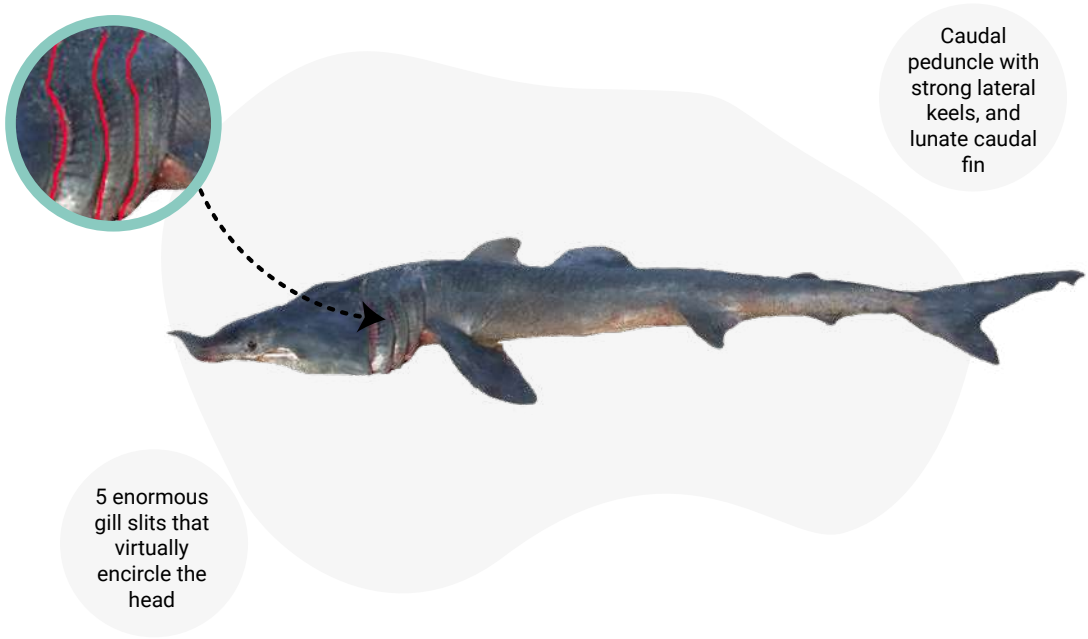
Status: UICN: Endangered, **SPA/BD Protocol:** Annex II, **CMS:** Appendix II, **CITES:** Appendix II

Similar species : *Alopias vulpinus* (Page 84)

Cetorhinidae

Cetorhinus maximus (Gunnerus, 1765)

EN Basking shark **FR** Pèlerin **AR** دودة/كلب بحر



Description

A large shark with enormous gill slits that virtually encircle the head, modified gill rakers, pointed snout, subterminal mouth with minute hooked teeth, caudal peduncle with strong lateral keels, and lunate caudal fin distinguish this shark from all others.

Size and biology

Maximum: 980 cm.
Common: 200-500 cm.
Maturity: 88-112 cm (males), 107-123 cm (females).
Size at hatching: 28-32 cm.
An aplacental viviparous species with Oophagous, litters of 1 to 6; reproductive cycle including gestation period unknown.

Habitat

Basking sharks are coastal pelagic, usually observed at the surface in areas where the water temperature is between 5 and 21 °C. They may be found close inshore, including enclosed bays, from the surfline and over the continental shelf, to well offshore at depths of over **1200 m**.

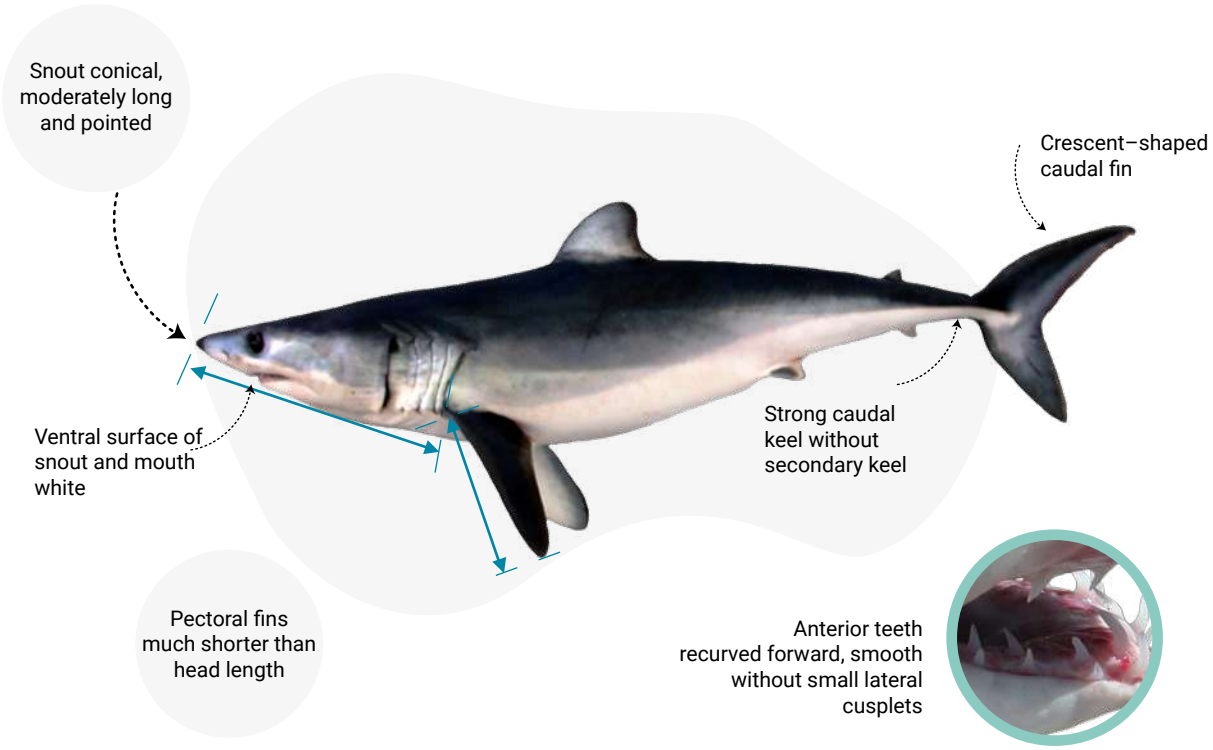
Status: UICN: Endangered, **SPA/BD Protocol:** Annex III, **CMS:** Appendix II, **CITES:** Appendix II

Similar species : *None*

Lamnidae

Isurus oxyrinchus Rafinesque, 1810

EN Shortfin Mako **FR** Requin-taupe bleu **AR** الزقاية



Description

A moderately slender to relatively robust shark, with a long, acutely pointed snout, pectoral fins less than head length, a high, erect first dorsal fin, an anal fin originating under midbase of second dorsal fin, and a crescent– shaped caudal fin.

Size and biology

Maximum: 400 cm.
Common: 100-200 cm.
Maturity: 195 cm (males), 270-300 cm (females).
Size at hatching: 60-70 cm.
An aplacental viviparous with oophagy and litters of 4-25. The gestation period is about 15-18 months. Birth usually occurs in the spring and summer.

Habitat

A common, coastal to offshore, oceanic, epipelagic shark that occurs from the surface to at least **600 m** deep.

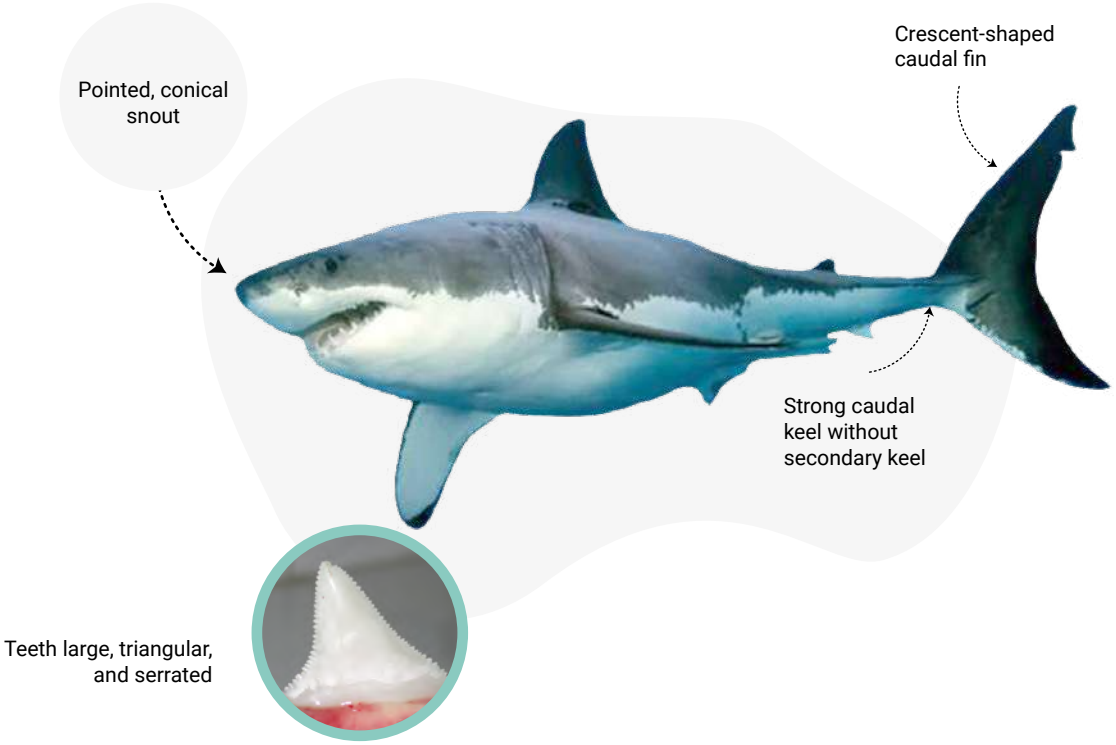
Status: **UICN:** Critically Endangered, **SPA/BD Protocol:** Annex III, **CMS:** Appendix II,

Similar species : *Carcharodon carcharias* (Page 88), *Lamna nasus* (Page 89)

Lamnidae

Carcharodon carcharias (Linnaeus, 1758)

EN Great white shark **FR** Grand blanc requin **AR** القرش الأبيض الكبير



Description

A stout spindle–shaped body, with a conical snout, teeth large, triangular, and serrated, a large erect, triangular first dorsal fin, minute second dorsal and anal fins, no secondary caudal keel, and a large crescent–shaped caudal fin.

Size and biology

Maximum: 650 cm.
Common: 300-500 cm.
Maturity: 360-400 cm (males), 450-500 cm (females).
Size at hatching: 120-150 cm.
An aplacental viviparous species with oophagy and litters ranging from 3 to 14; the gestation thought to be about two years.

Habitat

The species has one of the broadest habitat ranges of any shark species. They occur in coastal nearshore waters, including bays and estuaries, but are also oceanic, in the open sea and around islands far from any mainland. These sharks range from the surface to at least **1280 m** depth.

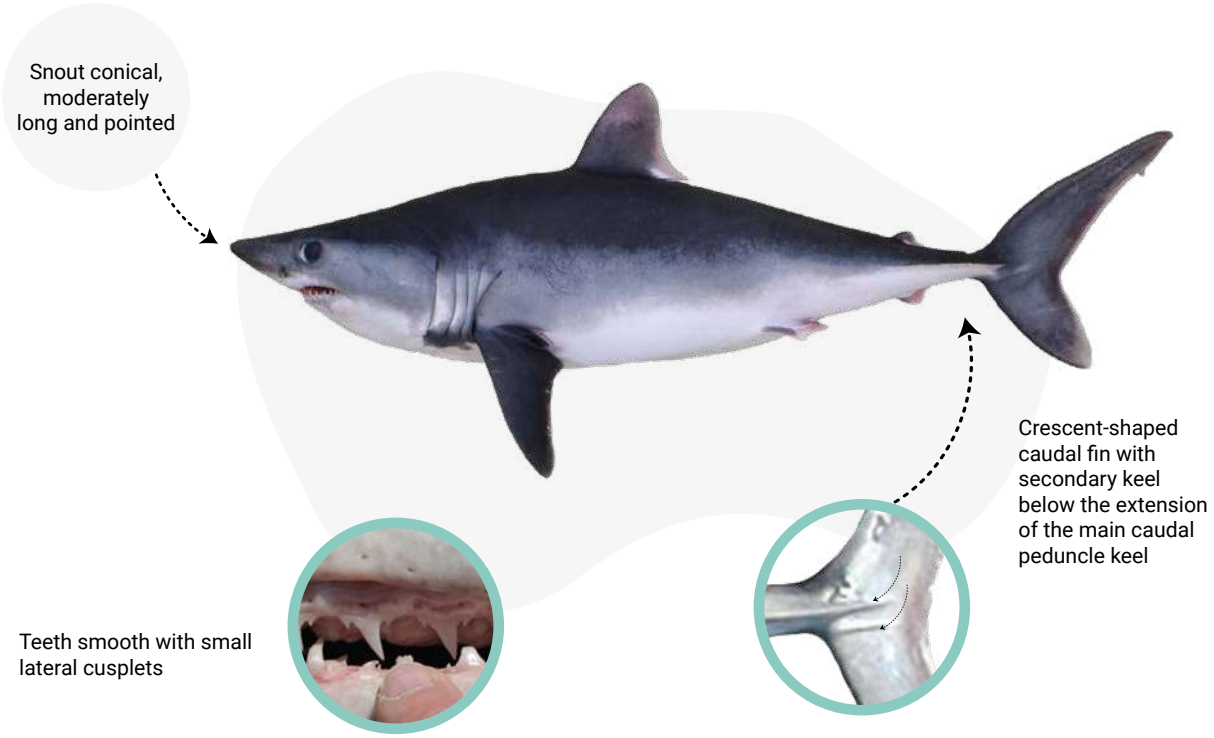
Status: UICN: Critically Endangered, **SPA/BD Protocol:** Annex III, **CMS:** Appendix II, **CITES:** Appendix II

Similar species : *Lamna nasus* (Page 89), *Isurus oxyrinchus* (Page 87), *Cetorhinus maximus* (Page 86)

Lamnidae

Lamna nasus (Bonnaterre, 1788)

EN Porbeagle shark **FR** Taupe commun **AR** الزقاية/طوبة



Description

A large , slender-bodied, white-spotted smooth- hound with moderately long snout, buccopharyngeal denticles covering almost the entire oral cavity.
It is the only white-spotted smoothhound in European waters, although these spots are often faint or even absent.

Size and biology

Maximum: 164 cm.
Common: 60-120 cm.
Maturity: 88-112 cm (males), 107-123 cm (females).
Size at hatching: 28-32 cm.
An aplacental viviparous species with litters 5-20. The gestation period is 12 months. mating and parturition occur during summer.

Habitat

A common inshore and offshore shark of the continental shelves, on or near bottom at depths from the intertidal down to at leat **100 m**. Prefers sandy and gravelly bottoms.

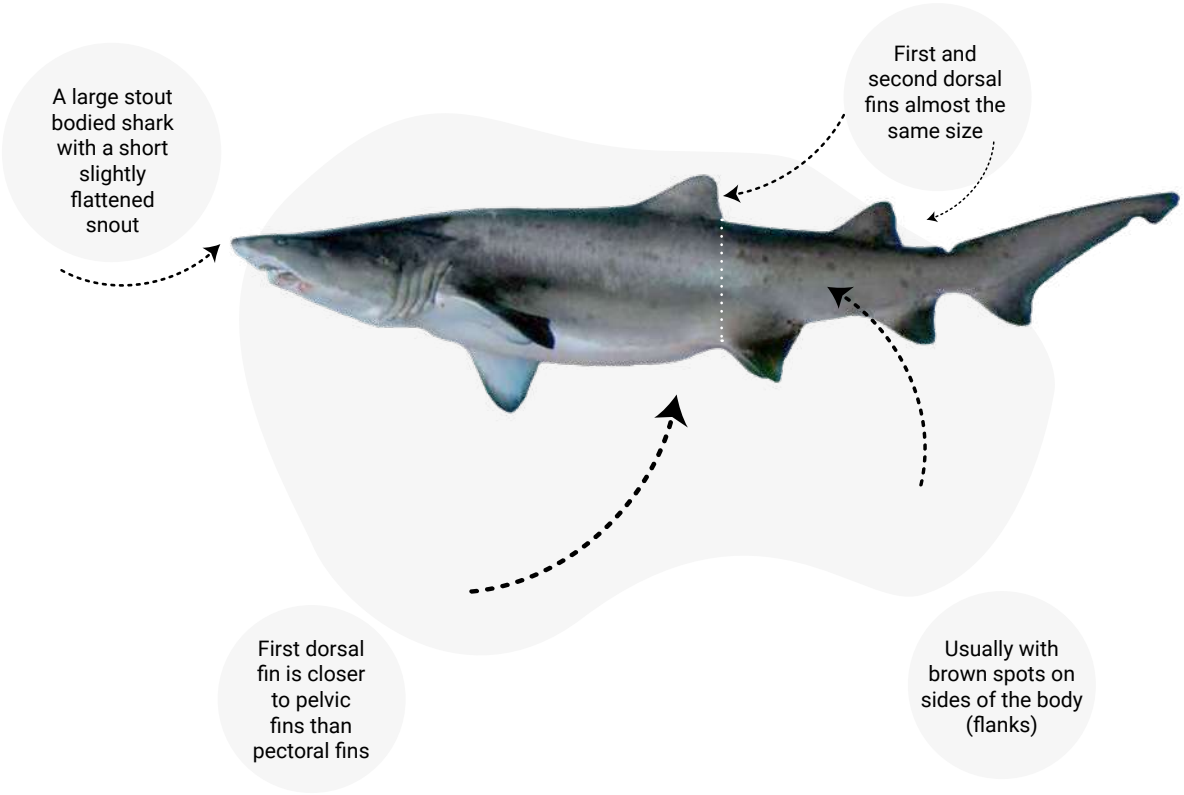
Status: UICN: Critically Endangered, **SPA/BD Protocol:** Annex III, **CMS:** Appendix II, **CITES:** Appendix II

Similar species : *Carcharodon carcharias* (Page 88), *Isurus oxyrinchus* (Page 87)

Carchariidae

Carcharias taurus Rafinesque, 1810

EN Sandtiger shark **FR** Requin-taureau **AR** القرش الثور



Description

A large stout bodied shark with a short, slightly flattened snout, mouth with distinctly prominent teeth, similar sized dorsal and anal fins, first dorsal fin is closer to pelvic fins than pectoral fins, upper precaudal pit present, lateral keels absent, and an asymmetrical caudal fin.

Size and biology

Maximum: 320 cm.
Common: 220-250 cm.
Maturity: 190-195 cm (males), 220-230 cm (females).
Size at hatching: 85-105 cm.
An aplacental viviparous with oophagy and exhibiting adelphophagy. The reproductive cycle is thought to be two years.

Habitat

A common nearshore, coastal shark of warm temperate and tropical seas where it occurs. It occurs in bays and estuaries, on sandy or muddy areas, and on rocky or coral reefs.

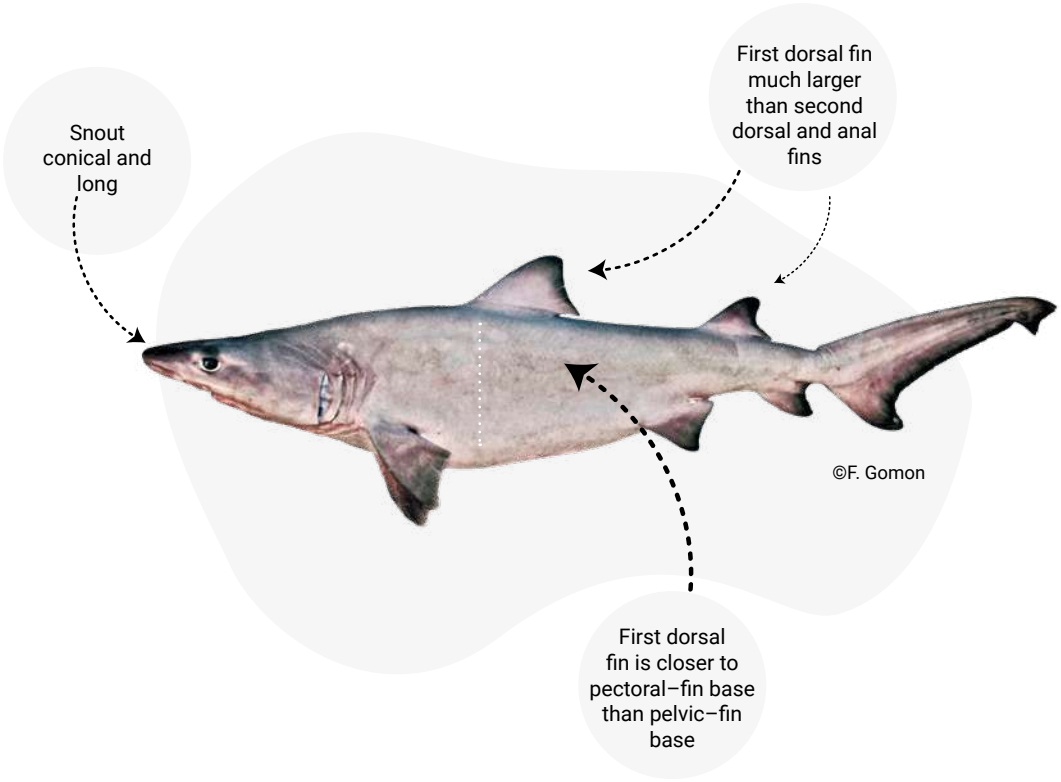
Status: **UICN:** Critically Endangered, **SPA/BD Protocol:** Annex III

Similar species : *Odontaspis ferox* (Page 91)

Odontaspididae

Odontaspis ferox (Risso, 1810)

EN Smalltooth sandtiger **FR** Requin féroce **AR** دودة/كلب بحر



Description

A large, bulky shark with long conical snout, mouth long and extending behind eyes, teeth moderately large with narrow cusps and two or more pairs of lateral cusplets, anal and second dorsal fins smaller than first dorsal fin, first dorsal fin closer to pectoral fins than pelvic fins.

Size and biology

Maximum: 410 cm.
Common: 60-120 cm.
Maturity: 275 cm (males), 107-364 cm (females).
Size at hatching: 105 cm.
Reproduction is sketchily known in the species, with litter size unknown.

Habitat

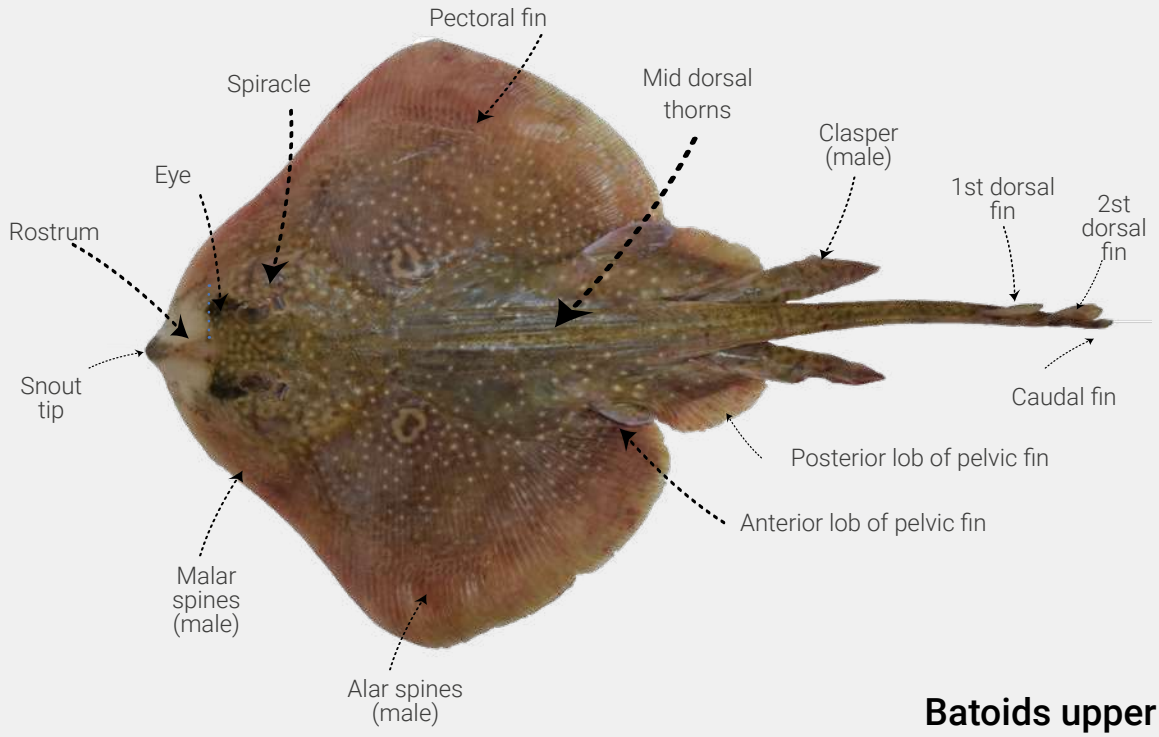
This shark is a little-known inhabitant of deepish water in warm-temperate, on or near the bottom on continental and insular shelves and upper slopes at depths of **13 to 420 m**, also possibly epipelagic zone in **140 to 180 m** over the ocean floor.

Status: **UICN:** Critically Endangered, **SPA/BD Protocol:** Annex III

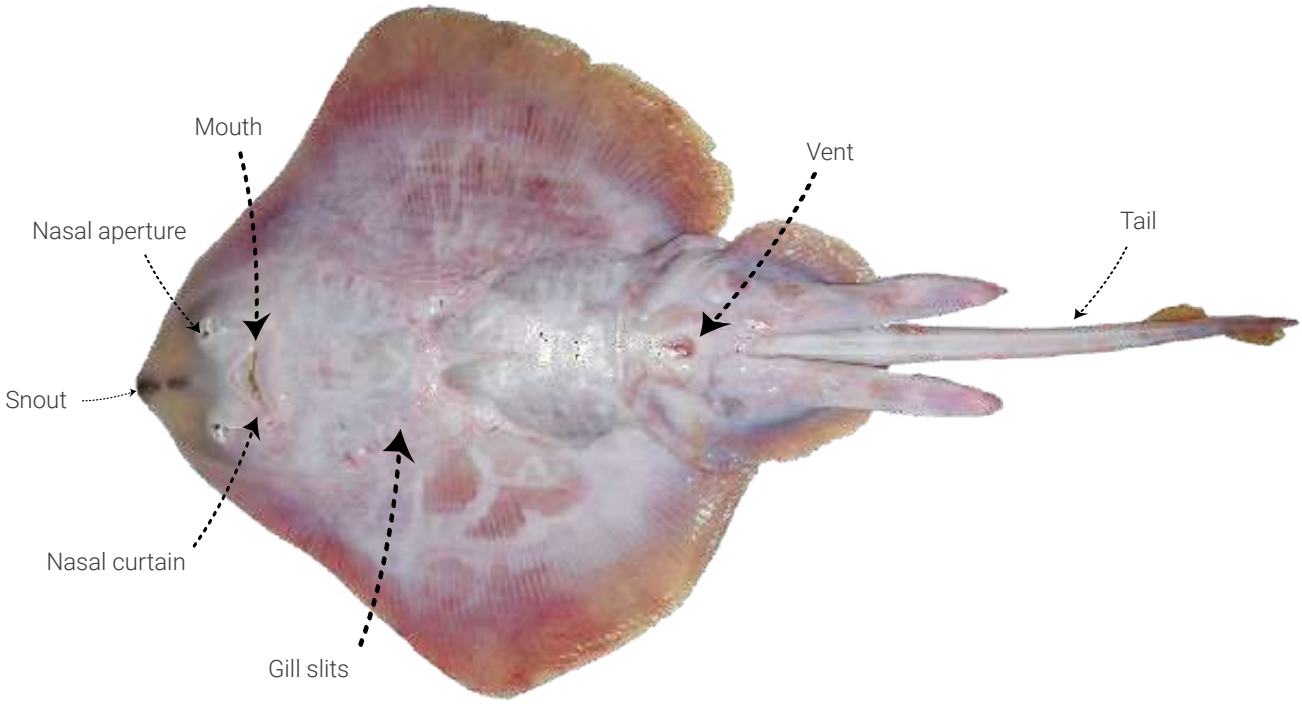
Similar species : *Carcharias taurus* (Page 90)

III. 2.2 Batoids

III. 2.2.1 EXTERNAL TERMINOLOGY USED FOR BATOIDS



Batoids upper side



Batoids lower side

III. 2.2.2 GLOSSARY OF TECHNICAL TERMS

- **Alar spines:** Large, modified dermal denticles located near the pectoral apices of skates
- **Anterior:** Forward. Towards the snout.
- **Claspers:** The paired copulatory organs present on the pelvic fins of male cartilaginous fishes, for internal fertilization of eggs.
- **Denticles:** Tiny tooth-like plates that create a protective and abrasive surface on the skin.
- **Disc:** The pectoral fins, trunk and head of a ray or skate.
- **Malar spines:** Large, modified dermal denticles located midway along the anterior margins of skate pectoral fins.
- **Nasal curtain:** A fleshy flap partly covering the nostrils of skates and Myliobatid rays.
- **Nuchal thorns:** Large, modified dermal denticles located along the centre-line of rays and skates.
- **Ocelli:** Fake eye spots (usually on the pectoral fins) formed by circular dark spots or rings, sometimes with a white centre. Used to scare other predators.
- **Pectoral fins:** Paired fins located ventrally posterior to the head in sharks. And forming the disc in rays.
- **Pelvic fins:** Paired fins located posterior to the pectoral fins.
- **Posterior:** Pertaining to the rear of the body.
- **Rostral ridges:** Ridges running longitudinally along the snout.
- **Scapular thorns :** Large, modified dermal denticles located at the shoulder region of skates.
- **Snout:** Part of a batoids in front of its eyes and mouth.
- **Spiracle:** An opening on each side of the head used in respiration.
- **Subrostral lobes:** The fleshy ridges under the snouts of cownose and eagle rays.
- **Thornlets:** Tiny thorns that are barely larger than a regular denticle.

GUIDE TO THE BATOIDS ORDERS OF MEDITERRANEAN SEA

Batoids: Mouth and gill slits in ventral side

Tail thin, usually long like whip, often with sting

MYLIOBATIFORMES P: 105

Tail massive, with two developed dorsal fins

Electric organ present

TORPEDINIFORMES P: 100

Snout elongated Wedge shaped or saw-like

RHINOPRISTIFORMES P: 96

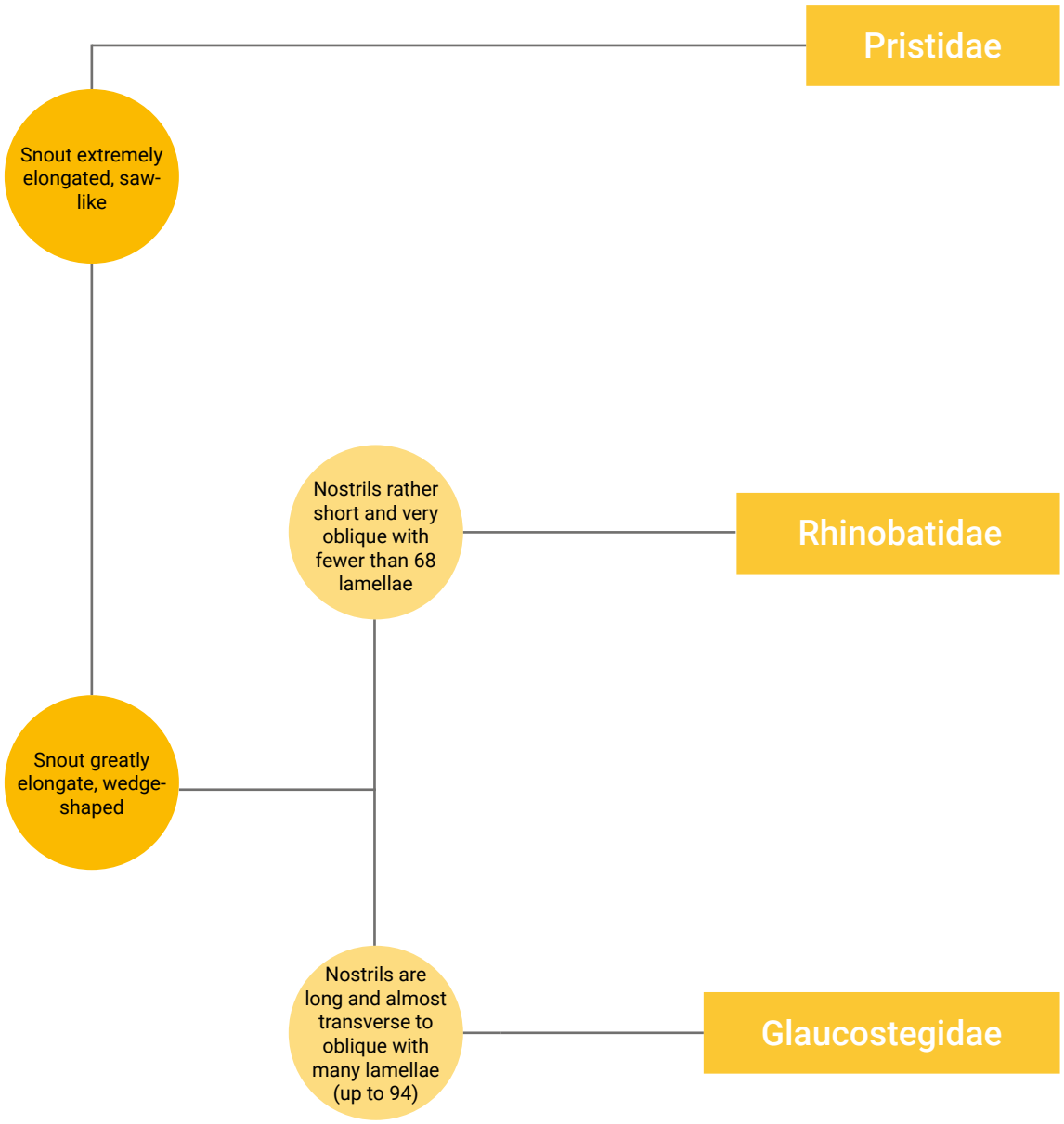
Electric organ absent

Disc rhomboidal. Head confused with pectoral fin

RAJIFORMES P: 118

Order RHINOPRISTIFORMES

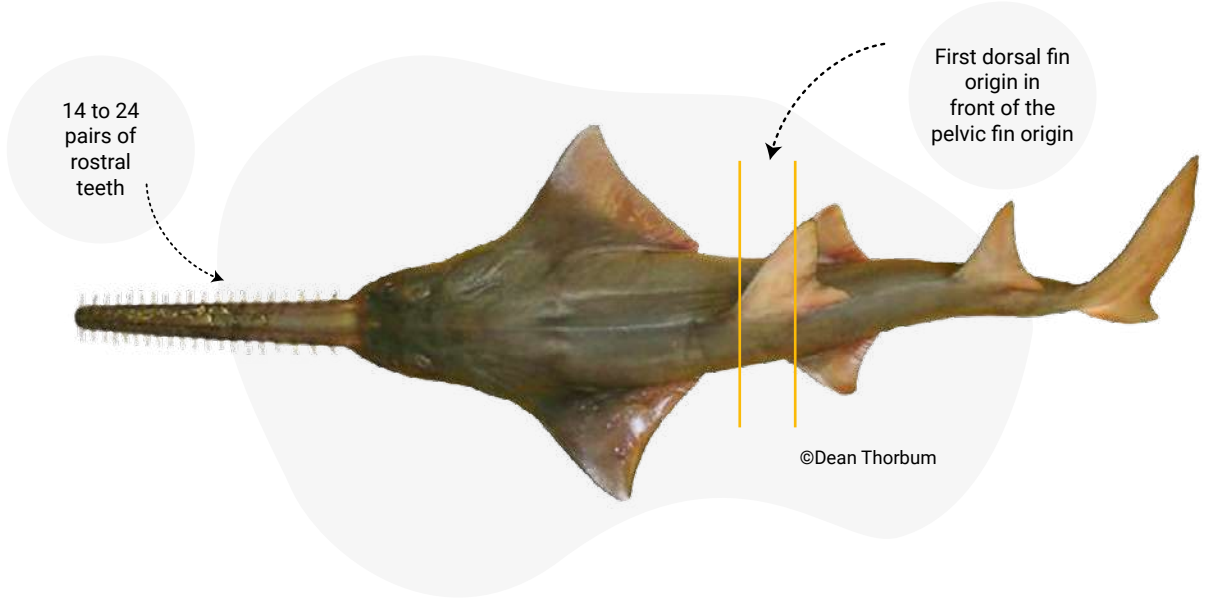
Mediterranean families



Pristidae

Pristis pristis (Linnaeus, 1758)

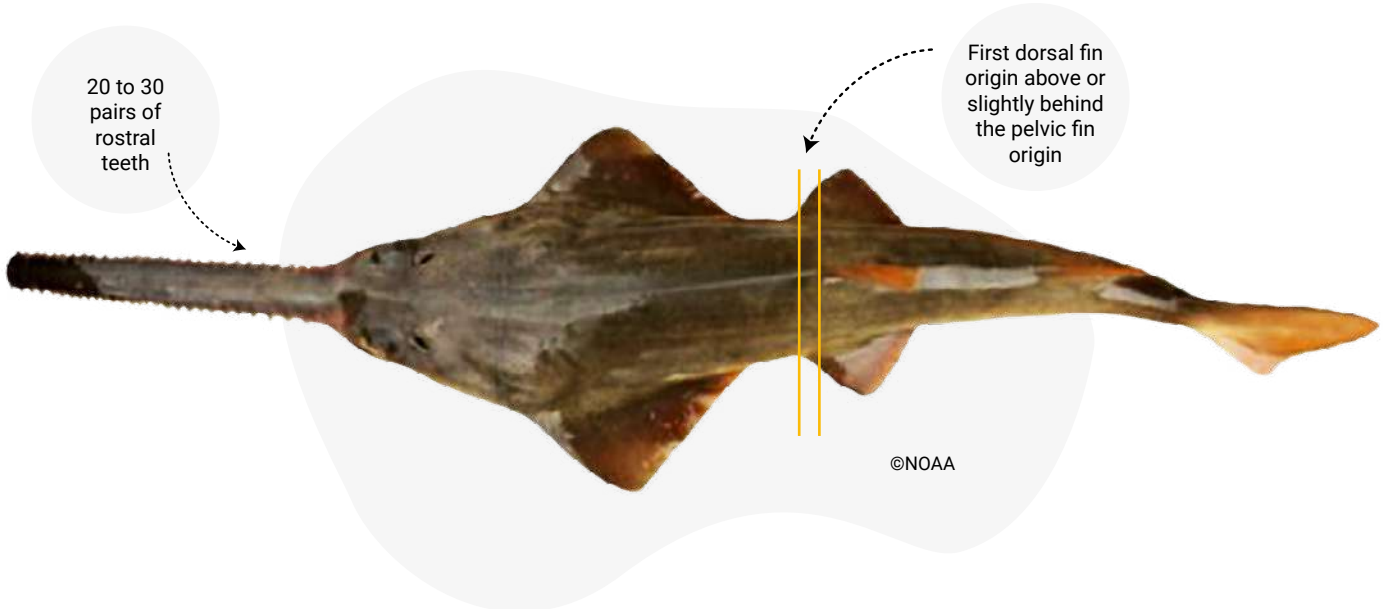
EN Common sawfish **FR** Poisson-scie commune **AR** السمكة المنشار



Pristidae

Pristis pectinata Latham, 1794

EN Smalltooth sawfish **FR** Poisson-scie tident **AR** السمكة المنشار الناعمة



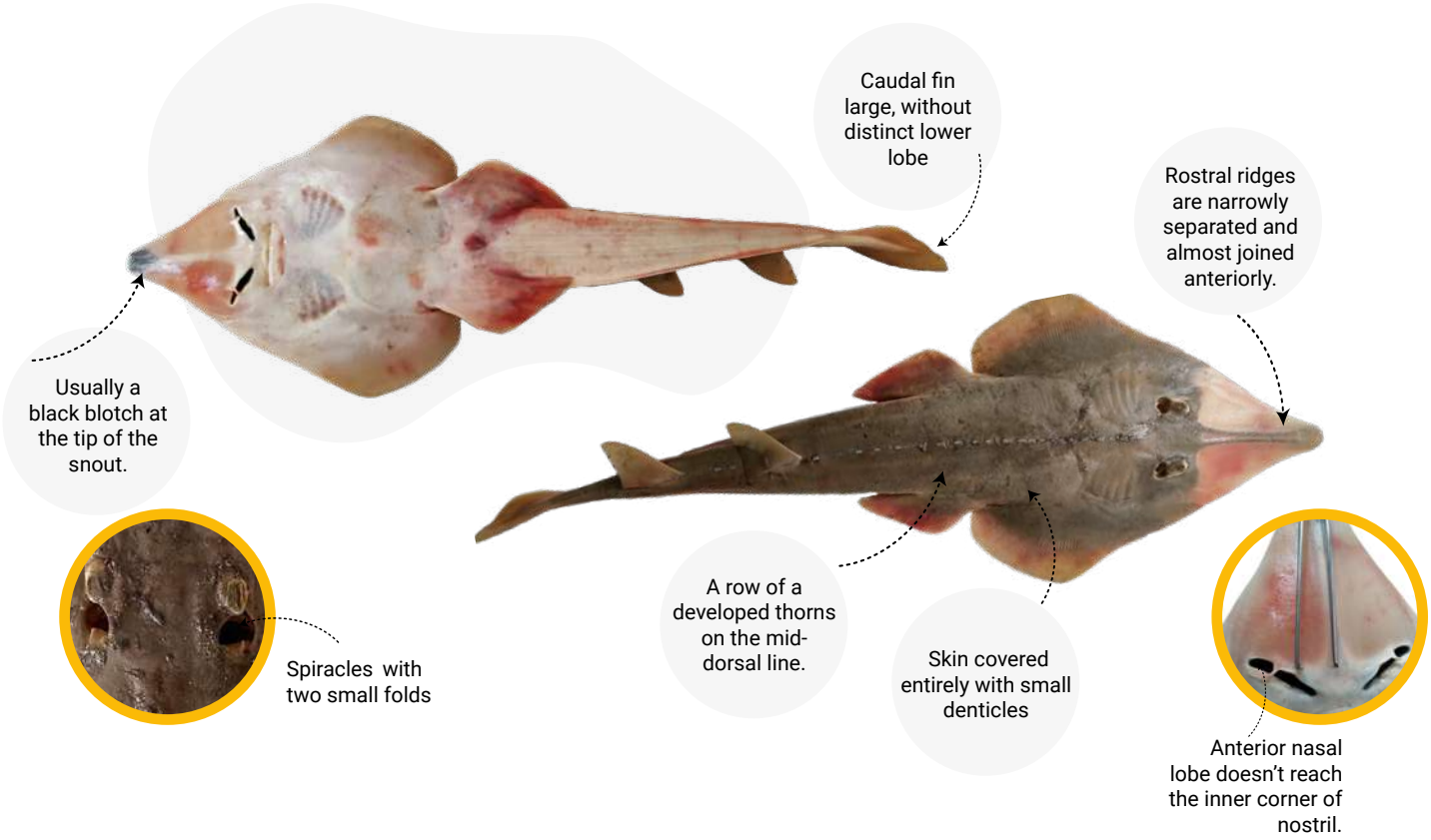
The last record of a sawfish *Pristis sp*. taken in the Mediterranean dates back to 1959. According to the FAO, both species can be considered extinct in the Mediterranean Sea.

Status : UICN: Critically Endangered, **SPA/BD Protocol:** Annex II, **CITES**: Annex I

Glaucostegidae

Glaucostegus cemiculus (Geoffrey Saint-Hilaire, 1817)

EN Blackchin guitarfis **FR** Poisson guitar fouisseur **AR** محراث/قرس/سكة



Description

A flattened wedge-shaped disc batoid. Snout elongated with a rostral ridges narrowly separated, nearly joints at the tip.
Spiracles with tow small fleshy folds, the outer one is more prominent.
The anterior nasal lobe don't reaching the inner corner of nostril. The posterior nasal flap is narrow.
Dorsal surface plain tannish-grey to brown.
Ventral side with a black blotch at the tip of snout.

Biology

Maximum: 205 cm TL
Common: 70 to 160 cm TL
Maturity: 112 cm TL (males); 138 cm TL (females).
Size at birth: 35 to 38 cm TL;
Aplacental viviparous species. Gestation period is about 12 month. Parturition takes place at the end of summer and beginning of autumn.
Fecundity ranges between 4 and 12 pups per year.

Habitat

A coastal and benthic species inhabiting sandy and muddy bottoms at low depths not exceeding **100 m**. It swims on the bottom or buries under the substrate.
More abundant in subtropical and tropical waters.

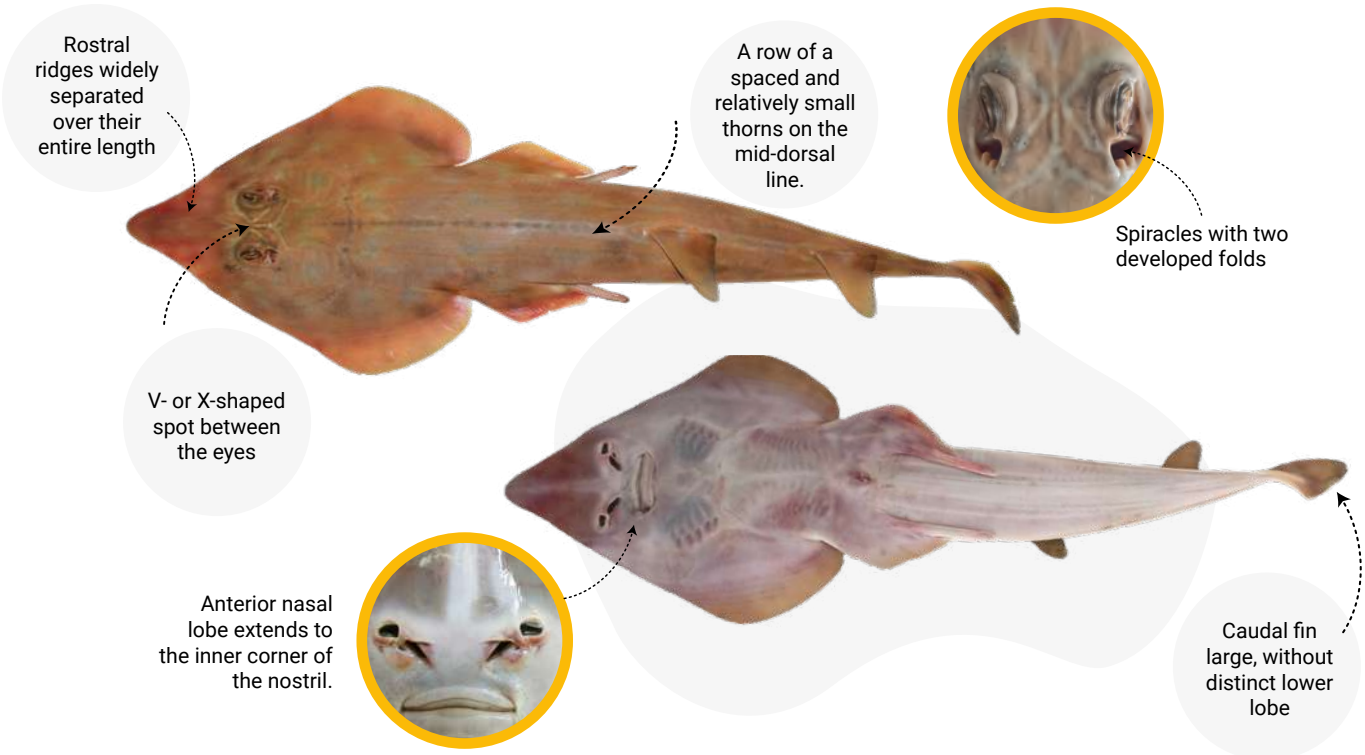
Status : **UICN:** Endangered, **SPA/BD Protocol:** Annex II, **CITES**: Annex II

Similar species : *Rhinobatos rhinobatos* (page 99)

Rhinobatidae

Rhinobatos rhinobatos (Linnaeus, 1758)

EN Common guitarfish **FR** Poisson-guitare commun **AR** محراث/قرس/سكة



Description

A medium size guitarfish. An elongate snoot with a rostral ridges widely separated over their length. Spiracles with tow developed fleshy folds, the outer one is prominent.
The anterior nasal lobe reaching the inner corner of nostril. The posterior nasal flap is wide.
Dorsal surface greenish brown to reddish brown
Ventral side white.

Biology

Maximum: 112 cm TL.
Common: 65 to 90 cm TL
Maturity: 70 cm TL (males); 80 cm TL (females)
Size at birth: 25 to 29 cm TL;
Aplacental viviparous species. Gestation period is about 12 month. Parturition takes place at the end of summer and beginning of autumn with 2 to 6 pups per year.

Habitat

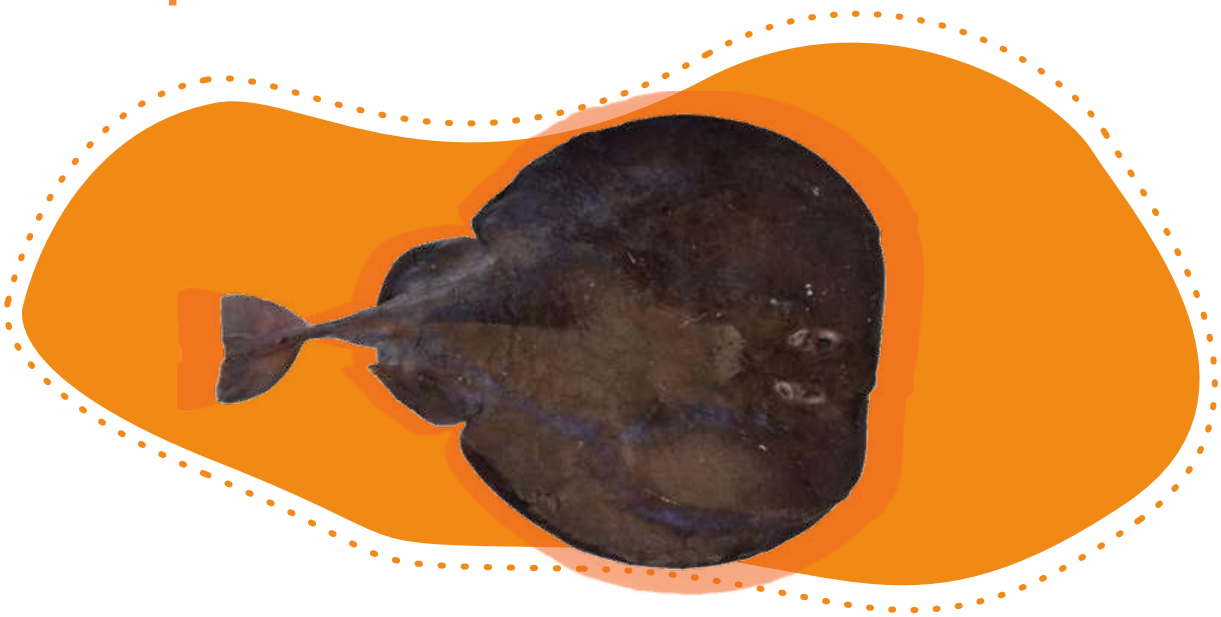
Benthic species inhabits sandy and muddy bottoms, seabed's and sometimes rocky reefs, from the intertidal zone to depth of **50 to 60 m**.
It swims on the bottom or buries under the substrate.
More common in subtropical and tropical waters.

Status : UICN: Endangered, **SPA/BD Protocol:** Annex II, **CITES**: Annex II

Similar species : *Glaucostegus cemiculus* (page 98)

Order TOPEDINIFORMES
Mediterranean families

Torpedinidae



Fleshy body with an electric organ. Tail massive, with two developed dorsal fins

1 family ----------➤ **Torpedinidae**

key to genus

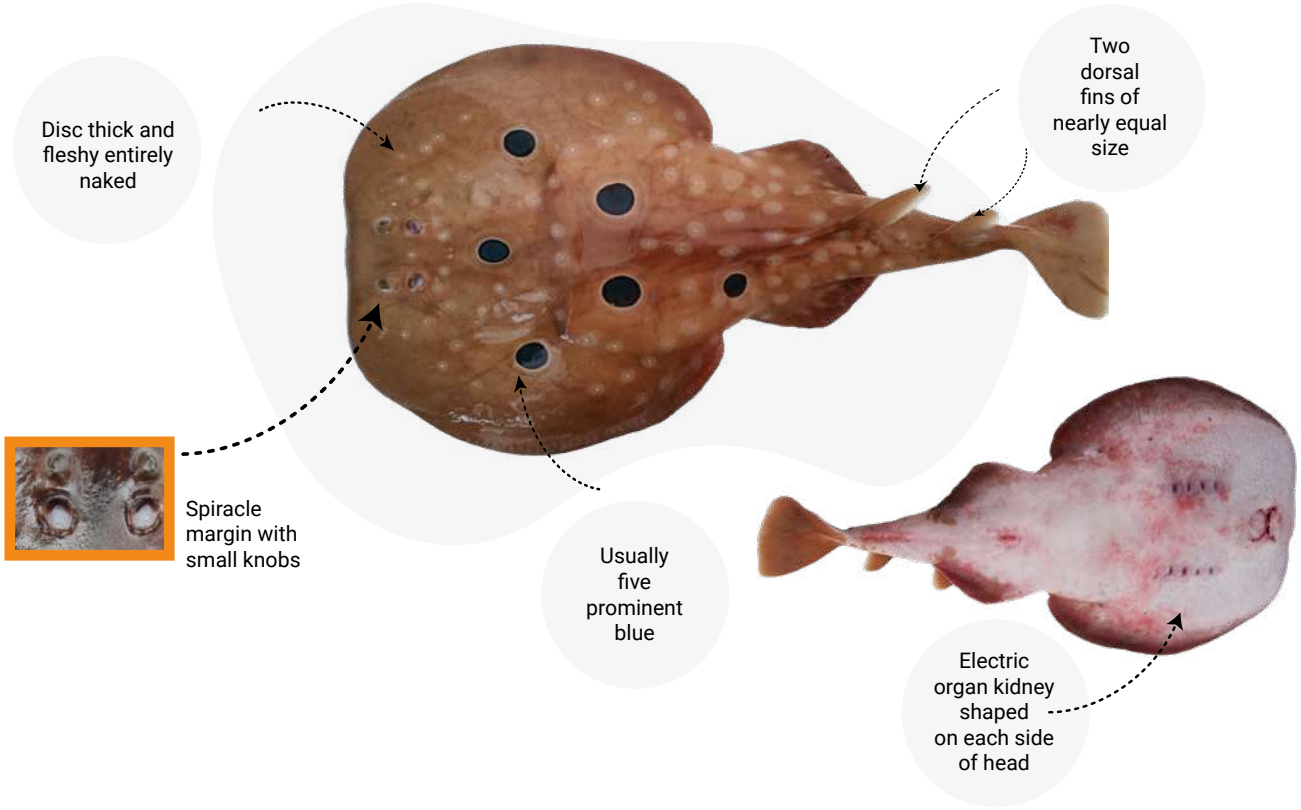
Spiracle margins smooth without knobs or papillae ----------➤ ***Tetronarce***

Spiracle margin with few to many knobs or papillae ----------➤ ***Torpedo***

Torpedinidae

Torpedo topedo (Geoffroy Saint-Hilaire, 1817)

EN Common torpedo **FR** Torpille ocellée **AR** نعاسة/رعاد



Description

A medium size electric ray. Disc nearly circular, thick and fleshy with a naked skin. Short tail with two dorsal fins of unequal size and a large caudal fin. Spiracle with small knobs on its rims. Dorsal surface brownish usually with small white spots scattered on disc and pelvic fins. Blue spots which usually number five but may vary from zero to nine. Ventral surface white with a brown border.

Biology

Maximum: 41 cm TL
Common: 25 to 35 cm TL
Maturity: 23 cm TL (males); 23 cm TL (females).
Size at birth: Size at birth: 8 to 9 cm TL; Aplacental viviparous species.
Gestation period of about **9 to 12** months. Parturition takes place at the end of summer and beginning of autumn with 1 to 9 pups per year.

Habitat

A benthic species, encountered on soft bottom, mainly in shallow and coastal waters at depth of about **50 m**. More common in tropical and sub-tropical area.

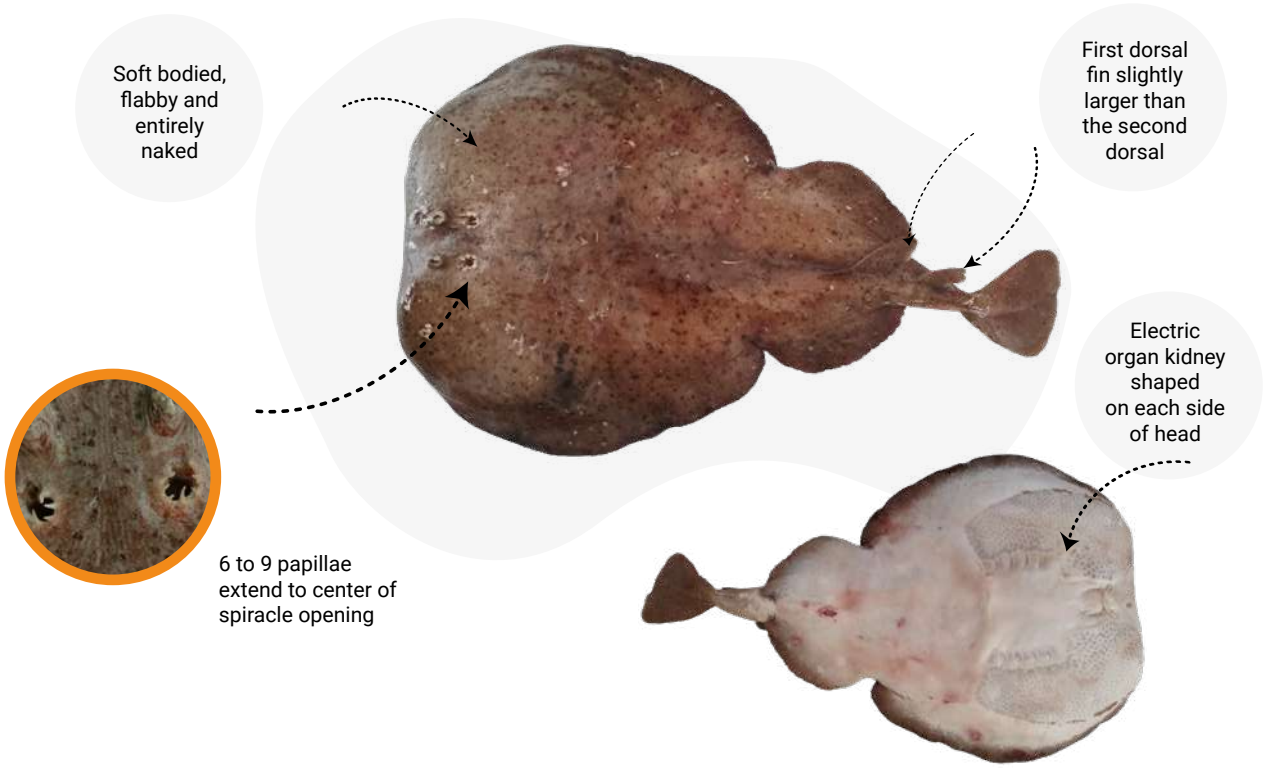
Status : UICN: Least Concern

Similar species : *None*

Torpedinidae

Torpedo marmorata Risso,1810

EN Marbled electric ray **FR** Torpille marbrée **AR** نعاسة/رعاد



Description

A medium size torpedo ray. Disc circular, thick and fleshy. Short tail with two developed dorsal fins. Spiracle with 6 to 9 tentacle-like papillae that extend to center of spiracle opening.
Dorsal surface marbled to speckled coloration with light or dark patterns on a beige to dark brown background.
Ventral surface white with disc and pelvic fins edge lined with dark brown.

Biology

Maximum: 100 cm TL
Common: 30 to 40 cm TL
Maturity: 25 cm TL (males); 31 cm TL (females).
Size at birth: 10 to 14 cm TL; Aplacental viviparous species. Gestation period of about 9 to 12 months.
Parturition takes place at autumn with 2 to 17 pups per year.

Habitat

The marbled electric ray is a benthic species inhabits rocky reefs, seagrass beds, and sandy and muddy flats in shallow to moderately deep waters don't exceeding **200 m**.

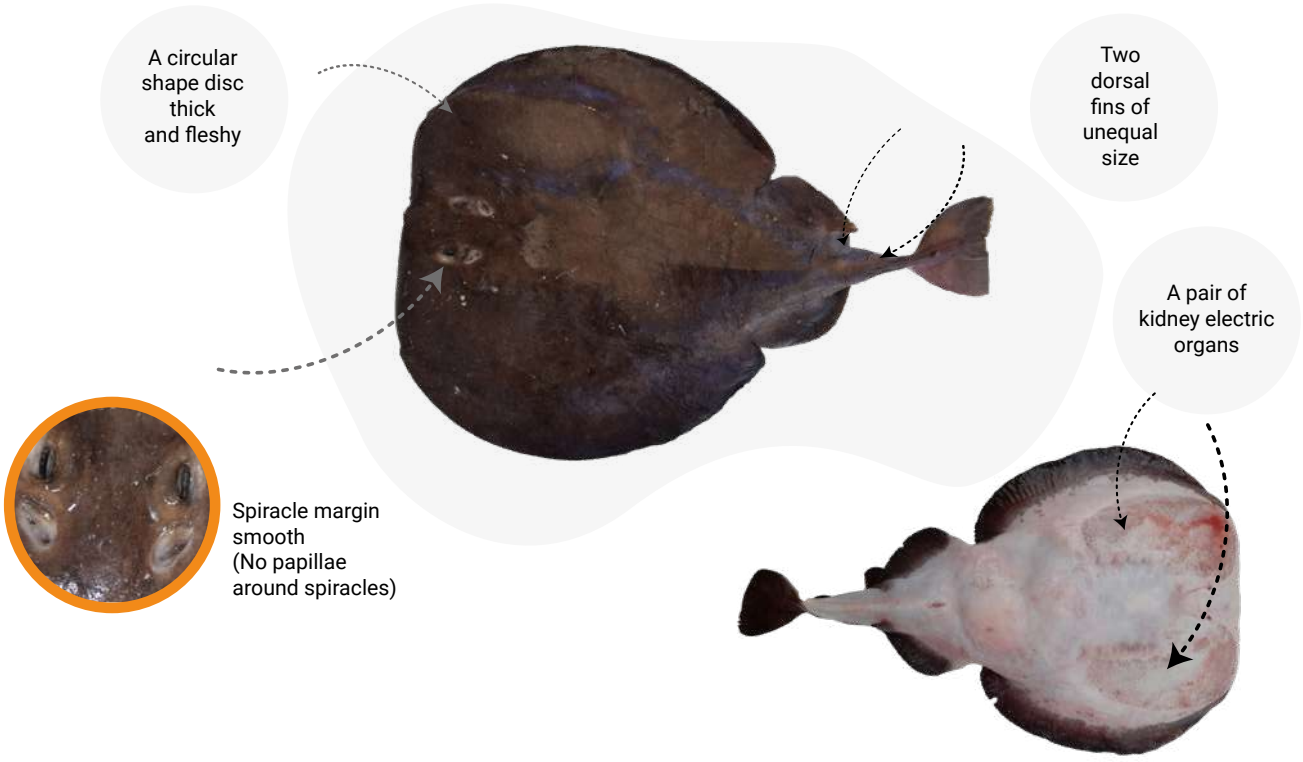
Status : UICN: Least Concern

Similar species : *Torpedo sinuspersici* (Page 104), *Tetronarce nobiliana* (Page 103)

Torpedinidae

Tetronarce nobiliana (Bonaparte, 1835)

EN Great torpedo **FR** Torpille noire **AR** نعاسة/رعاد



Description

A great size electric ray. A circular shape disc, thick and fleshy with a naked skin. Tail stout with two unequal dorsal fins and a paddle shape caudal fin. Spiracle smooth without tentacles or knobs on its rims. Dorsal surface uniformly black, grey to purplish brown. Ventral surface white with dusky to drack borders.

Biology

Maximum: 180 cm TL.
Common: 60 to 90 cm TL
Maturity: 55 cm TL (males); 90 cm TL (females).
Size at birth: 17 to 25 cm TL; Aplacental viviparous species. Gestation period of about 12 months.The ovarian fecundity vary between 15 and 71 depending on females sizes.

Habitat

Juveniles principally benthic on soft bottoms (usually **10 – 150 m**) while adults are pelagic or semi-pelagic with a wide depth distribution to **800 m**.
The great torpedo prefers sub-tropical waters.

Status : **UICN:** Least Concern

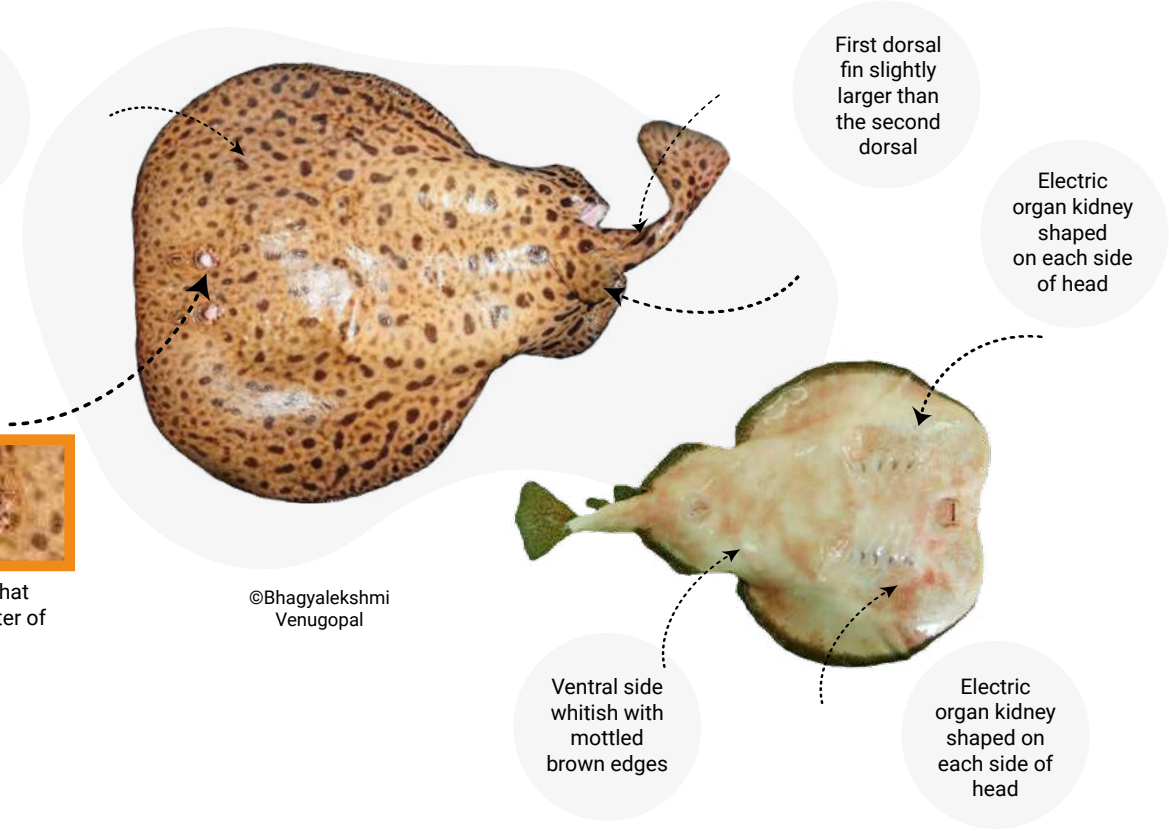
Similar species : *Torpedo marmorata* (Page 102)

Torpedinidae

Torpedo sinuspersici Olfers, 1831

EN Variable torpedo **FR** Torpille auréolée **AR** نعاسة/رعاد

9–10 short papillae that do not extend to center of spiracle opening



©Bhagyalekshmi Venugopal

Description

A medium size electric ray with a more or less circular shape disc, thick and fleshy with a naked skin. Tail stout with two unequal dorsal fins and a paddle shape caudal fin. Spiracle with 9–10 short papillae. Dorsal surface highly variable, from mottled or marbled brown to blackish brown covered with complex reticulated pattern of spot. Ventral surface creamy- white.

Biology

Maximum: 130 cm TL
Common: 60 to 100 cm TL
Maturity: No data.
Size at birth: No data;
Aplacental viviparous species. Gestation period of 6 to 10 months. Fecundity vary between 9 to 22 pups.

Habitat

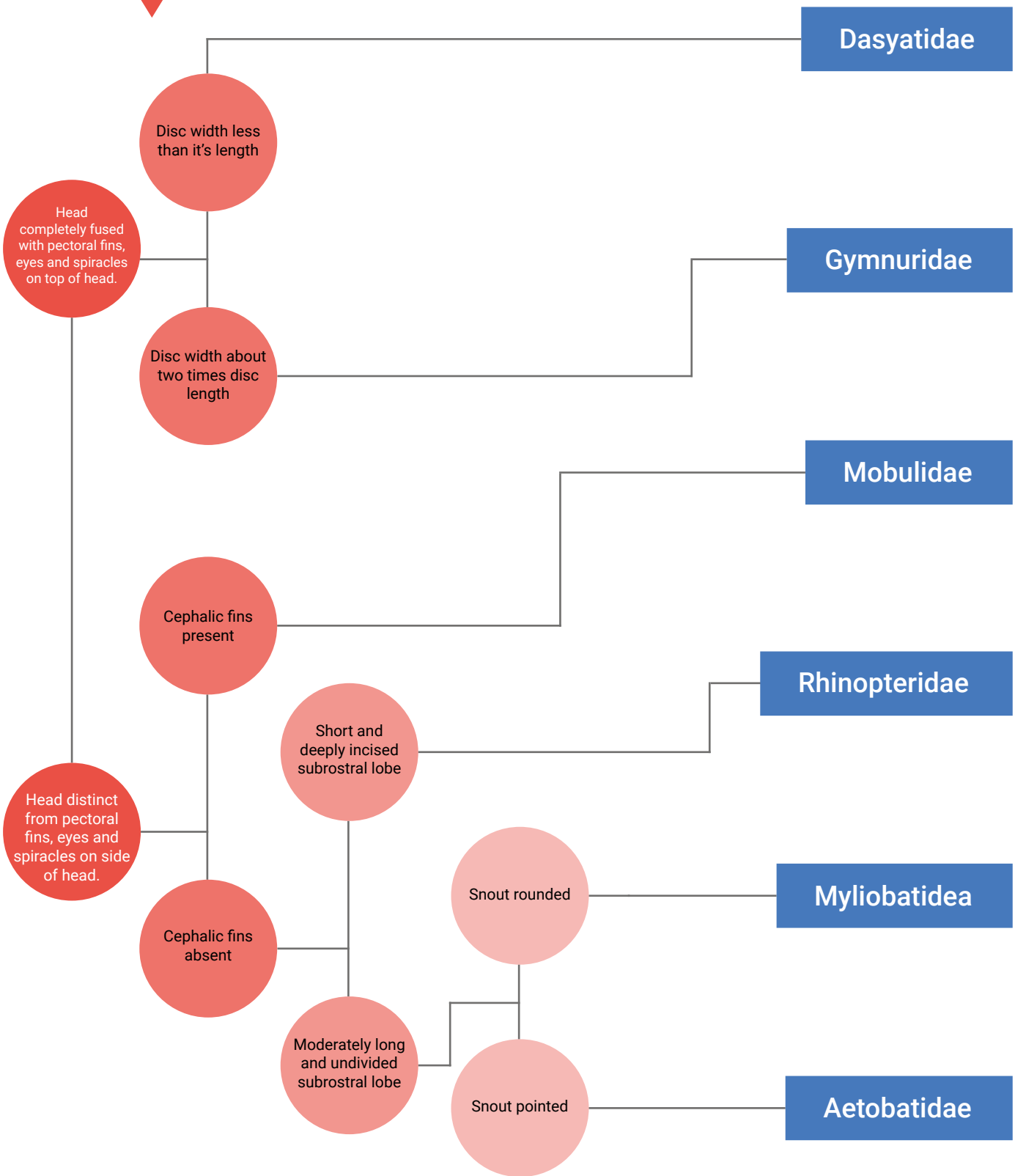
Benthic on soft bottoms of the continental self up to **150 m**. The variable torpedo prefer sub-tropical waters. Only few specimens of this species have been reported in Syrian waters.

Status : UICN: Not Evaluated

Similar species : *Tetronarce nobiliana* (Page 103)

Order MYLIOBATIFORMES

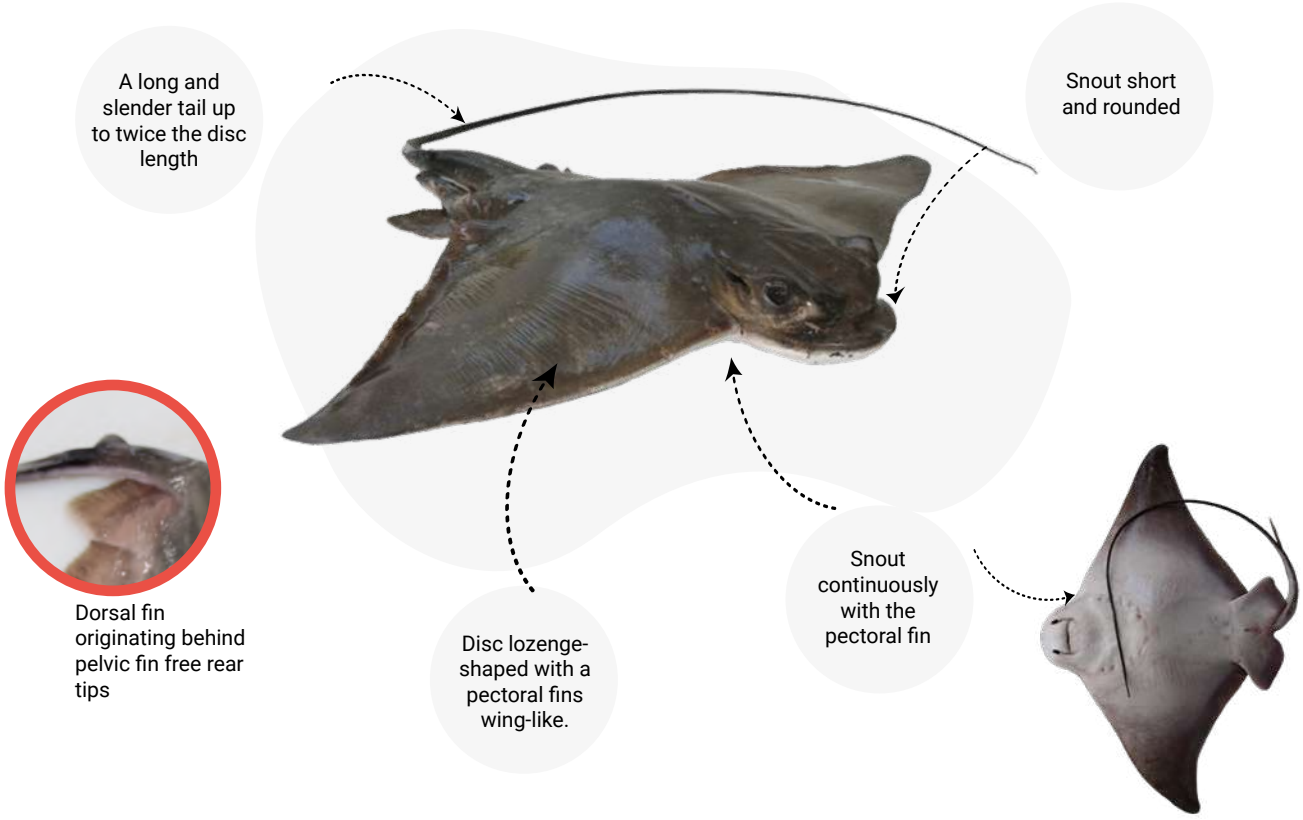
Mediterranean families



Myliobatidae

Myliobatis aquila (Linnaeus, 1758)

EN Common eagle ray **FR** Aigle commun **AR** قندوس/بقرة/عجل



Description

A large eagle ray with a rhomboidal disc of about twice as wide as long. The snout is protruding and rounded. A thin and long tail with a single dorsal fin, associated with one or two spines. No caudal and anal fin. Dorsal surface bronze or dark brown and ventral side white with brownish to dark margin.

Biology

Maximum: 114 cm DW
Common: 70 to 90 cm DW
Maturity: 50 cm DW (males); 73 cm DW (females).
Size at birth: 20 to 30 cm DW; Aplacental viviparous species. Gestation period between 6 to 8 months. Parturition takes place at the end of summer. The fecundity varies between 2 and 8 pups.

Habitat

A semi-pelagic species. It can be found in open water and near the surface but it prefers swimming near sandy bottoms up to **300 meters** depth.
The common eagle ray prefer tropical to warm temperate waters

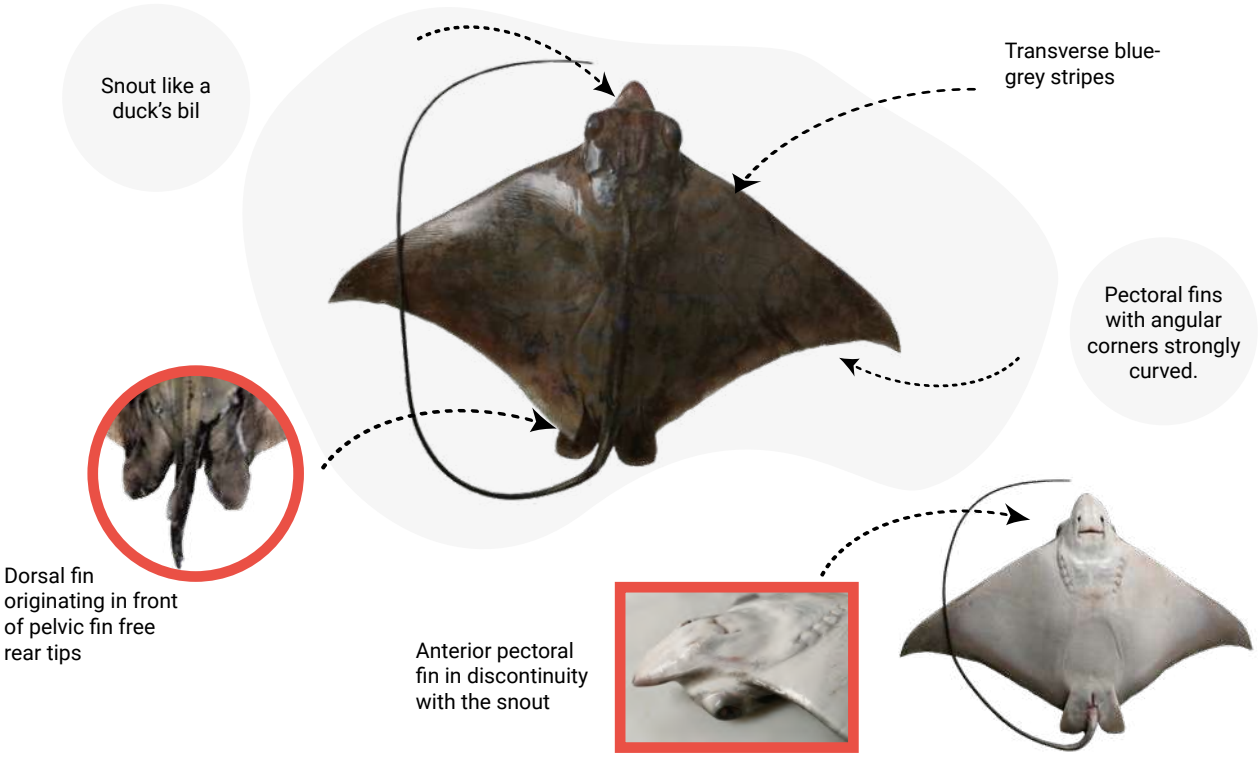
Status : **UICN:** Vulnerable, **SPA/BD Protocol:** Annex II

Similar species : *Aetomylaeus bovinus* (Page 107)

Aetobatidae

Aetomylaeus bovinus (Geoffroy Saint-Hilaire, 1817)

EN Bull ray **FR** Aigle vachette **AR** قندوس/بقرة/عجل



Description

A large batoid with a thick and prominent head with an elongated beaked snout. Pectoral disc sharply curved.
Dorsal fin before pelvic fin tips. No caudal and anal fin. A long and slender tail up to twice the disc length.
Dorsal surface light brown with transverse blue-grey stripes and ventral side white with brownish margin.

Biology

Maximum: 162 cm DW
Common: 70 to 100 cm DW
Maturity: 80 cm DW (males); 90 -100 cm DW (females).
Size at birth: 20 to 30 cm DW;
Aplacental viviparous species. Gestation period between 6 to 8 months. Parturition takes place at the end of summer. The fecundity varies between 2 and 6 pups.

Habitat

A semi-pelagic species occurring in sandy and muddy bottoms at depth from **10 to 150 m**. The bull ray frequent also bays, lagoons and estuaries.
It occurs in tropical and warm temperate coastal waters.

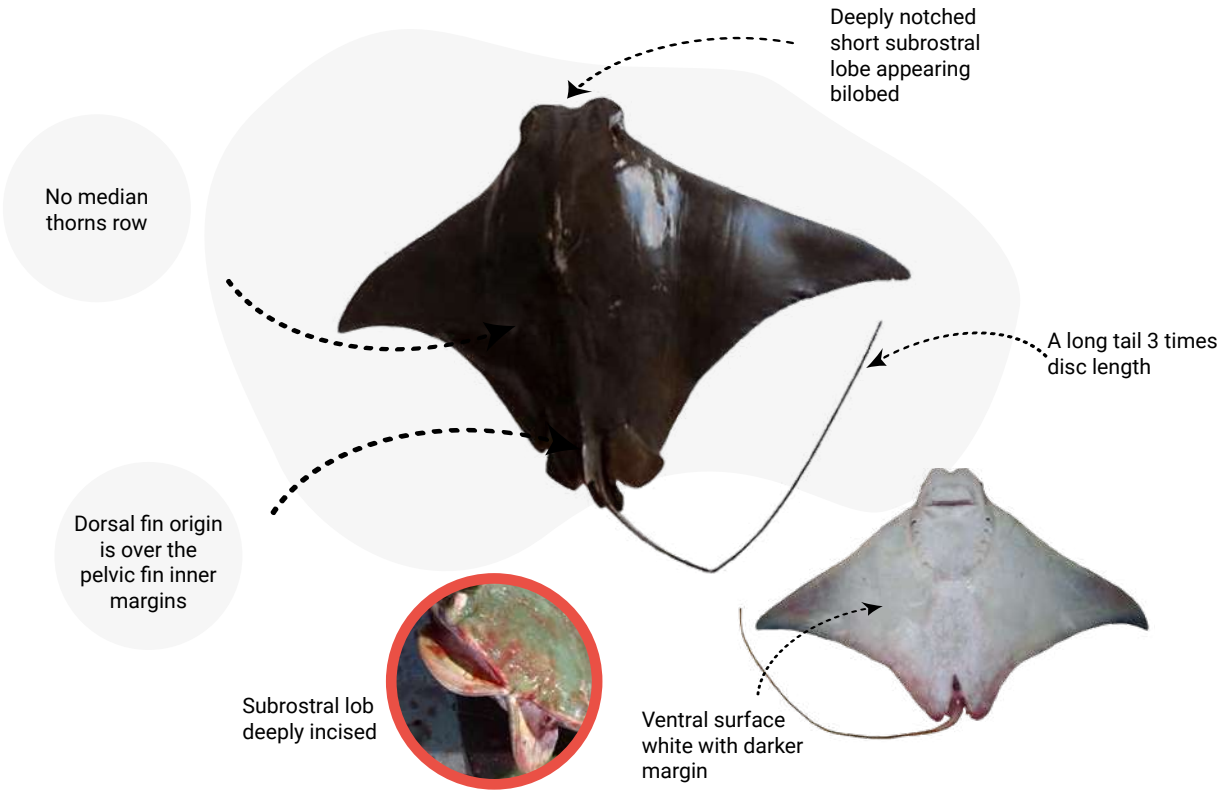
Status : **UICN:** Critically Endangered, **SPA/BD Protocol:** Annex II

Similar species : *Myliobatis aquila* (Page 106)

Rhinopteridae

Rhinoptera marginata (Geoffroy Saint-Hilaire, 1817)

EN Lusitanian cownose ray **FR** Mourine lusitanienne **AR** بقرة/عجل



Description

A medium to large batoids with a pectoral disc sharply curved and a head protruding from disk. A short snout with subrostral lobe deeply notched medially. Eyes and spiracles oriented sideways. A long and slender tail up to twice the disc length with a single dorsal fin.
Dorsal surface uniform greenish brown to bronze. Ventral side white with brownish margin.

Biology

Maximum: 150 cm DW
Common: 80 to 100 cm DW
Maturity: 75 cm DW (males); 80 cm DW (females).
Size at birth: 23 cm DW;
Aplacental viviparous species. Gestation period of 12 months. The fecundity varies between 1 and 6 pups.

Habitat

A bentho-pelagic species. Inhabit sandy or muddy substrates on the continental shelf at depth range between **20 to 100 m**.
The lusitanian cownose ray occur in tropical and warm temperate waters.

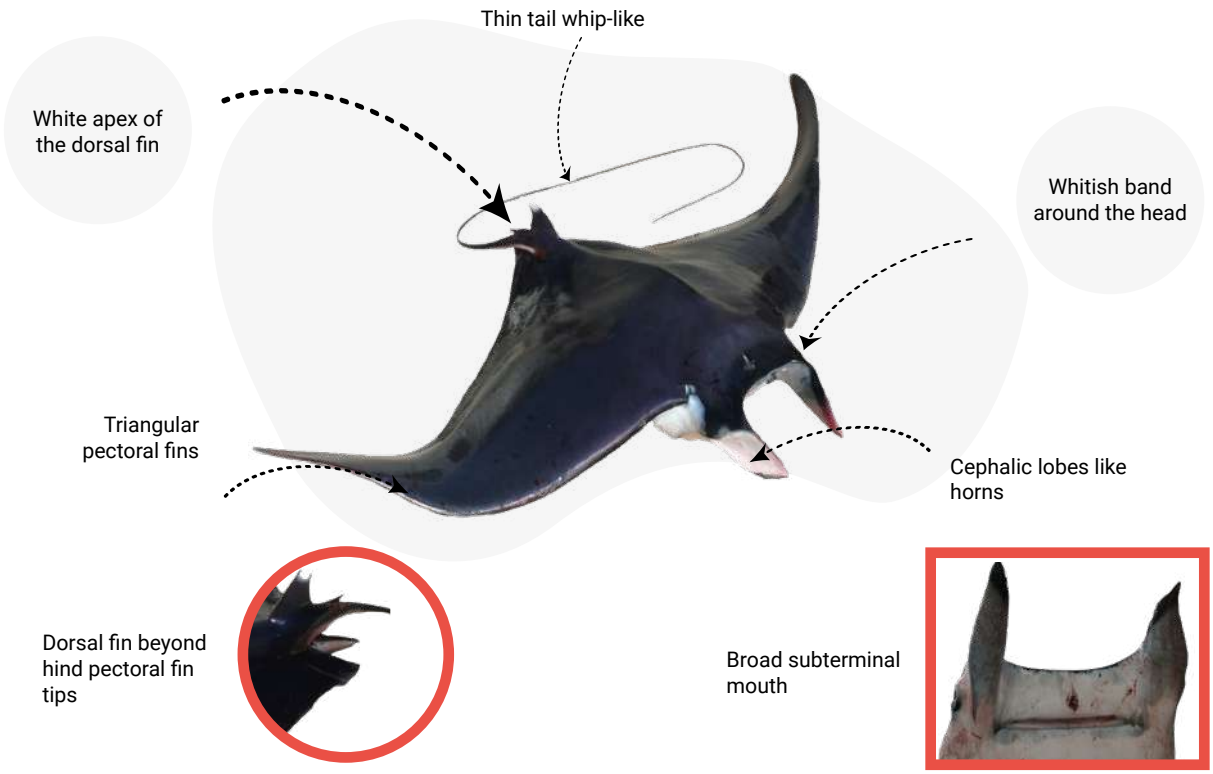
Status : **UICN:** Data Deficient, **SPA/BD Protocol:** Annex II

Similar species : None

Mobulidae

Mobula mobular (Bonnaterre, 1788)

EN Giant devil ray **FR** Mante méditerranéenne **AR** شيطان البحر / عينو في قرنو



Description

A large batoid with a disc 2 to 3 times wider than it's long. A head distinct from the disc with typical cephalic fins. Mouth subterminal. Base of the dorsal fin before hind tips of pectoral fin. A long tail up to twice the disc length.
Dorsal surface more or less dark blue color with generally a dark and a whitish band around the head. Ventral side white

Size and biology

Maximum: 350 cm DW
Common: 280 cm DW
Maturity: 200 cm DW (males); 220 cm DW (females).
Size at birth: 160 cm DW;
Aplacental viviparous species. Gestation period probably 12 months. The fecundity varies between 1 and 2 pups per litter.

Habitat

The giant devil ray is an epipelagic species inhabiting continental shelf waters mostly between **0** and **100 m**. It prefers temperate waters.

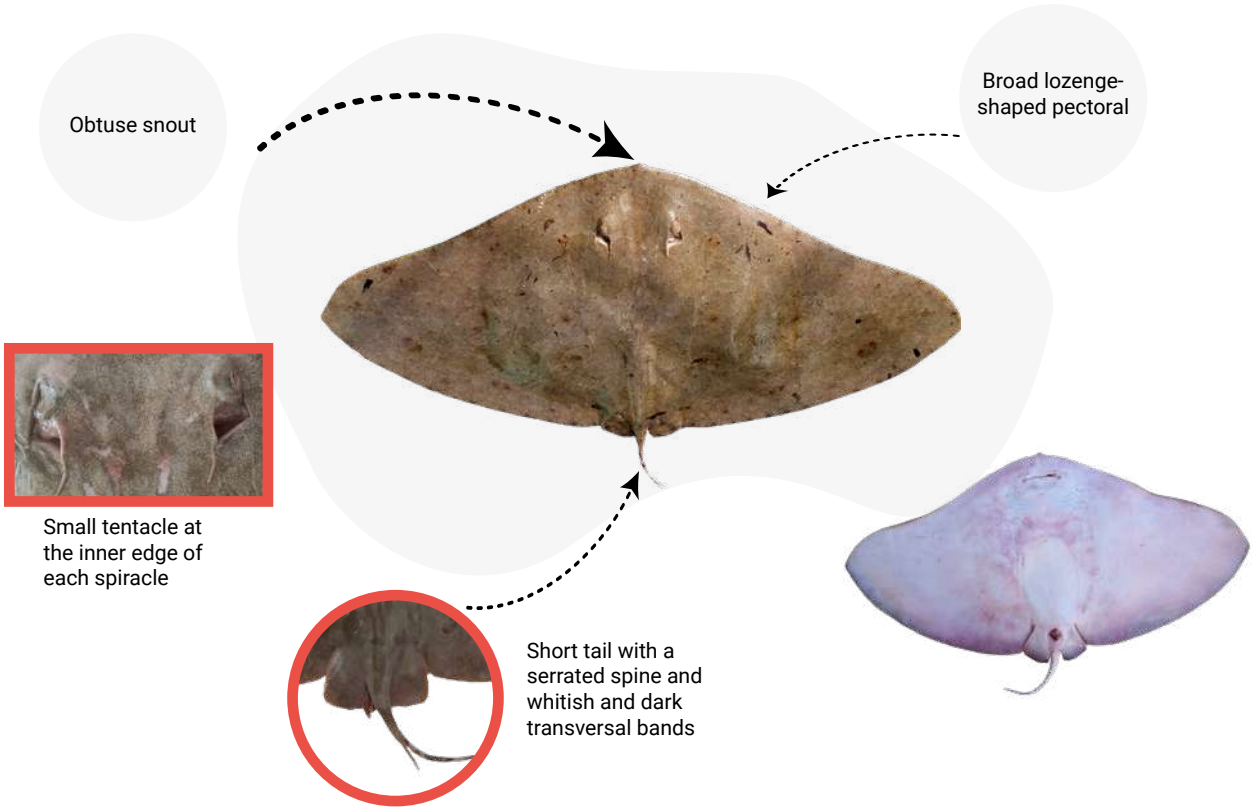
Status : UICN: Endangered, **SPA/BD Protocol**: Annex II, **CITES:** Annex II

Similar species : None

Gymnuridae

Gymnura altavela (Linnaeus, 1758)

EN Spiny butterfly ray **FR** Raie papillon épineus **AR** حصيرة



Description

A very large batoid with a disc about twice as broad as long. Small tentacle at the inner lateral edge of the spiracle. Tail very short with a whitish and dark crossbars. No dorsal fins. Dorsal surface dark brown to grayish or reddishbrown scattered with small dark and light spots. Ventral surface white, slightly pinkish or rusty.

Size and biology

Maximum: 162 cm DW
Common: 80-100 cm DW
Maturity: 76 cm DW (males); 102 cm DW (females).
Size at birth: 40 cm DW; Aplacental viviparous species. Gestation period lasts 6 to 8 months. Parturition occurs on autumn. The fecundity varies between 2 and 6 pups per litter.

Habitat

Benthic species living in on sandy bottoms, sometimes on posidonia meadows at depth varying from **10** to **100 m**. Spiny butterfly ray prefers subtropical and temperate waters.

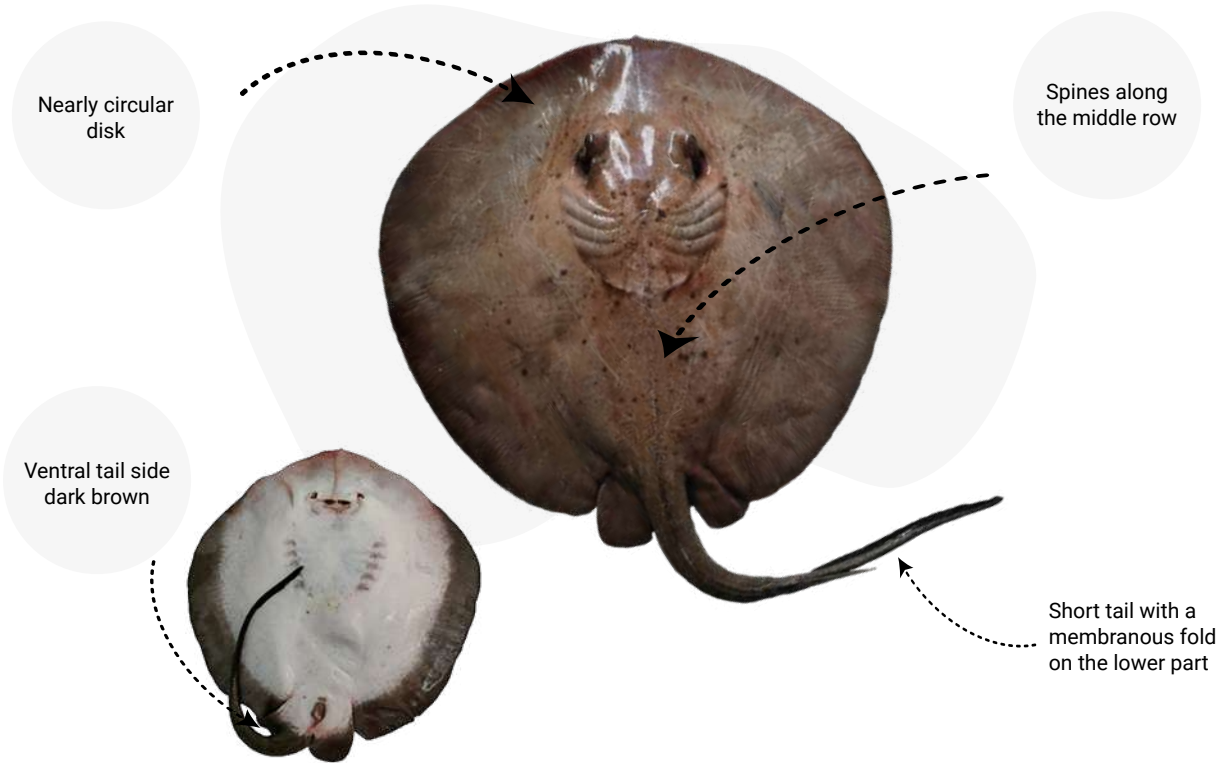
Status : **UICN:** Critically Endangered, **SPA/BD Protocol:** Annex II

Similar species : *Gymnura micrura*

Dasyatidae

Taeniurops grabatus (Geofroy St. Hilaire, 1817)

EN Round fantail stingray **FR** Pastenague africaine **AR** ترش/حصيرة



Description

A large batoid with a near circulardisc and a slightly pronounced snout tip. Some scattered dermal denticules in adults. A short and compressed tail with a developed serrated spine and membranous fold on the lower side. No dorsal or caudal fins. Dorsal surface brown to grey with darker speckles in juveniles. Ventral side whitish with a brown border.

Size and biology

Maximum: 200 cm DW
Common: 80-100 cm DW
Maturity: Unknown.
Size at birth: Unknown; Aplacental viviparous species. Parturition occurs on the end of summer. The fecundity vary between 2 and 4 pups per litter.

Habitat

A demersal species inhabits sandy, muddy, or rocky coastal area at depth until **300 m**. The round fantail stingray prefer the tropical and temperate waters.

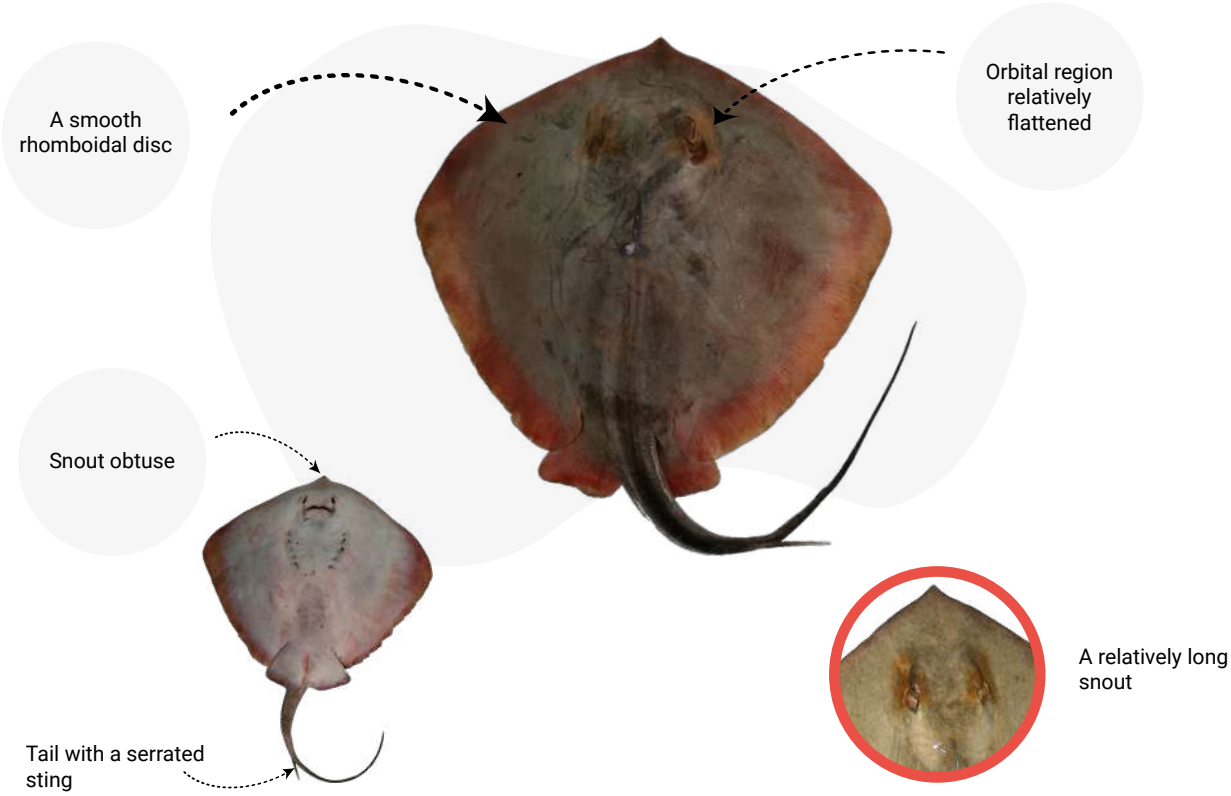
Status : UICN: Data Deficient

Similar species : *None*

Dasyatidae

Dasyatis pastinaca (Linnaeus, 1758)

EN Common stingray **FR** Pastenague commune **AR** حمام بحر



Description

A medium size batoid with a rhomboidal disc slightly wider than long. An orbital region relatively flattened. A whip-like tail 1.3 to 1.5 times disc length with a developed serrated sting. No dorsal or caudal fins. Dorsal surface is uniformly grayish- green, brownish, or grey, with a yellowish blotch around orbits. Ventral side white with a greyish brown margin.

Size and biology

Maximum: 54 cm DW
Common: 25-40 cm DW
Maturity: 30 cm DW (males); 40 cm DW (females).
Size at birth: 11-13 cm DW;
Aplacental viviparous species. Parturition occurs on the end of summer. The fecundity varies between 8 and 10 pups per litter.

Habitat

A demersal species inhabits sandy or muddy habitats in coastal waters shallower than **60 m**. The common stingray prefers the tropical and temperate waters.

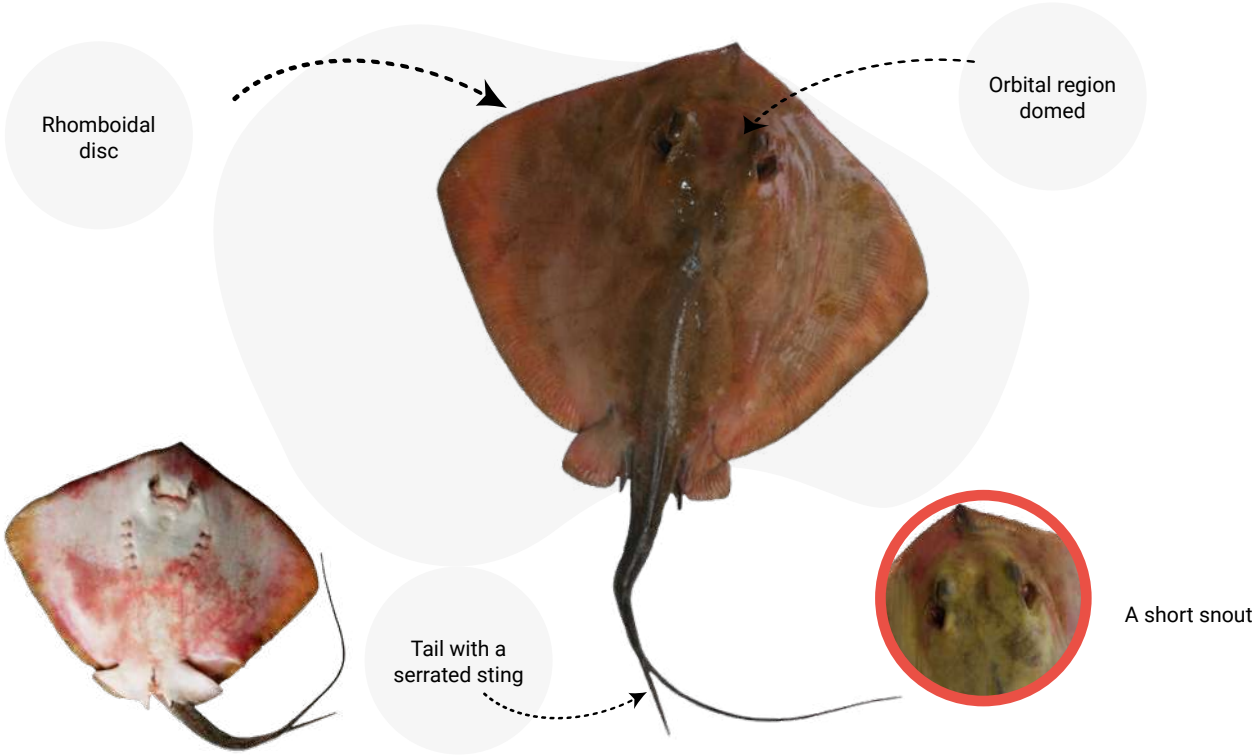
Status : **UICN:** Near Threatened, **SPA/BD Protocol:** Annex II

Similar species : *Dasyatis tortonesei* (Page 113)

Dasyatidae

Dasyatis tortonesei Capapé, 1975

EN Tortonese's stingray **FR** Pastenague de Tortonese **AR** حمام بحر



Description

A medium size batoid with a rhomboidal disc slightly wider than long. A bulges orbital region in comparison of the rest of body. A whip-like tail 1.3 to 1.5 times disc length with a developed serrated sting. No dorsal or caudal fins. Dorsal surface is uniformly brownish to yellowish, varying to orange. Ventral side white with a greyish brown margin.

Size and biology

Maximum: 60 cm DW
Common: 25-40 cm DW
Maturity: 32 cm DW (males); 39 cm DW (females).
Size at birth: 10-11 cm DW;
Aplacental viviparous species. Parturition occurs on the end of summer. The fecundity varies between 8 and 10 pups per litter.

Habitat

A demersal species inhabits sandy or muddy bottoms. Found from close inshore to depth of about **100**.
The Tortonese's stingray occurs in tropical and temperate waters.

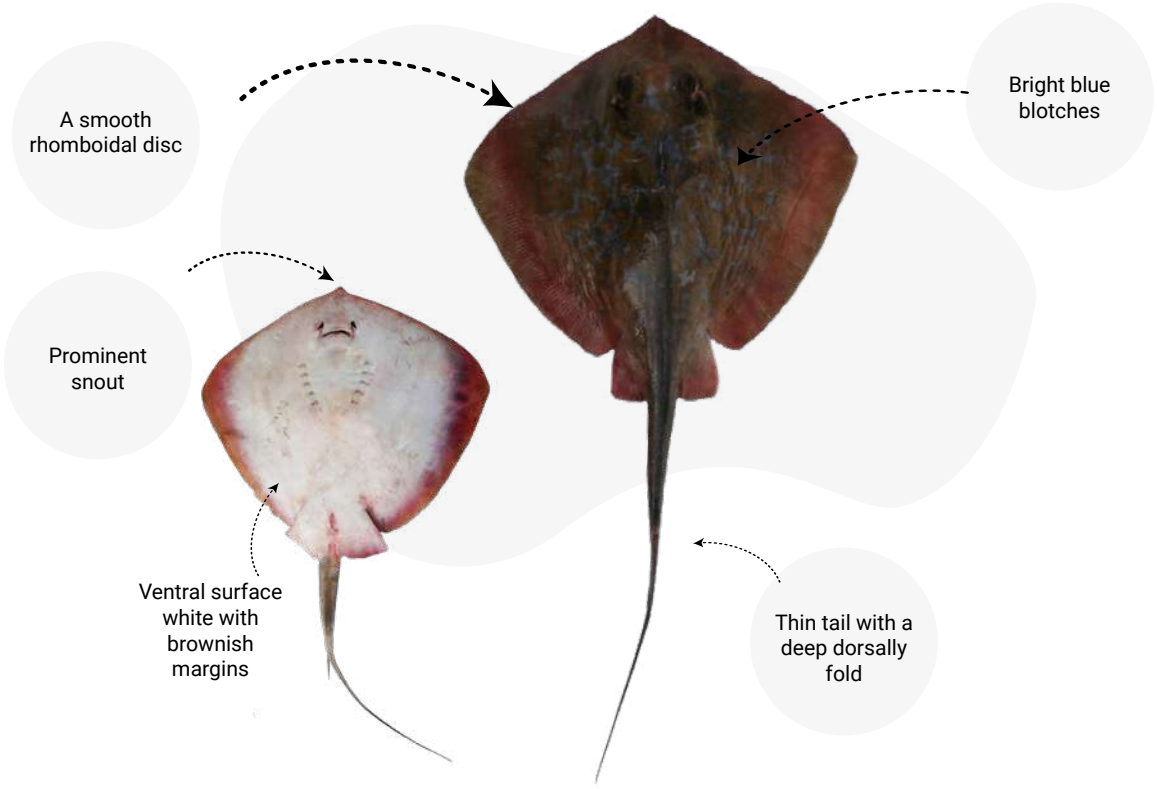
Status : UICN: Not Evaluated

Similar species : *Dasyatis pastinaca* (Page 112)

Dasyatidae

Dasyatis marmorata (Steindachner, 1892)

EN Marbled stingray **FR** Pastenague marbrée **AR** حمام بحر



Description

A medium size batoid with a rhomboidal disc without spines. A whip-like tail about 1.3 times disc length with a developed dart on its base. No dorsal or caudal fins. A golden-brown dorsal surface with bright blue blotches. Ventral side white with a greyish brown margin.

Size and biology

Maximum: 45 cm DW
Common: 30-40 cm DW
Maturity: 30 cm DW (males); 32 cm DW (females).
Size at birth: 11 cm DW;
Aplacental viviparous species. Parturition occurs on the end of summer. The fecundity varies between 2 and 4 pups per litter.

Habitat

A demersal species inhabits coastal and shallow waters on sandy and muddy bottoms to depth of **60 m**.
The marbled stingray prefers tropical and temperate waters.

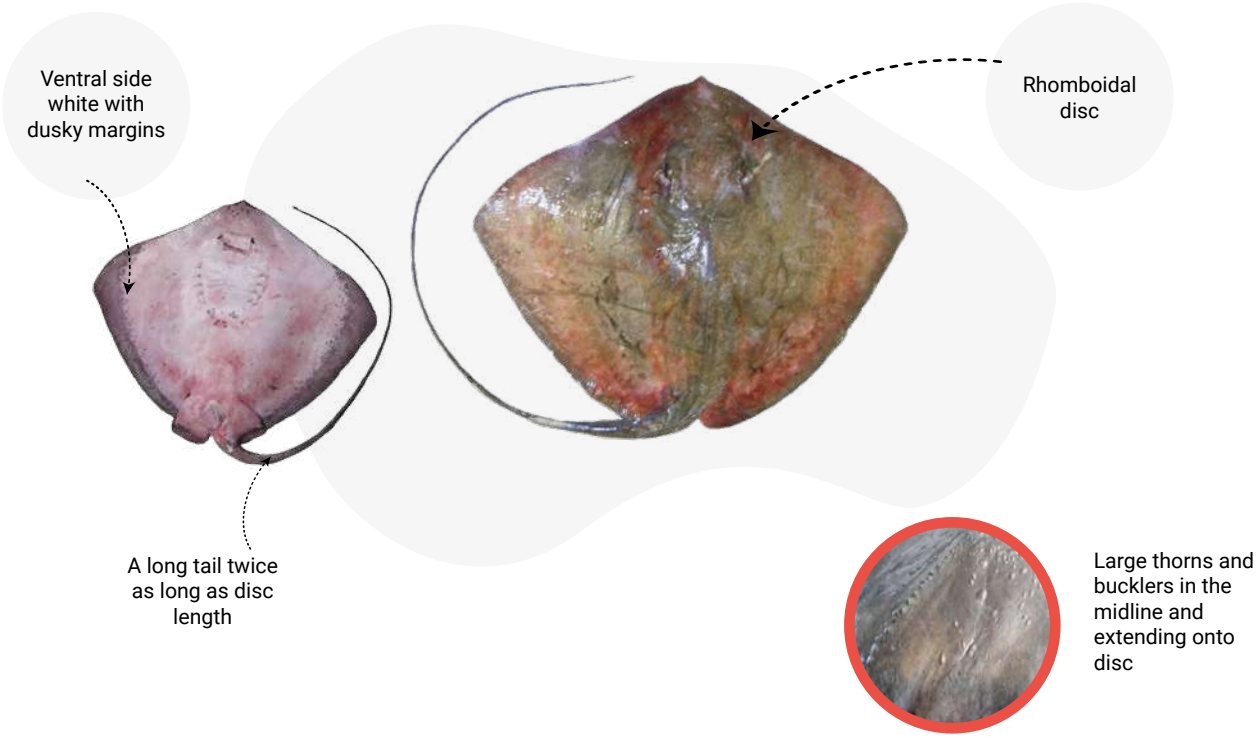
Status : UICN: Not Evaluated, **SPA/BD Protocol:** Annex III

Similar species : *Dasyatis pastinaca* (Page 112), *Dasyatis tortonesei* (Page 113)

Dasyatidae

Bathytoshia lata (Garman, 1880)

EN Roughtail stingray **FR** Pastenague épineuse **AR** قاحو



Description

A large batoid with a broad rhomboidal disc with large bucklers. A very long whip-like tail with a developed serrated sting. No dorsal or caudal fins. Dorsal surface is uniformly greyish brown to blackish in large specimens. Ventral side white with a dark colored tail behind the stinging spine.

Biology

Maximum: 54 cm DW
Common: 25-40 cm DW
Maturity: 30 cm DW (males); 40 cm DW (females).
Size at birth: 11-13 cm DW; Aplacental viviparous species. Parturition occurs on the end of summer. The fecundity varies between 8 and 10 pups per litter.

Habitat

Demersal on continental shelves. Found on sandy or muddy bottoms, sometimes near coral reefs from shallow waters to **200 m**.
The roughtail stingray prefers temperate waters.

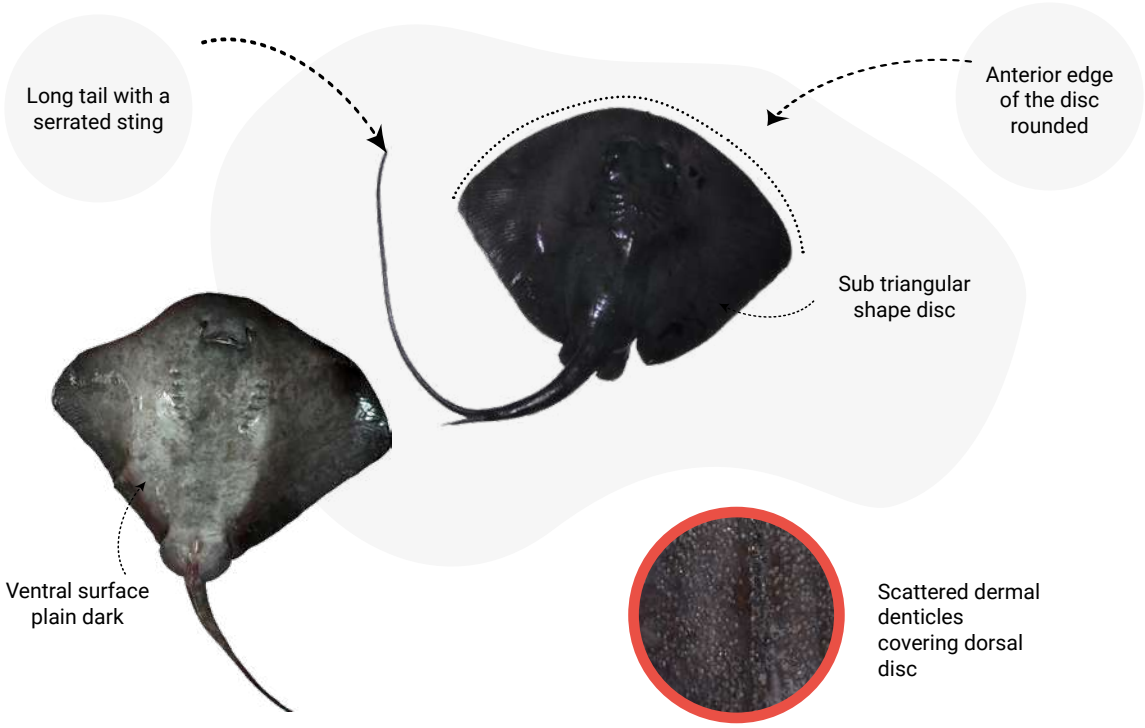
Status : **UICN:** Not Evaluated, **SPA/BD Protocol:** Annex II

Similar species : *Dasyatis pastinaca* (Page 112), *Dasyatis tortonesei* (Page 113)

Dasyatidae

Pteroplatytrygon violacea (Bonaparte, 1832)

EN Pelagic stingray **FR** Pastenague violette **AR** حمام الزرقاية



Description

A medium size batoid with an almost triangular disc. The anterior margin of the disc forms an arc. Larger specimens with scattered dermal denticles on dorsal side. A whip-like tail more than 2 times the disc length with a developed serrated sting. No dorsal or caudal fins. Dorsal side uniformly purple or dark blue and ventrally less dark.

Size and biology

Maximum: 100 cm DW
Common: 60-80 cm DW
Maturity: 34-47 cm DW (males); 40-50 cm DW (females).
Size at birth: 14-26 cm DW; Aplacental viviparous species. Parturition occurs on the end of summer. The fecundity varies between 4 and 6 pups per litter.

Habitat

The only pelagic stingray species. It occurs in tropical to warm temperate waters. Usually found in the water column of **100 m**.

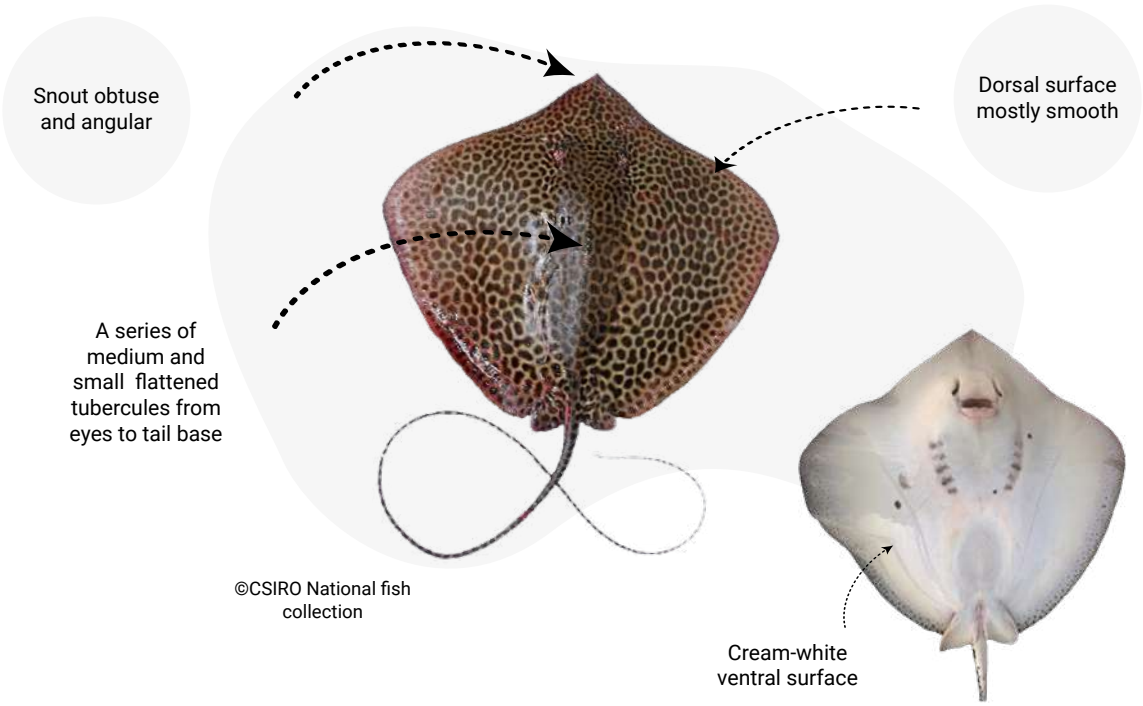
Status : **UICN:** Least Concern, **SPA/BD Protocol:** Annex III

Similar species : *None*

Dasyatidae

Himantura uarnak (Gmelin, 1789)

EN Honeycomb stingray **FR** Pastenague indienne **AR** حمار



Description

A large batoids with a relatively rhomboidal disc and straight anterior margins. Pectoral fin tips broadly rounded. A whip-like tail more than 2.5 times disc length (when intact) with a very long serrated sting on its base. Dorsal surface in adults whitish to yellowish brown with complex pattern of dark brown to blackish reticulations and rings. Juveniles with mostly large black spots. Ventral surface whitish with a darker margin.

Size and biology

Maximum: 200 cm DW
Common: 80-130 cm DW
Maturity: 70-80 cm DW (males); 80-100 cm DW (females).
Size at birth: 120-28 cm DW; Aplacental viviparous species. Gestation period last 1 year. The fecundity varies between 2 and 6 pups per litter.

Habitat

Demersal and benthic species; inhabits sandy or muddy bottoms from surface to **50 m** of depth. Common on sandy beaches and in shallow estuaries and lagoons. The Honeycomb stingray prefer tropical water. *Himantura uarnak* is a Lessepsian species

Status : UICN: Not Applicable

Similar species : *Taxonomic uncertainty persists for the genus Himantura (Last et al. 2016a).*

Order RAJIFORMES
Mediterranean families

Pectoral fins fused with head and trunk. Disc rhomboidal. Tail massive with two dorsal and caudal fins.

1 family

Rajidae

Key to genus

Snout very long and pointed, anterior disc margins are deeply concave. Internasal width usually less than 70% of the prenarial length. Thorns on disc usually absent on adults

- Ventral side coloration variable from white with dusky blotches to dark with white blotches to uniformly dark. Sensory pores black. — **Dipturus**
- Ventral side coloration uniformly white except for disc margins (dark to grey). Sensory pores not black. — **Rostroraja**

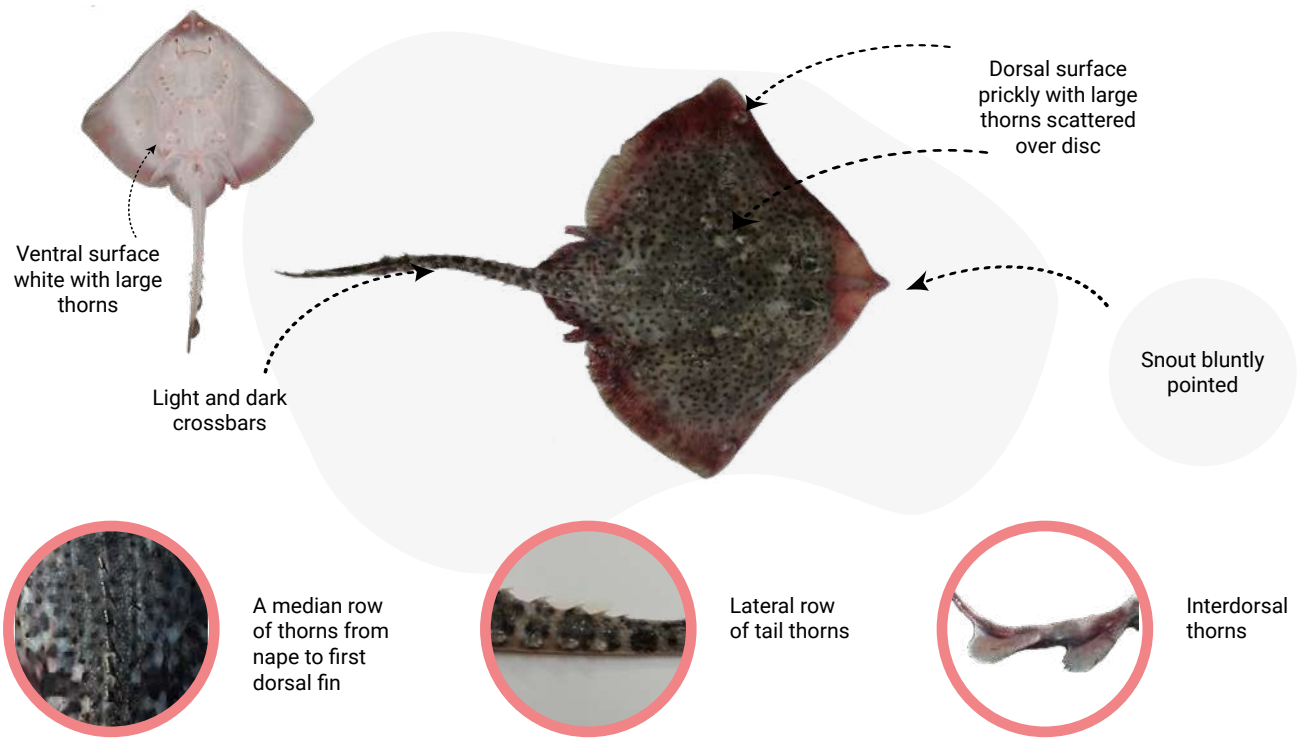
Snout moderately long to short, anterior disc margins are slightly concave. Internasal width usually more than 70% of the prenarial length. Thorns on disc always present.

- Median thorns from nape to the first dorsal fin always present (may become incomplete on trunk in large specimens particularly males). Orbital, nuchal and scapular thorns note close-set. Pectoral fin tips angular. — **Raja**
- Median thorns either reduced or disappearing with growth. Orbital thorns form continuous crescent. Nuchal and scapular thorns form triangular patches. Pectoral fin tips mostly rounded. — **Leucoraja**

Rajidae

Raja clavata Linnaeus, 1758

EN Thornback skate **FR** Raie bouclée **AR** قرشلة/ريا



A median row of thorns from nape to first dorsal fin

Lateral row of tail thorns

Interdorsal thorns

Description

A medium size skate with a flattened body and a broad, wing- like pectoral fins. Upper surface wholly prickly with additional large thorns in adults. Supplementary alar and malar thorns in adult males. Tails about as long as disc length. Dorsal surface variable brownish with dark and light blotches often marbled or producing patterns like eyespot. Ventral side white with dark margin.

Biology

Maximum: 110 cm TL
Common: 60-70 cm TL.
Maturity: 65 cm TL (males); 79 cm LT (females).
Oviparous species.
Continuous egg spawn during year around. About 150 eggcases are disposed annually with a pic in spring and summer. Eggcases length vary between 7 to 8 cm.

Habitat

Demersal coastal species, occurs on the shelf and upper slope. Inhabits a variety of substrates with a preference for sandy bottoms. Reported from **10 to 1000 m** deep (more common between **10 m and 60 m**). The thornback skate prefer subtropical waters.

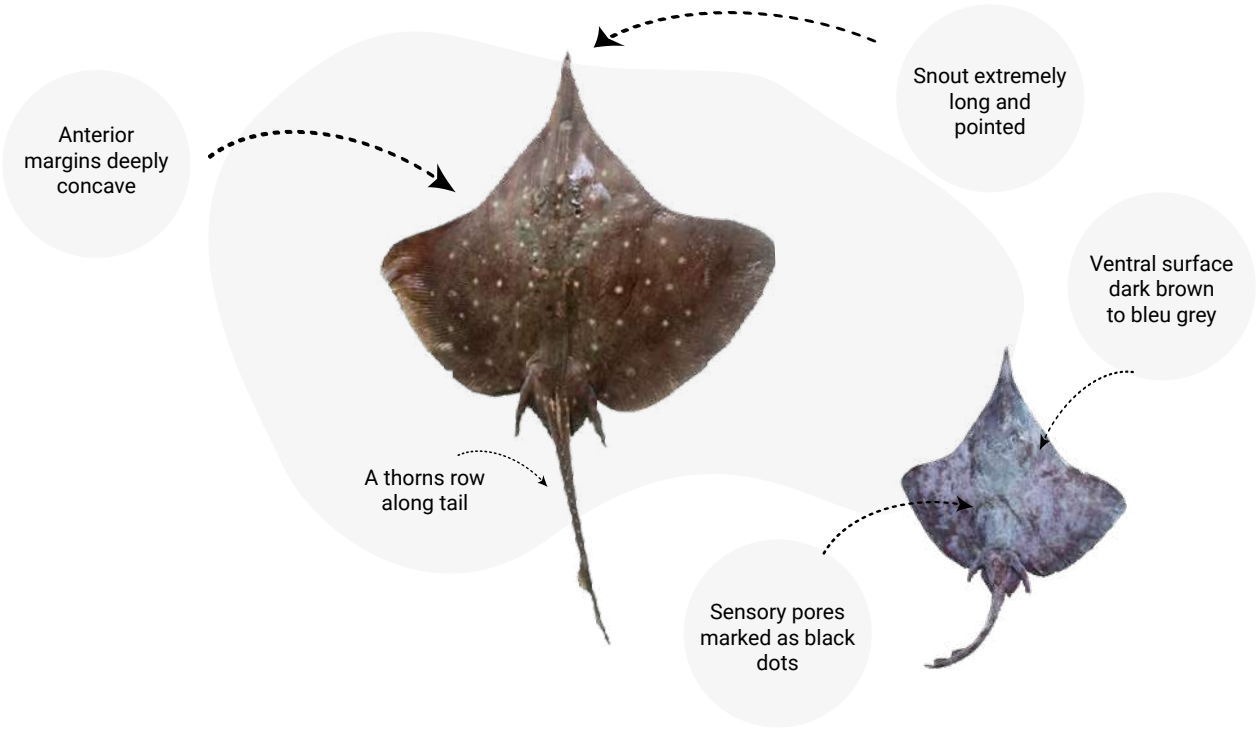
Status : UICN: Near Threatened

Similar species : *Raja montagui* (Page 129)

Rajidae

Dipturus oxyrinchus (Linnaeus, 1758)

EN Sharpnose skate **FR** Pocheteau noir **AR** قرشلة/ريا



Description

A large skate with a flattened an a broadly disc. Snout is very long and pointed. Upper surface with pale spots. No thorns on disc except alar thorns for males. A row of less than 12 thorns along tail to first dorsal fin is present. Dorsal surface light grey or dark grey to dark brown, with some dark and light spot. Ventral side almost dark brown to bleu grey. Mucous pores on both sides marked as black dots and streaks.

Biology

Maximum: 150 cm LT **Common:** 60-100 cm LT.
Maturity: 70 cm TL (males); 790 cm TL (females).
Oviparous species with eggs deposition in spring to early summer. Females may deposit 10 to 45 eggcases annually. A brownish to greenish Capsule with a length of 3.5 to 13 cm.

Habitat

Demersal species that lives at depths of **70–1230 m** on sandy or muddy substrates and, rarely, on rocky and pebbly grounds; it is usually found at depths of **200–500 m**. The Sharpnose skate prefer the cold waters.

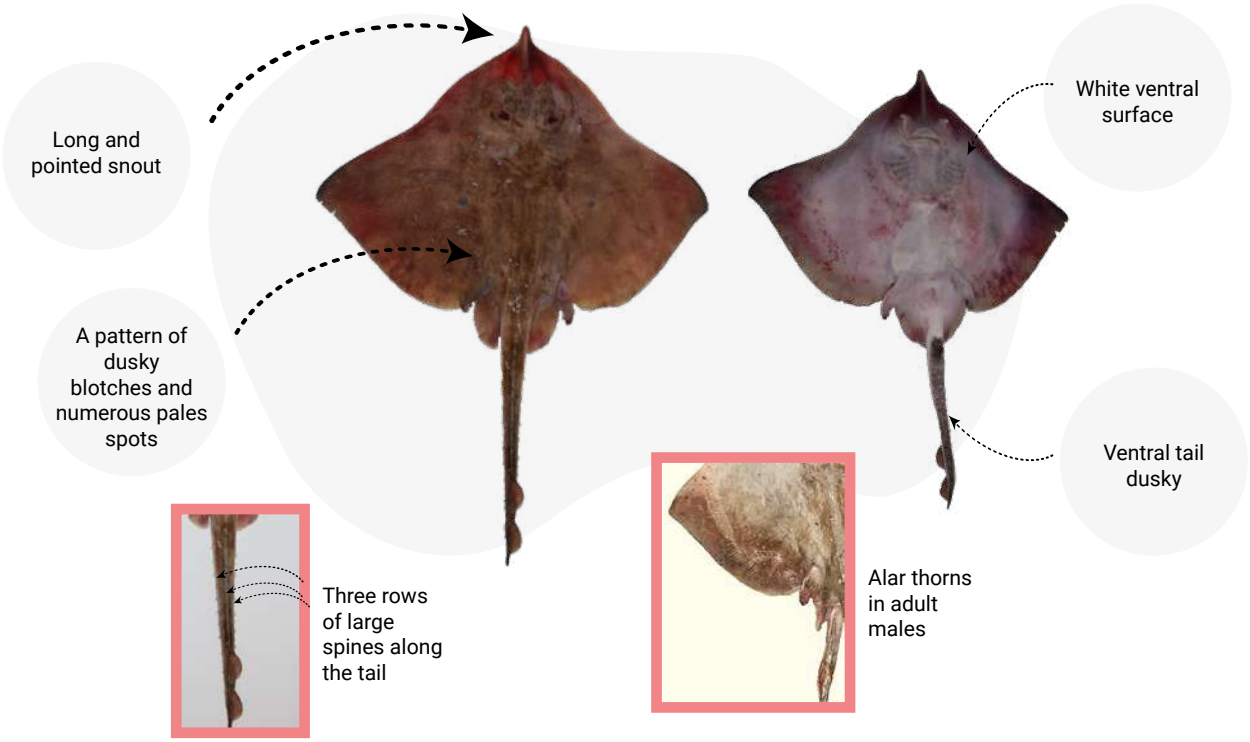
Status : UICN: Near Threatened

Similar species : *None*

Rajidae

Rostroraja alba (Lacepède, 1803)

EN White skate **FR** Raie blanche **AR** قرشلة/ريا



Description

A large skate with a flattened an a broadly disc. Snout is pronounced and pointed. Upper surface smooth without thorns except alar thorns in adult males becoming prickly with growth. Three rows of spine along tail. Dorsal surface reddish-brown in juveniles and greyish-blue in adults with a pattern of pale spots. Ventral side white with a darker margins that disappear with growth.

Biology

Maximum: 200 cm TL
Common: 80-90 cm TL.
Maturity: 125 cm TL (males); 130 cm TL (females).
Oviparous species with continuous eggs deposition. Females may deposit 55 to 156 very large eggcases annually. They are rough with a very long posterior horns and a of length of 12 to 18 cm.

Habitat

Demersal species from coastal waters to upper slope region. Found on sandy, rock-sandy and detrital substrates, from **10 to 750 m** of depth (usually between **50-200 m**). The White skate prefer cold waters.

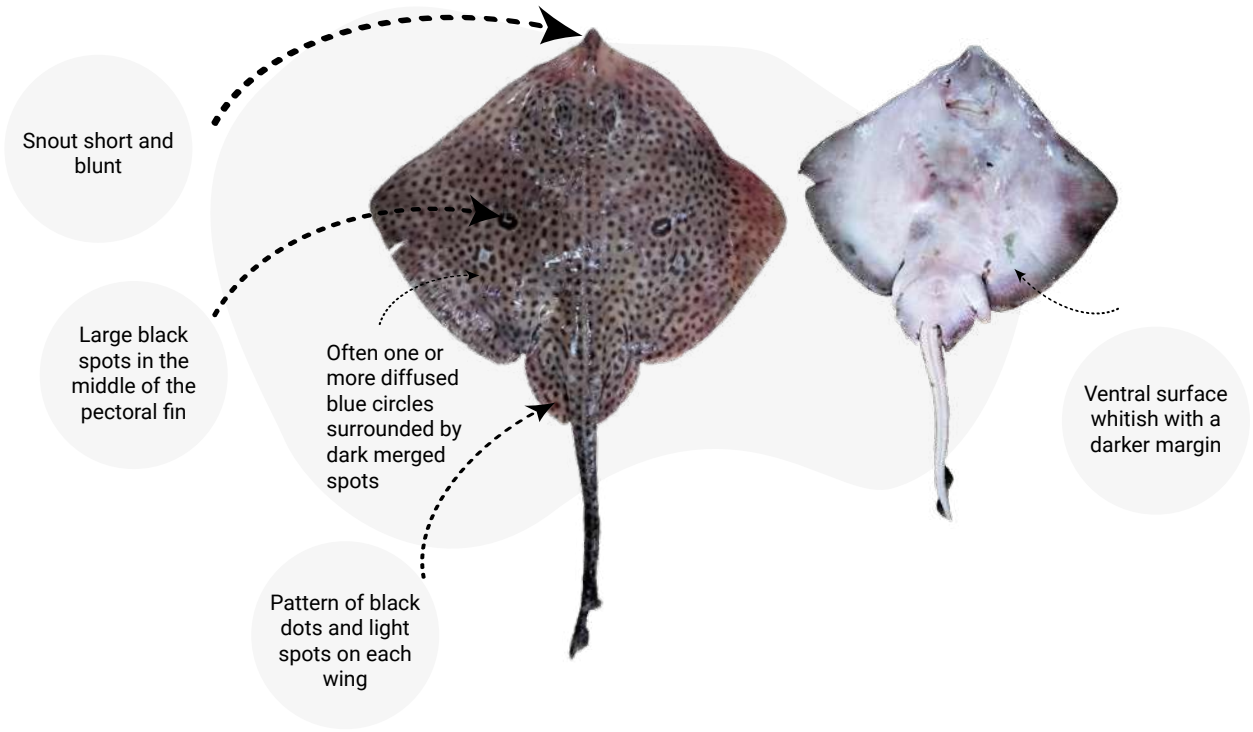
Status : UICN: Endangered; **SPA/BD Protocol:** Annex II

Similar species : None

Rajidae

Raja polystigma Regan, 1923

EN Speckled ray **FR** Raie tachetée **AR** قرشلة/ريا



Description

Medium-sized skate with an anterior disc margin weakly undulate. Upper surface smooth with nuchal and scapular thorns. Median row of small thorns to first dorsal fin in addition of a two lateral caudal thorns rows.
Dorsal surface greyish to greyish- brown with scattered dark and pale spots. For juveniles, blue circle is often absent. Ventral side white with darker margins.

Biology

Maximum: 70 cm TL
Common: 40-50 cm TL.
Maturity: 40 cm TL (males); 50 cm TL (females).
Oviparous species. Females can lay between 20 to 62 eggs mainly in summer. Eggcases are brown with yellow at the edges and of 5,5 to 6,5 cm total length.

Habitat

Demersal species, mainly found on deep bottoms of the continental shelf from shallow waters to **650 m**. More common on sandy and muddy bottoms from **100 m** to **400 m** depth. The speckled ray prefers cold waters.

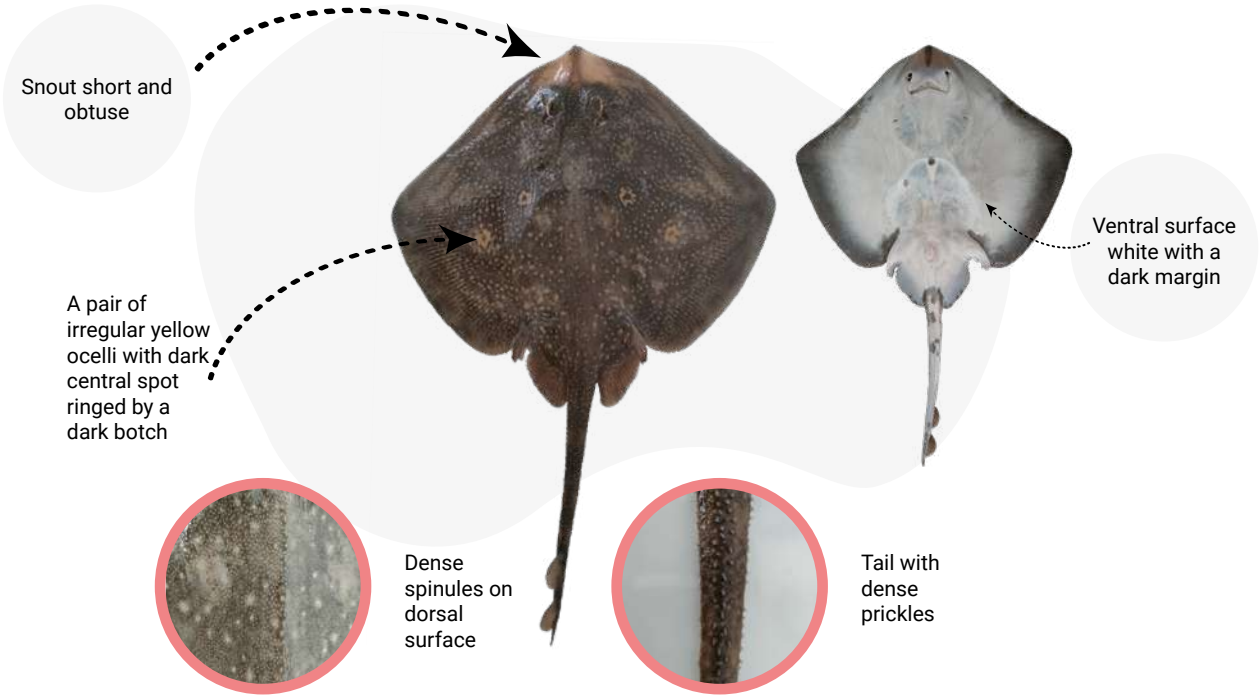
Status : UICN: Least Concern

Similar species : *Raja montagui* (Page 129), *Raja brachyura* (Page 124)

Rajidae

Raja radula Delaroche, 1809

EN Rough skate **FR** Raie râpe **AR** قرشلة/ريا



Description

Medium-sized skate with anterior disc margins weakly undulate. Upper surface with dense prickles becoming smooth with growth only in males. A median row of small thorns from trunk to first dorsal fin. Tail with many thorn rows.
Dorsal surface greyish to reddish- brown with several yellowish spots. and dark transversal lines. Ventral surface white with a darker fin margins.

Biology

Maximum: 70 cm TL
Common: 25-30 cm TL.
Maturity: 40 cm TL (males); 46 cm TL (females).
Oviparous species. Females can lay between 80 to 154 eggs mainly in spring and summer. Eggcases are brownish of 5 to 7 cm total length.

Habitat

Demersal species in coastal waters. Inhabits sandy or muddy bottom from surface to **300 m** of depth.
The rough skate is an endemic species of the Mediterranean Sea. It prefers subtropical waters.

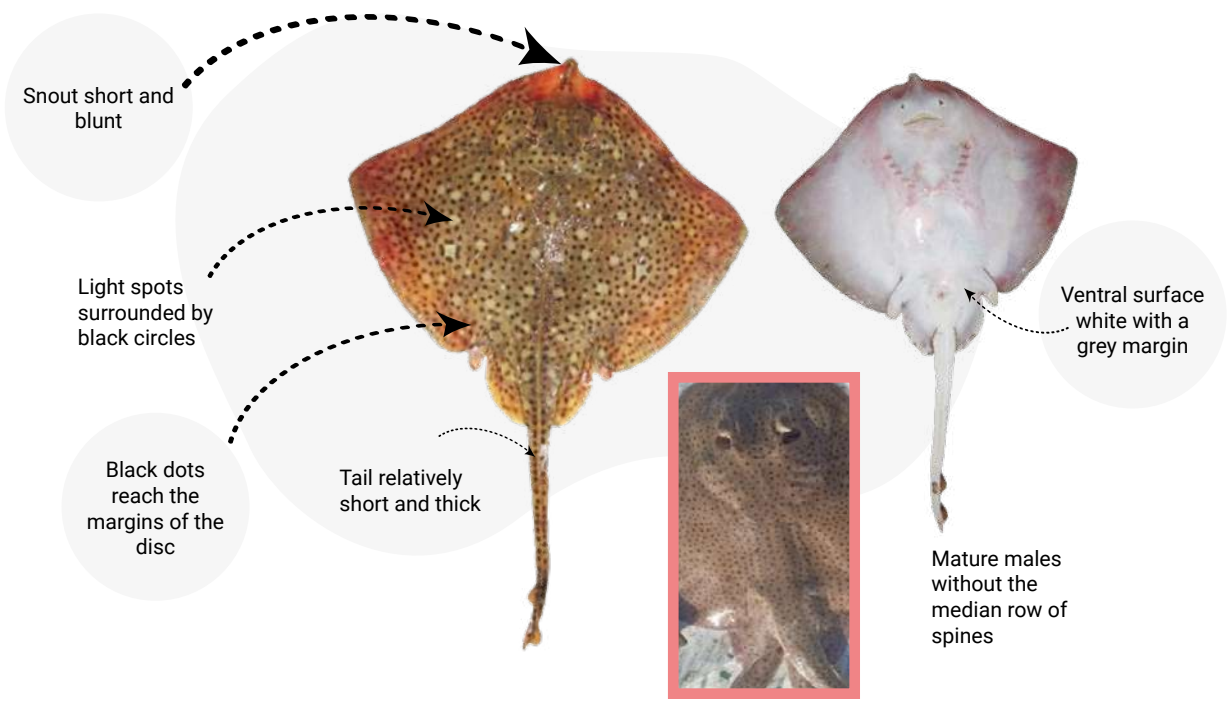
Status : UICN: Endangered

Similar species : *Raja undulata* (Page 127)

Rajidae

Raja brachyura Lafont, 1873

EN Blonde ray **FR** Raie lisse **AR** قرشلة/ريا



Description

A large-sized skate with a pectoral fins with clear angles on the lateral side. Upper surface smooth in juvenile and prickly in adults. A median row of small thorns from trunk to first dorsal fin in young and large females interrupted in adult males. Dorsal surface light brown with scattered dark dots reaching the disc margin. Supplementary light spots on each wing. Ventral surface white with grey margins.

Biology

Maximum: 120 cm TL.
Common: 40-80 cm TL.
Maturity: 80 cm TL (males); 90 cm TL (females).
Oviparous species. Females deposit between 30 to 70 eggs per year mainly in spring and summer. Eggcases are reddish brown to greenish in the edges and the keels and measuring 11 to 14 cm total length.

Habitat

Demersal species in inshore waters. Occurs on soft substrates, mainly on sand, sand-rock and seabed habitats at **150 m** depth.
The blond ray prefers cold waters.

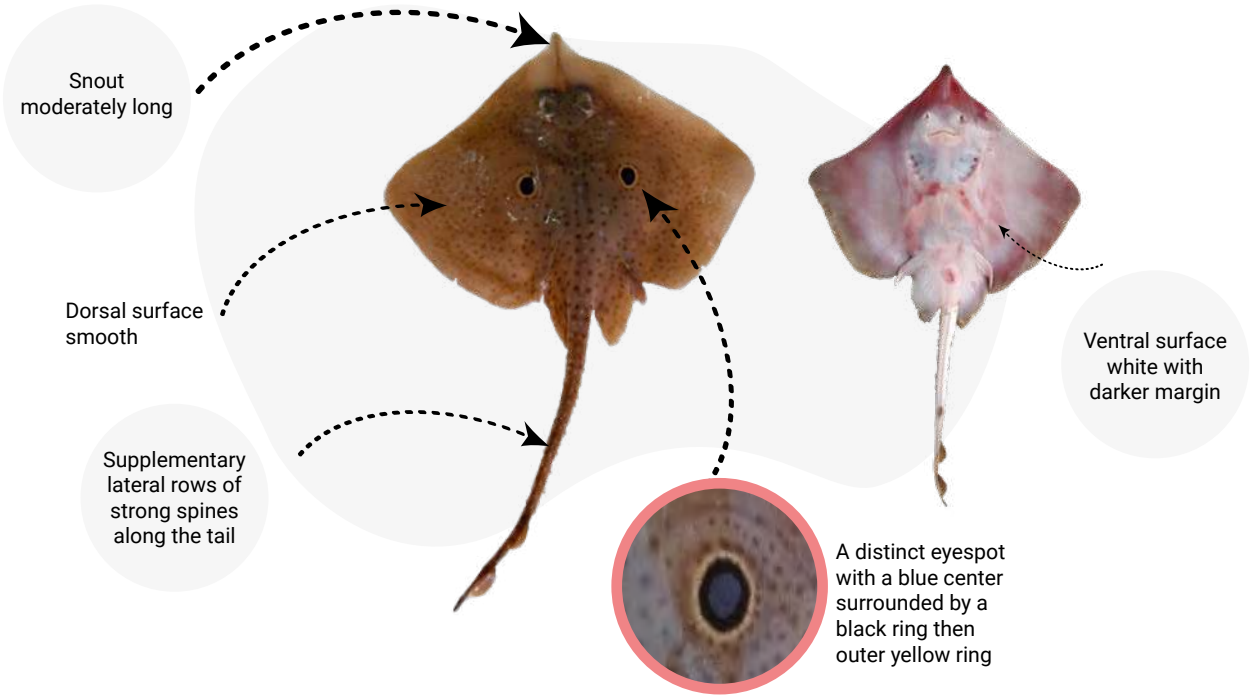
Status : UICN: Near Threatened

Similar species : *Raja polystigma* (Page 122), *Raja montagui* (page 129)

Rajidae

Raja miraletus Linnaeus, 1758

EN Brown ray **FR** Raie miroir **AR** قرشلة/ريا



Description

A small skate with pectoral fins wider than long and a tail slightly longer than the disc length. Upper surface smooth except the presence of nuchal and scapular thorns. A median row of small thorns from trunk to first dorsal fin in young reduced in adults. Dorsal surface yellowish to reddish brown with numerous dark spots and a specific ocellus on each wing. Ventral surface white with darker margins.

Biology

Maximum: 60 cm TL.
Common: 20-50 cm TL.
Maturity: 35 cm TL (males); 40 cm TL (females).
Oviparous species. Females deposit between 40 and 72 eggs per year mainly in spring and summer.
Eggcases are brown to amber measuring 4 to 5 cm total length.

Habitat

Demersal species on continental self, mainly from **50 to 150 m** depth but it can reach **800 m**. Occurs on sandy bottom and on Posidonia seagrass beds. The brown ray prefers subtropical waters.

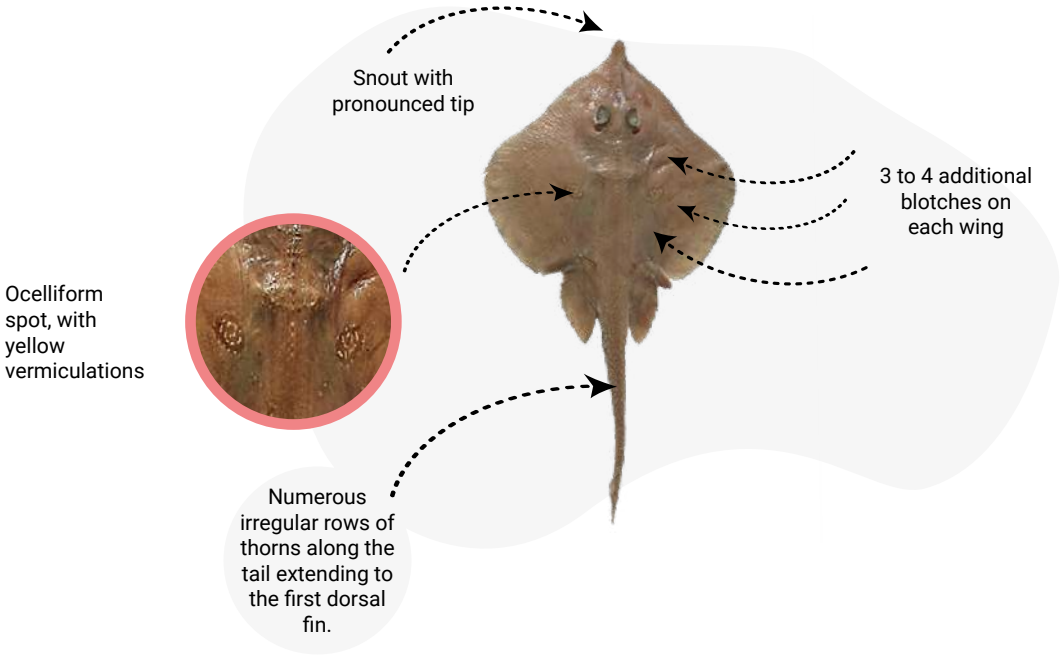
Status : UICN: Near Threatened

Similar species : *None*

Rajidae

Leucoraja melitensis (Clark, 1926)

EN Maltese skate **FR** Raie de Malte **AR** قرشلة/ريا



Description

A small skate with an anterior disc margin undulated and rounded pectoral fin tips. Upper surface almost spinulose with bare patches on central of the disc and a triangle of thornlets on nape/shoulder area. 3 to 5 irregular rows of thorns along tail to first dorsal fin. Dorsal surface light brown with large ocellus on central pectoral fin. Ventral surface white with pale brown to greyish margins.

Biology

Maximum: 50 cm TL.
Common: 35-45 cm TL.
Maturity: 40 cm TL (males); 40 cm TL (females).
Oviparous species. Females may deposit from 10 to 56 eggs per year mainly in spring and autumn. Eggcases with a longer anterior apron than the posterior, measure 4 to 4.5 cm total length and they have shades of brown.

Habitat

Demersal species found in a wide range from surface to **800 m** of depth, but more common in the upper continental slope. Occurs on sandy and sandy muddy bottom The Maltese skate is an endemic species from Mediterranean Sea prefer subtropical waters.

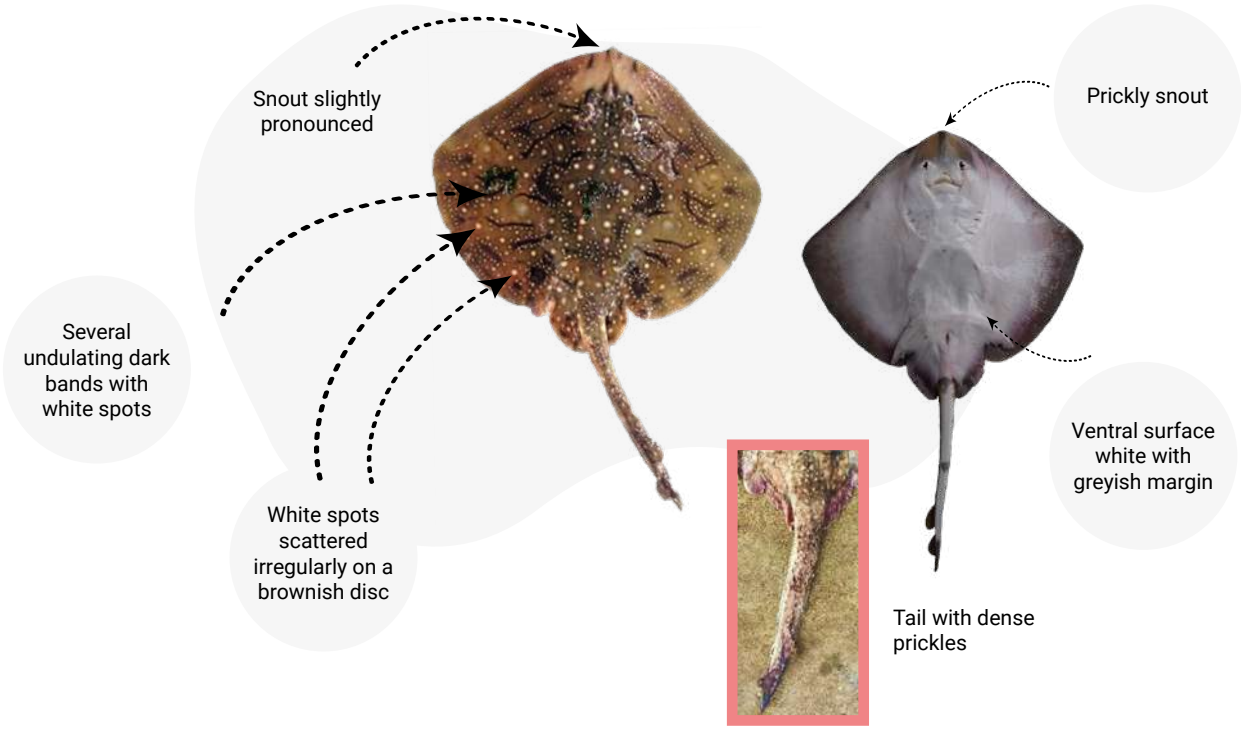
Status : UICN: Critically Endangered

Similar species : *None*

Rajidae

Raja undulata Lacepéde,1802

EN Undulate ray **FR** Raie brunette **AR** قرشلة/ريا



Description

A moderately large skate with an anterior disc margin slightly undulated and rounded pectoral fin tips. Upper surface almost spinulose with bare patches on central of the disc. A median row of thorns along tail to first dorsal fin. Supplementary lateral rows Dorsal surface ochre to grayish-brown, with several dark undulating bands and edged with white spots. Ventral surface white with greyish margin.

Biology

Maximum: 120 cm TL.
Common: 60-80 cm TL.
Maturity: 75 cm TL (males); 80 cm TL (females).
Oviparous species. Females deposit from 30-90 eggs per year mainly in spring and summer. Eggcases with oblong capsules covered by fibers with stiff pointed measure 5 to 9 cm total length.

Habitat

Demersal species in shallow waters to about **300 m** on soft and sandy bottoms but more common at depths **<50 m**.
The undulate ray prefers cold waters.

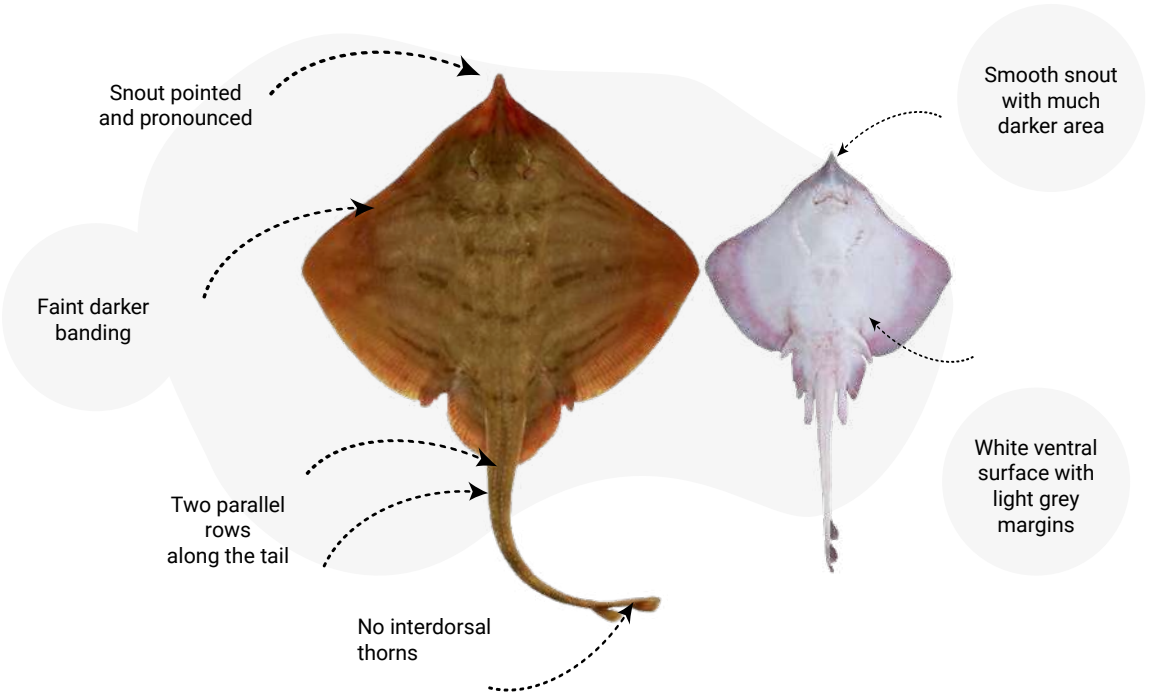
Status : UICN: Near Threatened

Similar species : *Raja radula* (Page 123)

Rajidae

Leucoraja fullonica (Linnaeus, 1758)

EN Shagreen ray **FR** Raie chardon **AR** قرشلة/ريا



Description

A moderately large skate with an anterior disc margin undulated and rounded pectoral fin tips. Upper surface entirely spinulose with 3 to 9 nuchal thorns. No more than two rows on tail. Dorsal surface ash-gray with inconspicuous darker bands across body. Ventral surface white with pectoral and posterior pelvic fins light grey and darker snout.

Biology

Maximum: 120 cm TL.
Common: 40-80 cm TL.
Maturity: 75 cm TL (males); 80 cm TL (females).
Oviparous species. No information on fecundity is known in the area. Egg case with long and pointed horns. Anterior horns length greater than the posterior. The ovisac total length varies between 7 to 9 cm.

Habitat

Demersal species found in offshore shelf and upper slope water, on the upper parts of the continental slope. Occur from **30 to 800 m** deep but more often around **200 m**.
The undulate ray prefers relatively cold coastal waters.

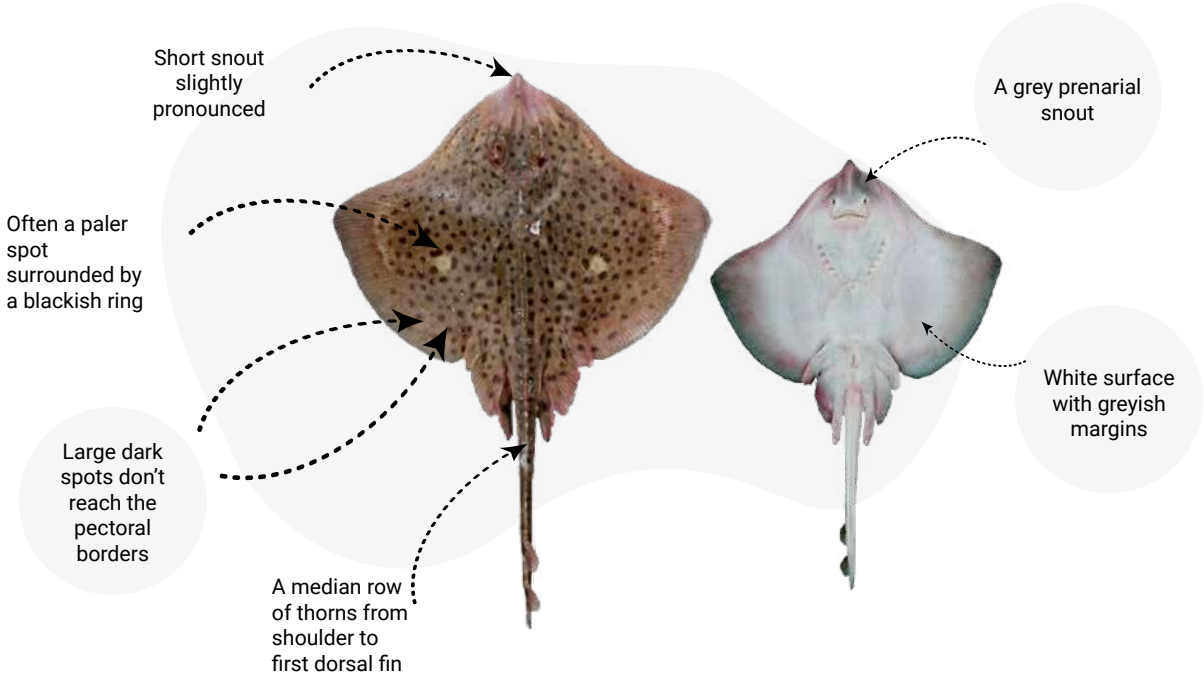
Status : UICN: Critically Endangered

Similar species : *None*

Rajidae

Raja montagui Fowler, 1910

EN Spotted Skate **FR** Raie douce **AR** قرشلة/ريا



Description

A medium size skate with an anterior disc margin undulated and a rounded pectoral fin tips. Upper surface smooth in juvenile and prickly in larger individuals. A median row with more than 20 thorns to first dorsal fin. Two lateral rows on tail with weak spines. Dorsal surface greyish-to yellowish with numerous scattered blackish spots. Ventral side white with greyish margins.

Biology

Maximum: 80 cm TL.
Common: 30-60 cm TL.
Maturity: 40 cm TL (males); 60 cm TL (females).
Oviparous species. Females deposit about 24 to 60 eggs per year. Egg case with long posterior horns and a total length varying between 5 to 8 cm.

Habitat

Demersal species on soft seabed bottoms such as sandy or muddy, at depth up to **650 m** (more common around **100 m**). The Spotted Skate prefer cold waters.

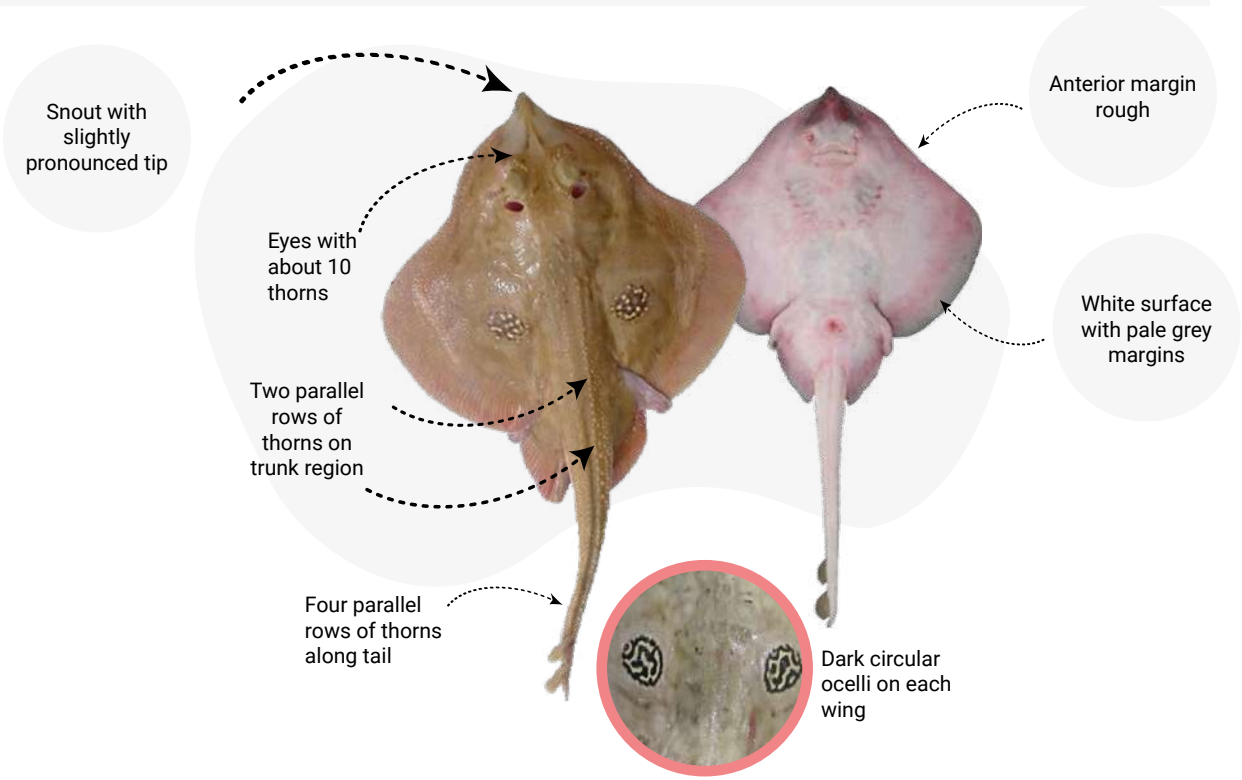
Status : UICN: Least Concern

Similar species : *Raja polystigma* (Page 122), *Raja brachyura* (Page 124)

Rajidae

Leucoraja naevus (Müller & Henle, 1841)

EN Cukoo ray **FR** Raie fleurie **AR** قرشلة/ريا



Description

A medium size skate with a sinuous pectoral fin anterior margins. Upper surface entirely spinulose, smooth in juveniles with indistinct narrow bands and lines. Underside smooth except for the snout. Dorsal surface ochre to light greyish brown. A large black ocella with yellow marbling on each wing. White ventrally.

Biology

Maximum: 81 cm TL.
Common: 40-60 cm TL.
Maturity: 50 cm TL (males); 60 cm TL (females).
Oviparous species. Females deposit more than 100 eggs per year. Eggcases have rectangular shape and pointed horns longer anteriorly. Their total length varying between 5 to 7 cm.

Habitat

Demersal species inhabiting inshore to offshore waters at depth from **10 to 900 m**. but usually at **20 to 250 m**. It occurs on coarse sand and gravel substrate. The cukoo ray prefer cold waters.

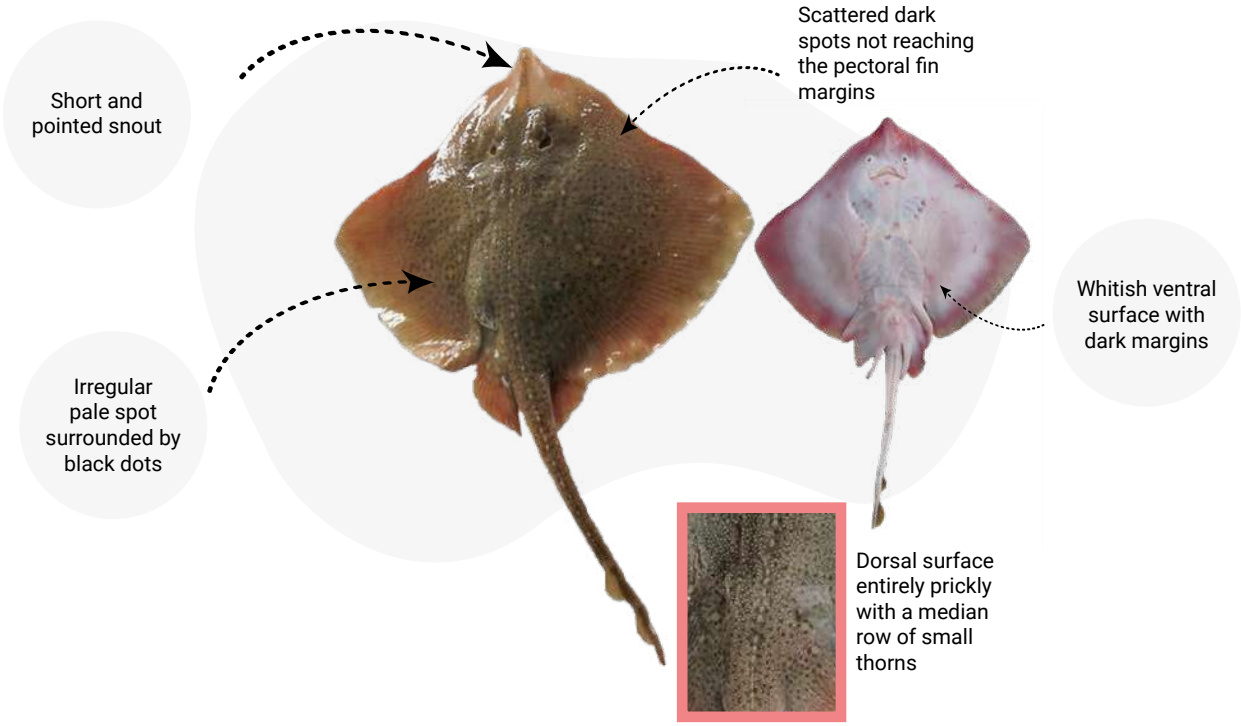
Status : UICN: Least concern

Similar species : None

Rajidae

Raja asterias Delaroche, 1809

EN Mediterranean starry ray **FR** Raie étoilée **AR** قرشلة/ريا



Description

A medium size skate with slightly undulate pectoral fins on the anterior margins. Upper surface entirely spinulose in adults, smooth in juveniles. A medium row of closely spaced thorns from nape to first dorsal fin. Additional rows of lateral thorns on tail. Dorsal surface brown yellowish with several fin dark spots don't reaching the pectoral fin margins. Underside white.

Biology

Maximum: 76 cm TL.
Common: 40-60 cm TL.
Maturity: 52 cm TL (males); 56 cm TL (females).
Oviparous species. Females lay between 30-112 eggs per year. Capsule are yellowish with brown shades and have a square shape. Their total length varying between 3 to 4.5 cm.

Habitat

A benthic species of inshore waters at usually at depth varying between **50 and 100 m**. Juveniles inhabit shallow water of about **7 m**.
It occurs on sandy and muddy bottom.
The Mediterranean starry ray is considered as endemic species in the area. It prefers cold waters

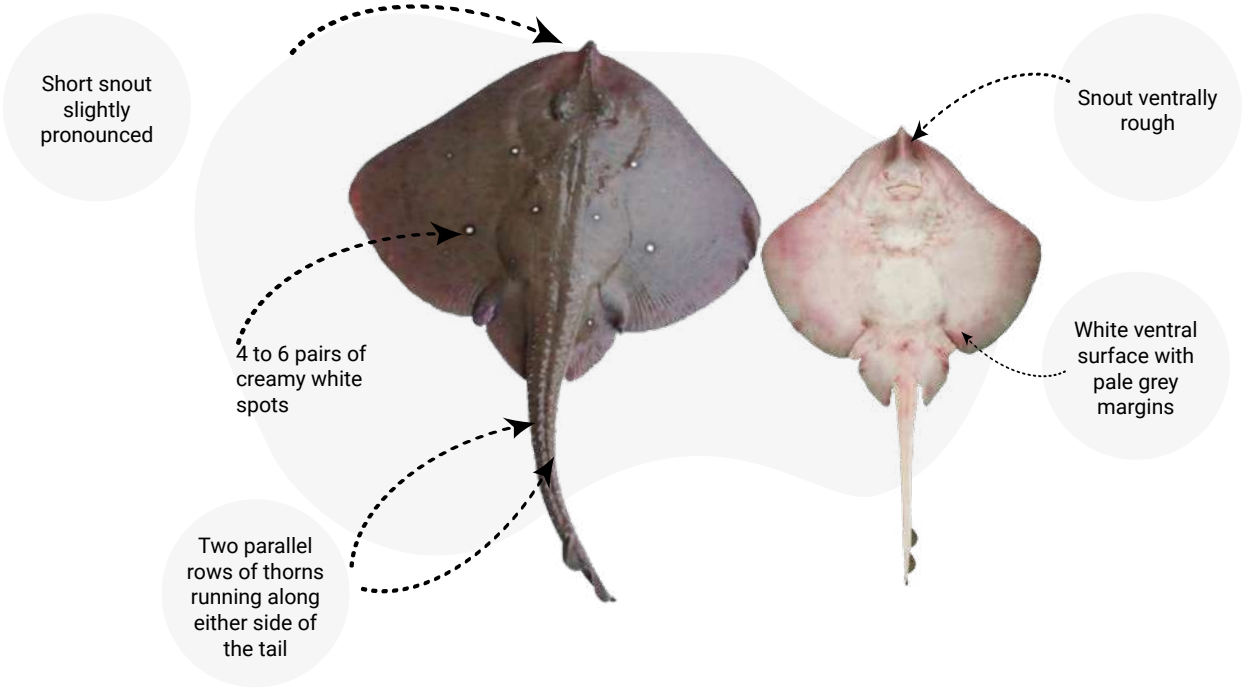
Status : UICN: Near Threatened

Similar species : *Raja montagui* (Page 129)

Rajidae

Leucoraja circularis (Couch, 1838)

EN Sandy ray **FR** Raie circulaire **AR** قرشلة/ريا



Description

A medium size skate with slightly undulate pectoral fins anterior margins. A spiny upper surface with bare areas in the hind half. A triangle of thorns on nape region and two parallel rows of thorns running either side from trunk to first dorsal fin. Additional rows of lateral thorns on tail.
Dorsal surface reddish to dark brown with 4 to 6 pairs of creamy spots symmetrically arranged on disc. Underside white.

Biology

Maximum: 120 cm TL.
Common: 60 - 100 cm TL.
Maturity: 66 cm TL (males); 76 cm TL (females).
Oviparous species. Females deposit eggcases from August to November. No data on fecundity is known in the area. Capsules have rectangular shape, long and pointed horns and a total length from 3 to 5 cm.

Habitat

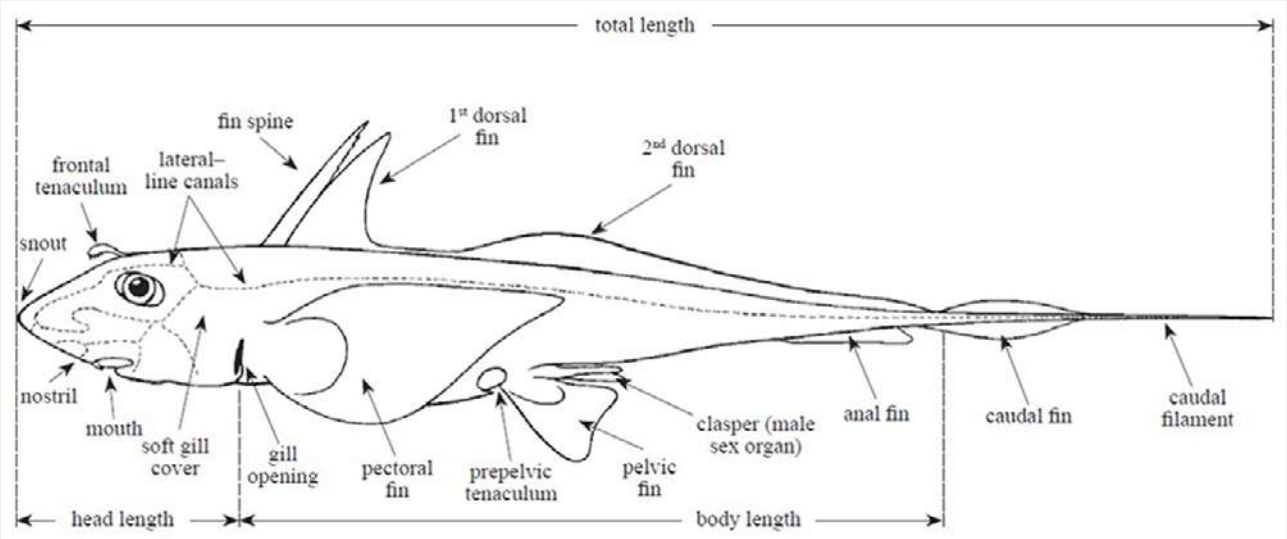
A demersal species that inhabits continental shelf and upper slopes from **50 to 300 m**, sometimes to **800 m** depth. It occurs on soft substrate sandy and muddy.
The sandy ray occupies cold and temperate waters.

Status : UICN: Critically Endangered
Similar species : *None*

III. 2.3 Chimaeras

III. 2.3.1 EXTERNAL TERMINOLOGY USED FOR CHIMAERAS

Lateral view of a typical Chimaera and ovisac



III. 2.3.2 GLOSSARY OF TECHNICAL TERMS

- **Body:** Can refer to a Chimaera, sometimes restricted to the trunk from the gill openings to the lower origin of caudal fin.

- **Caudal filament:** The long, thin, whip–like structure that extends behind the end of the caudal fin in chimaeras.

- **Deciduous:** Usually referring to denticles that are easily rubbed off, especially common in Chimaeras.

- **Dorsal–fin spine:** A small to large enameloid–covered, dentine–cored spine located on the anterior margins of one or both of the dorsal fins, found on bullhead sharks Heterodontiformes), many dogfish sharks, fossil (but not living) batoids, chimaeroids, but lost entirely or buried in the fin bases of other shark–like fishes.

- **Gill openings or slits:** In elasmobranchs, the paired rows of five to seven transverse openings on the sides or underside of the head for the discharge of water through the gills. Chimaeras have their four gill openings hidden by a soft gill cover and discharge water through a single external gill opening.

- **Head:** That part of a Chimaera fish from its snout tip to the gill slits.

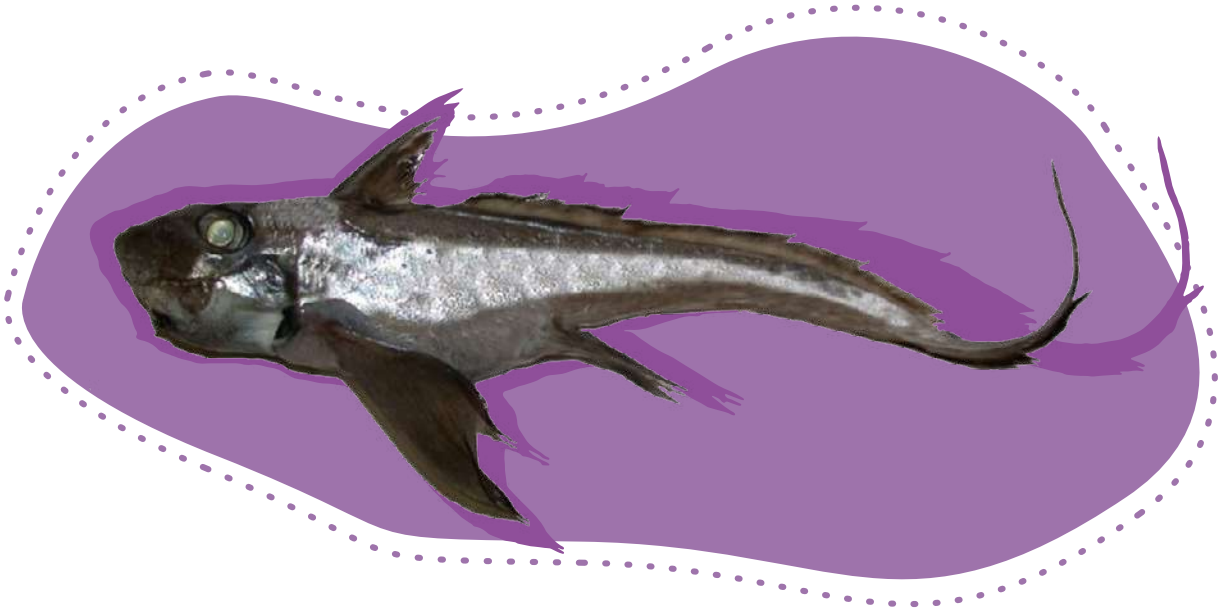
- **Holocephali:** The subclass Holocephali (from Greek holos, entire, and kephalos, head), the living chimaeras and their numerous fossil relatives, a major subdivision of the class Chondrichthyes. The name is in reference to the fusion of the upper jaws or palatoquadrates to the skull in all living species and in many but not all fossils.

- **Egg case:** A stiff–walled elongate shaped capsule that surround the eggs of the species, and is deposited by the female on the substrate. It is made of protein, which is a type of collagen that superficially resembles horn or keratin. As the egg travels from the ovaries into the oviducts and through the nidamental glands, the egg case is secreted around it and the egg is fertilized..

- **Tenaculum:** A unique reproductive organ found on adult male chimaera. The frontal tenaculum is located on the forehead and is curved with hook–like denticles and a knobat the end. The pelvic tenaculum is located just in front of the pelvic fins. All these structures are used during courtship and copulation in chimaeras.

Order CHIMAERIFORMES
Mediterranean families

Chimaeridae



1 family

Short and blunt snout ----------➤ ***Chimaeridae***

key to genus

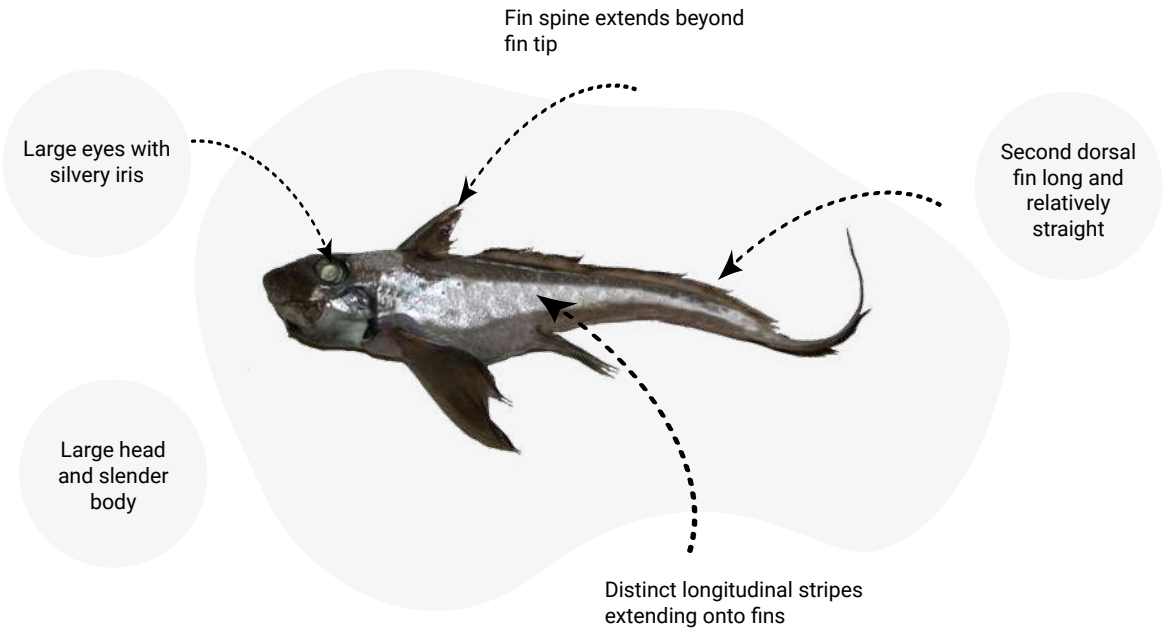
Anal fin present ----------➤ ***Chimaera***

Anal fin absent ----------➤ ***Hydrolagus***

Chimaeridae

Chimaera monstrosa Linnaeus, 1758

EN Rabbit fish **FR** Chimère commune **AR** ألسماك الخرافية



Description

Body elongated, slender, tapering from the head to the whiplike tail filament. A reddish-brown body coloration with light mottling and longitudinal stripes on the dorsal side of the trunk, extending onto paired and median fins.

Size and biology

Maximum: 100 cm.
Common: 40-70 cm.
Maturity: 53.5 cm (males), 67 cm (females).
Size at hatch: unknown
Oviparous, egg-capsules (17 cm long; 3 cm wide) deposited mainly in spring and summer. The embryos developing in about 9-12 months and hatch to 10 cm length.

Habitat

Bathydemersal to benthopelagic generally between **300 and 500 m** depth. Found in the upper continental slope. Usually found in deeper waters in southern latitudes, while making a summer inshore migration up to **40-100 m** in the northern areas.

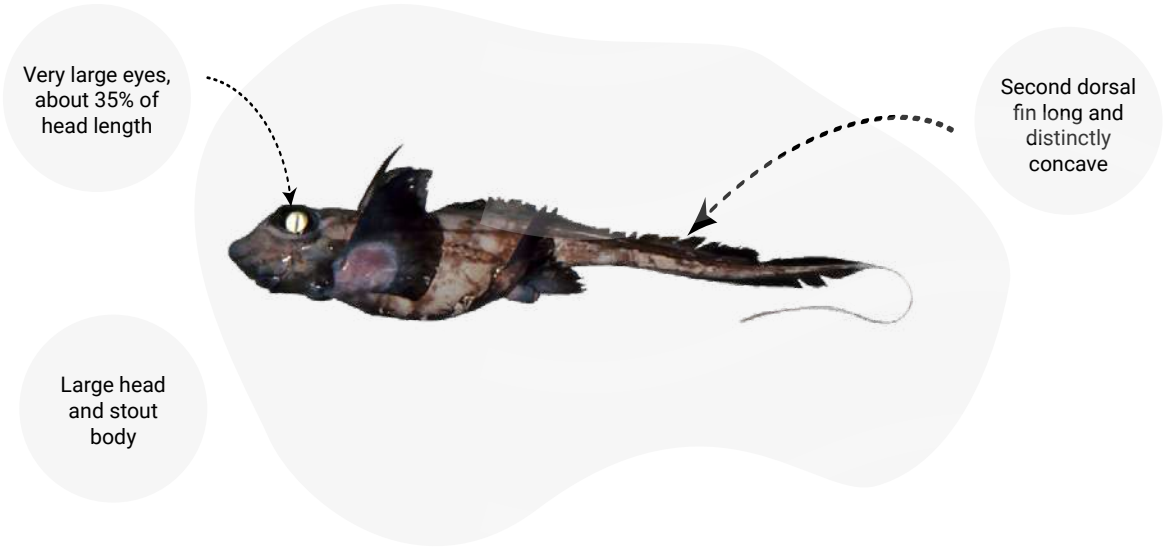
Status : UICN: Near Threatened

Similar species : *Hydrolagus mirabilis* (Page 138)

Chimaeridae

Hydrolagus mirabilis (Collett, 1904)

EN Large-eyed rabbitfish **FR** Chimère à gros yeux **AR** ألسماك الخرافية



Description

A very small *Hydrolagus* with the oral and preopecular lateral lines sharing a common branch, second dorsal fin concave, and a very long whip-like filamentous tail. Colour is a uniform light to dark brown or greyish, with darker fin edges.

Size and biology

Maximum: 80 cm.
Common: 40-60 cm.
Maturity: unknown
Size at hatch: <18 cm
Oviparous, but nothing else is known about its reproductive biology.

Habitat

The large-eyed Rabbitfish is a medium-sized deep-water chimaera moderately common on continental slopes. A poorly known chimaera with a depth range of **450 to 1933 m**, but generally occurrig below **800 m**.

Status : UICN: Least Concern

Similar species : *Chimaera monstrosa* (Page 137)

OVERVIEW ON **SHARK AND RAY FISHERIES IN TUNISIA**

IV-1 About Tunisian coasts

Tunisia, with 2,290 km of coastline, constitutes a transition zone between the eastern and western basins of the Mediterranean (APAL 2015). The Tunisian marine coasts include the FAO-GFCM Geographical Sub Areas (GSA) 12, 13 and 14 (**Figure IV-1**).

The northern coasts (GSA 12) are characterized by an irregular underwater morphology, with an alternation of hard and soft bottoms and a steeply sloping continental shelf. This diversity of biotopes favours higher biodiversity. Among the 327 fish species listed in Tunisian waters, 270 were recorded in the Northern coast (Bradai *et al.* 2004).

The eastern region of Tunisia (GSA 13), corresponding to the Gulf of Hammamet, begins with a narrow continental shelf (the -50 m isobath is located quite far from the coast), bordered by the Siculo-Tunisian channel and gradually widening from north to south of this region. The seabed of the area provides a transition between the northern and southern Tunisia (Azouz and Ben Othman 1975).

The GSA 14, corresponding *sensu lato* to the Gulf of Gabès represents the southern part of the Tunisian coast (Bradai *et al.* 1995). This region is characterized by a significant tidal phenomenon and an extended continental shelf. The presence of extensive seagrass meadows and easy access to fishing grounds rich in commercially valuable species make this region one of the most important marine fishing areas in Tunisia.

The area is a hotspot for marine biodiversity of regional importance. It constitutes a preferential habitat for several emblematic vertebrates: a wintering and feeding area for the Loggerhead Sea Turtle (*Caretta caretta*) (Bradai *et al.* 2009), a nursery for several species of elasmobranchs, some of which are threatened (Bradai *et al.* 2006; Enajjar *et al.* 2015; Bradai *et al.* 2018) and a favorable area to several fish such as the groupers and tunas. Cetaceans, especially bottlenose dolphin (*Tursiops truncatus*) and the fin whale (*Balaenoptera physalus*), are regularly encountered (Bradai 2000; Karaa *et al.* 2012).

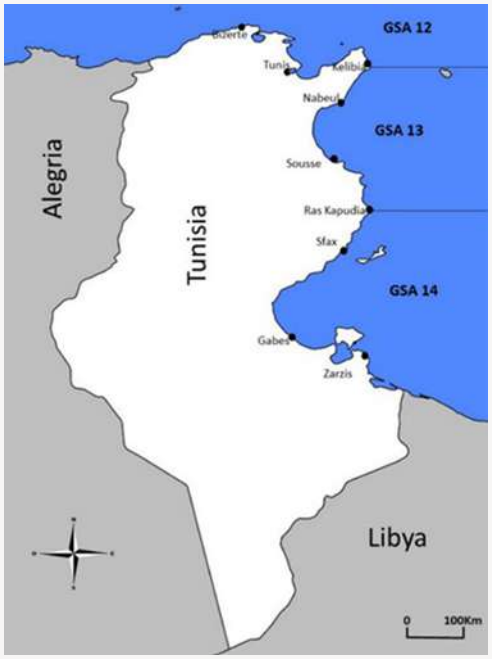


Figure IV-1. GFCM geographic subareas of Tunisian coasts

IV-2 Tunisian fisheries

-Port infrastructure

Forty-one fishing ports are officially reported in Tunisia: 10 deep fishing ports housing boats intended for trawling, tuna, light fishing and coastal fishing, 22 coastal ports including 4 medium ports that can accommodate small trawlers, sardine boats and localized coastal boats and 9 shelter dykes or landing sites. Their distribution is as follows:

- 10 ports in the north (GSA 12) ;
- 9 ports in the east (GSA 13) ;
- Around 22 ports in the Gulf of Gabès region (GSA 14).

-Fishing fleet

Active maritime fishing units in Tunisia, registered in 2020, counting about 13000 including 12000 Small-Scale Vessels with or without engine, 408 benthic trawlers and 423 purse seiners.

For trawlers, the largest concentration of units is in the Gulf of Gabès where the number of trawlers exceeds 61% of the national total. This concentration of the fishing fleet has led to the overexploitation of the fish stocks and contributes to by-catches of important emblematic species and, in general, to significant discards. This fishing activity, alongside several other problems such as pollution and Non-Indigenous Species (NIS), contributes considerably to the degradation of the ecosystem in this region, which despite everything, remains relatively in better health than several others Mediterranean marine regions, especially in the North (Béjaoui *et al.* 2019). Coastal fishing remains the most common type of fishing throughout the country, however the distribution pattern by region is quite similar to that of trawlers (60% of coastal boats are concentrated in the Gulf of Gabès). The sardine boats, whose total number in 2020 amounts to 423 units, are attached mainly to the ports of Kélibia, Mahdia, Teboulba and Gabès.

-Fishing gears

Several types of fishing are known in the north and center of Tunisia: trawl fishing, coastal fishing, fire fishing, lobster fishing, coral collecting and lagoon fishing). Trawling activity, which mainly targets pink shrimp, constitutes an important component in this region. Benthic fishing targets species with high commercial value

In the two sub-regions GSA 12 and GSA 13, coastal fishing is characterised by a diversification of fishing gear targeting pelagic species in particular swordfish with surface longlines and dolphinfish with non-sliding purse seines and demersal species with many kinds of nets and traps.

The ease of access to fishing areas and the abundance of species with high commercial value (shrimps, cuttlefish, octopus…), intended for export, have made the Gulf of Gabès the most frequented area by Tunisian maritime fishing boats.

Alongside benthic trawling and purse seine, many kinds of nets are used by small scale vessels: trammel nets 13,000 or 13,400, trammel nets 40,000 for shrimp, combined nets, bottom gillnets, shark nets, stones and octopus's pots, traps, bottom and surface longlines, fixed fisheries (the "cherfia", the "jemma"…).

Two main fishing campaigns for octopus (*Octopus vulgaris*) and the shrimp (Mainly *Penaeus kerathurus*) characterise the fishing activity in the Gulf of Gabès in which most of the fleet participates. The octopus campaign officially runs from 15 October to mid-May each year. The fishing gear used is the pot. The shrimp campaign generally takes place from April to July for coastal boats using 40,000 trammel nets. For trawlers whose engine power varies from 150 to 1300 HP, the shrimp campaign period is currently from April to June in depths exceeding 30 m.
Bottom longlining is used during end spring and summer to capture groupers mainly, and some other bony fish. Alongside these target species, elasmobranchs are captured accidentally. The hooks are numbered 04 or 05 for groupers and 13, 14 and 15 mainly for fishing other bony fish. The soak time is 1 to 3 hours and the bait used is generally *Sardinella*.

Trammel nets and gillnets are the most commonly used fishing gear. These fishing gears are very often set before sunset and raised after dawn. The length of the set nets depends on the size of the fishing boat. In the Gulf of Gabès, the trammel net is the most suitable net for fishing a large number of species.
In the Gulf of Gabès a small fleet seasonally uses special gillnets for elasmobranchs:

- Garracia and Kallabia, respectively called from the local name of the guitarfish (Guirs) and of the sandbar shark (Kalb bhar): it is a mesh net often measuring 16 to 17 cm. The dimensions of each piece of the net are generally 50 m long by 3 m high. This type of net targets, as suggested by its local name, the sandbar shark and the guitarfish.
- Gattatia, its name comes from the local name of smoothhounds "Gtat": it is a net with a mesh side of approximately 7 to 8 cm. The dimensions of each piece of the net are generally 50 m long by 3 m high. This type of net targets the two smoothhounds, *Mustelus mustelus* and *M. punctulatus*.

The bottom trawl is used in the Gulf of Gabès to fish mainly shrimps, cuttlefish and benthic fishes.

IV-3 Diversity and Status of elasmobranchs

64 elasmobranch species occur in Tunisia: 35 sharks belonging to 16 families and 29 batoids belonging to 9 families (**See checklist below**). This number reflects the high species richness of elasmobranchs along the Tunisian coasts, representing 74.4% of all species recorded in the Mediterranean Sea.

Among elasmobranchs species occurring in Tunisian coast, only three were very common in all sub-areas, being frequently caught throughout the region along the year: the smooth-hound (*Mustelus mustelus*), the common torpedo (*Torpedo torpedo*) and the thornback ray (*Raja clavata*). Four species were common, being captured in more or less abundant quantities in at least one sector of the region and during a period of the year: the shortfin mako (*Isurus oxyrinchus*), the marbled electric ray (*Torpedo marmorata*), the brown ray (*Raja miraletus*), the round stingray (*Taeniura grabatus*).
The southern waters of Tunisia were characterized by the presence of costal species: the blackchin guitarfish (*Glaucostegus cemiculus*), the common guitarfish (*Rhinobatos rhinobatos*), the sandbar shark (*Carcharhinus plumbeus*) and the spiny butterfly ray (*Gymnura altavela*), whereas, deep species were found mainly in northern zone: the velvet belly (*Etmopterus spinax*), the kitefin shark (*Dalatias licha*), and the little gulper shark (*Centrophorus cf. uyato*).

According to the IUCN Red List, more than 52 % of elasmobranch species observed in Tunisian waters are threatened (Critically Endangered, Endangered, and Threatened). Thirteen (13) species are data deficient, not evaluated, or not applicable.

Species listed in Annex II of the SPA/BD Protocol benefit from strict protection measures, including the prohibition of capture, killing, disturbance, possession, and trade. In addition, the GFCM legally prohibits the fishing of these species in the Mediterranean through specific binding recommendations. According to the latest amendments to Annexes II and III of the SPA/BD Protocol (decision IG.27/10), three species and one genus are set for transfer from Annex III to Annex II, and two additional species are set for inclusion in Annex II by the end of 2025.

Therefore, twenty-eight out of thirty-six species listed in Annex II of the SPA/BD Protocol— which will be subject to strict protection —are present in Tunisian waters (77.78 %).

-Elasmobranchs fishing

Tunisian coasts (Central Mediterranean Sea) are characterized by their sharks and ray's diversity (Bradai *et al.* 2004 and Bradai *et al.* 2012). The region is known to be an important habitat for this taxon and a nursery for many species such as the sandbar shark *(Carcharhinus plumbeus)*
(Bradai *et al.* 2005 ; Saidi 2008 and Enajjar *et al.* 2015).

Tunisian cartilaginous fish, as in all Mediterranean Sea, are subject to an increasing pressure due to the anthropogenic activities mainly fisheries (Bradai *et al.* 2006) has led to a decline of several elasmobranch populations (Bradai *et al.* 2006). Nevertheless, investigation on management and conservation on elasmobranch have received little attention.

-Elasmobranchs Landing

In Tunisia, elasmobranch species are mainly caught as bycatch. Nevertheless, some species such as the sandbar shark and the smooth-hound are targeted by a small artisanal fishery mainly in the southern coast of the country during the summer (Chouikhi *et al.* 2013). This fishery uses a specific gill nets locally called "Garracia" and "Gattatia", above described.

Elasmobranchs represent an average of about 1,5 % of the national landing, a mean of 2350 tons 'year is landed during the period 2000-2022. The production shows an increase trend, although some exceptional decreases were noted during 2012 and 2017 (**Figure IV-2**).

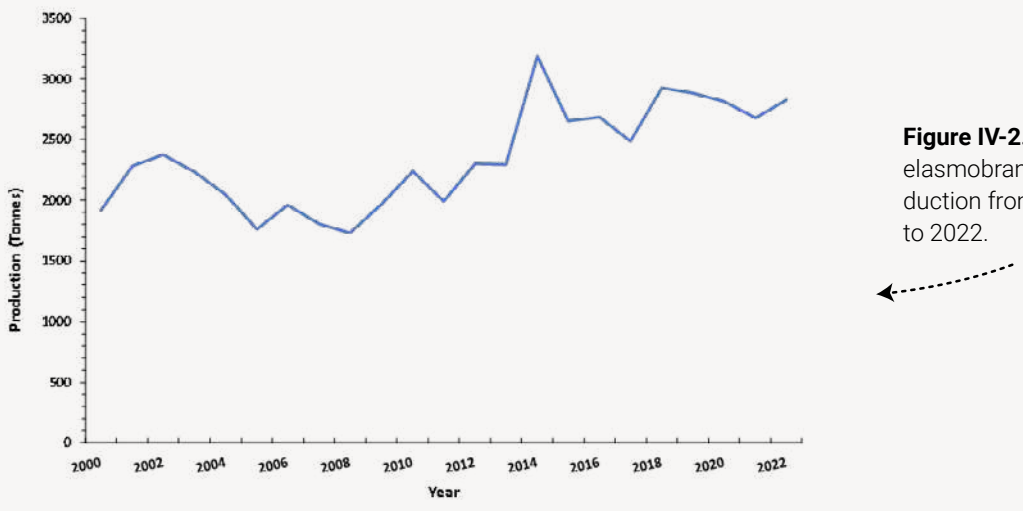


Figure IV-2. Tunisian elasmobranchs production from 2000 to 2022.

The Gulf of Gabès region (GSA 14) is known to be the most important area for sharks and rays in Tunisia, contributing by more than 60% in the landing of elasmobranchs (Bradai *et al.* 2006).
Along the Tunisian costs, elasmobranchs are landed mainly by small-scale vessel using gillnets, trammel nets and longlines followed by bottom trawl (**Figure IV-3**).

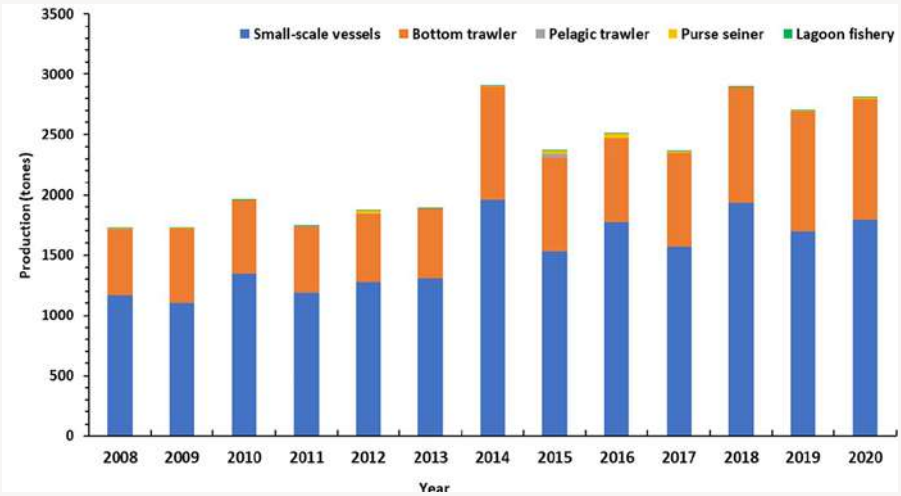


Figure IV-3. Tunisian elasmobranchs production by fishing gear according to GDFA statistics (Enajjar *et al.* 2022)

IV-4 Bycatch of elasmobranchs

In Tunisia, elasmobranchs are caught accidentally by all fishing gear (trawl, trammel net, longline, purse seine…) and as a targeted species during the summer by specific gillnets in the southern coast (GSA 14).
Overall, for Tunisia and at the level of all GSAs and among the species considered vulnerable according to annex 1a and 1b of the Bycatch protocol developed within the framework of the MedBycatch project (FAO, 2019), elasmobranchs constitute the most captured group compared to the total number of individuals of other vulnerable taxa captured with a minimum of 93.77% in the Gulf of Gabès and a maximum recorded at GSA 12 of 99.33% (**Figure IV-4**).

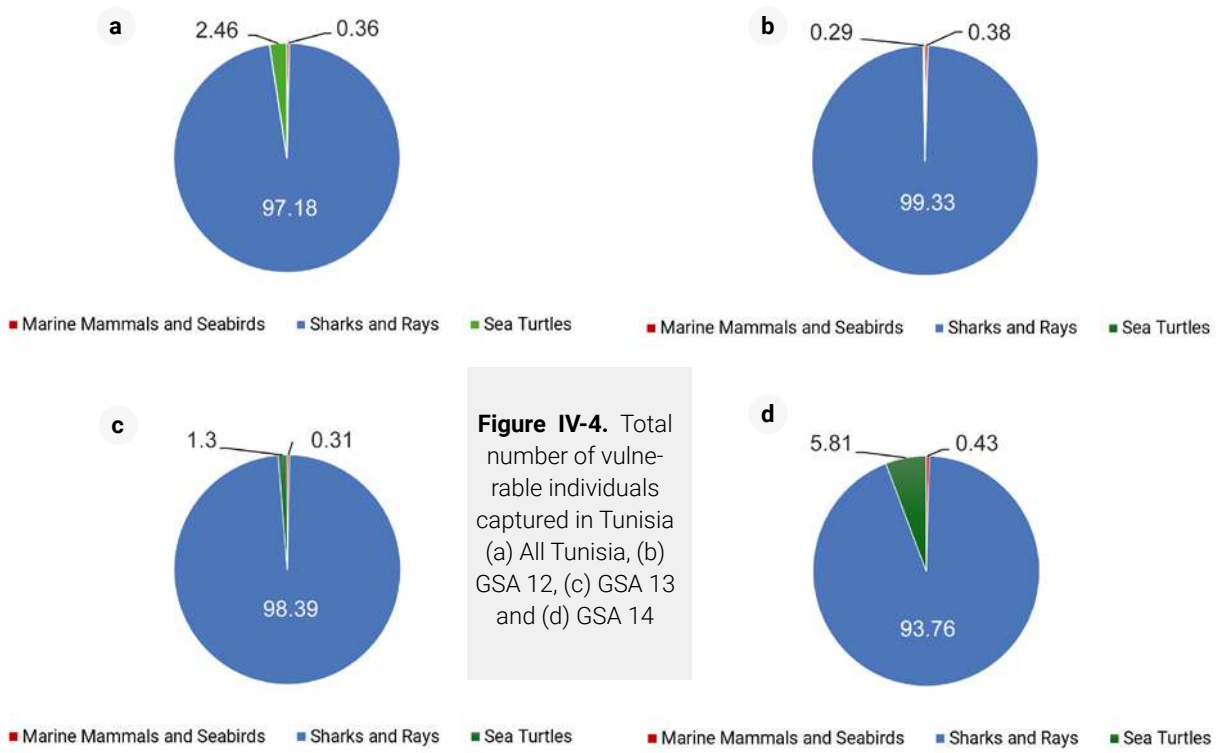


Figure IV-4. Total number of vulnerable individuals captured in Tunisia (a) All Tunisia, (b) GSA 12, (c) GSA 13 and (d) GSA 14

More than 22 vulnerable species of elasmobranchs were registered in the captures. Species of families Dasyatidae and Rajidae are the most represented in the bycatch of elasmobranchs in the three subregions. In addition to representatives of these two families, guitarfish and the sandbar sharks are very represented in the captures in GSA 14 (UNEP/MAP-SPA/RAC, AAO/BirdLife in Tunisia, INSTM, DGPAq, 2022). However, the density map of elasmobranchs in Sicily Canal and Tunisian plateau (**Figure IV-5**)

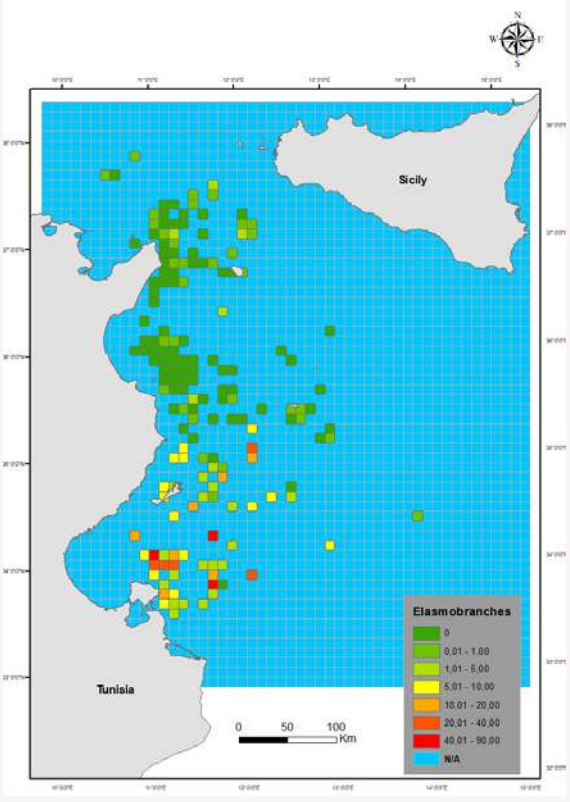


Figure IV-5. Catch per fishing day of elasmobranchs per 10 km by 10 km raster (Strait of Sicily and Tunisian plateau) (Bradai *et al.* 2022)

shows the importance of elasmobranchs in the Gulf of Gabès region (GSA 14). It is to note that some species are more abundant in this region (**Figure IV-6**).
studies show the importance of the bycatch mainly in the Gulf of Gabès:

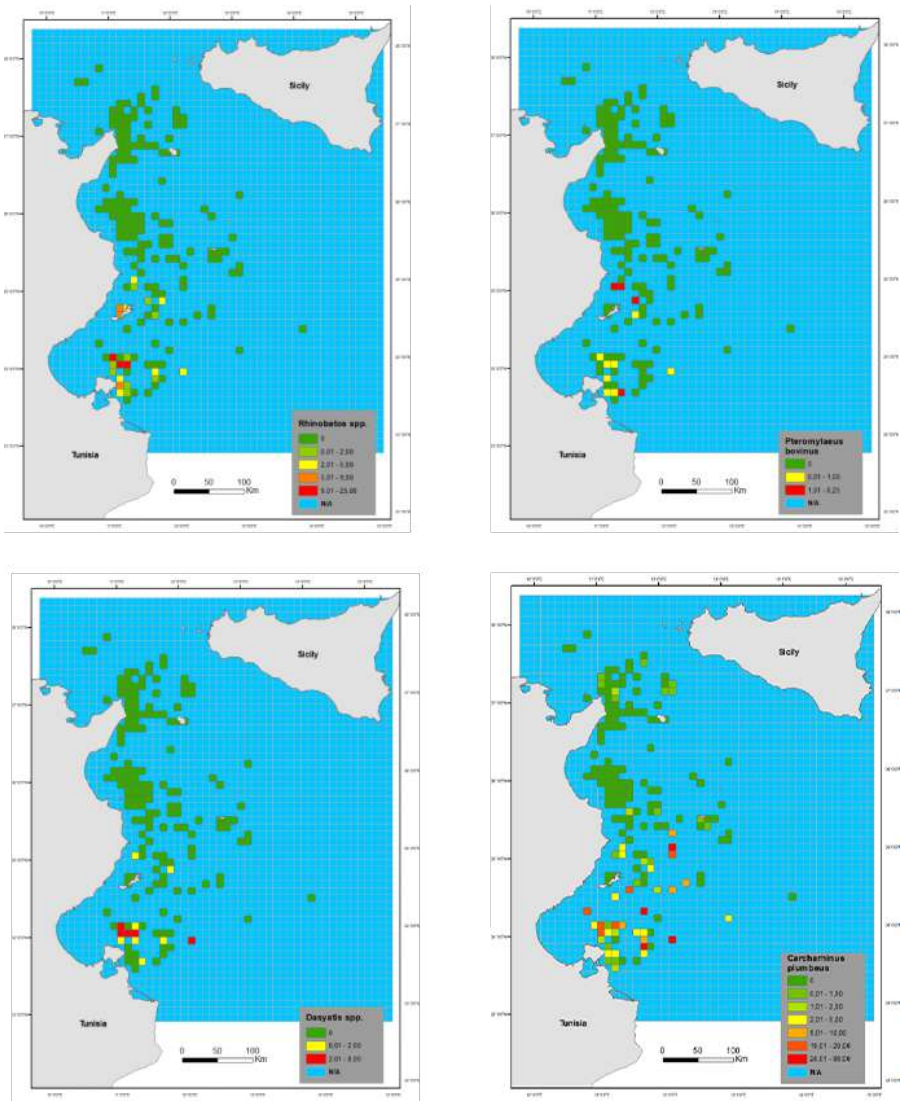


Figure IV-6. Catch per fishing day of some elasmobranchs per 10 km by 10 km raster (Strait of Sicily and Tunisian plateau): *Rhinobatos spp., Pteromylaeus bovinus, Dasyatis spp. and Carcharhinus plumbeus*

- Longline

Results show that of the bottom longline targeting groupers in Zarzis area (South of the Gulf of Gabès) capture a lot of elasmobranchs representing about 46% of the production. The most caught species are: the blackchin guitarfish (*Glaucostegus cemiculus*), the hound sharks (*Mustelus spp.*), the Shortnose spurdog (*Squalus megalops*), the sandbar shark (*Carcharhinus plumbeus*) and the stingray (*Dasyatis spp.*) (Bradai *et al.* 2016; Enajjar *et al.* 2018).
Elasmobranchs represent more than 90 % of capture of pelagic longline in the southern coast of Tunisia.

Guitarfishes

Two species are known in Tunisia; the blackchin guitarfish *Glaucostegus cemiculus* and the common guitarfish *Rhinobatos rhinobatos*, both endangered (IUCN Red list) and prohibited to fish and to sale by the GFCM.
The two species are caught as bycatch mainly by trawl and longline and targeted in summer in GSA 14 by a special gillnet called "garracia". The last gear captures also a high number of sea turtles.
Spatiotemporal mitigation trials (mainly depth) in GSA 14 show a significant reduction in bycatch of guitarfishes when depth increases (for bottom trawl). For bottom longline, no capture of guitarfishes was recorded beyond 50 m depth.
The reduction of the soak time of "Garracia" reduces mortality of sea turtles but this gillnet should be banned.

9 elasmobranch species were captured by this gear (sandbar shark, spinner shark, shortfin mako shark, smooth hound, pelagic stingray, blackchin guitarfish, bull rays, round stingray and thornback ray). The captures were dominated by the sandbar shark accounting about 82.5 % of capture (Bradai *et al.* 2016 ; Enajjar *et al.* 2018 and Saidi *et al.* 2019).

-Shrimp's trammel

The shrimp's trammel nets used in Sfax region (GSA 14) from May to July capture, as by-catch, 7 species of elasmobranchs (*Mustelus mustelus, M. punctulatus, Dasyatis pastinaca, D. marmorata, Torpedo torpedo, Carcharhinus plumbeus and C. brevipinna*). The smoothhound sharks Mustelus spp. is by far the most caught species (88.9%) reflecting their abundance in the area. Captures were composed essentially of neonates and juvenile sharks, while the batoids were dominated by mature individuals (Saidi *et al.* 2016).

-Bottom trawlers

Elasmobranchs are commonly caught as by-catch by bottom trawlers in the Gulf of Gabès (GSA 14). A total of 31 elasmobranch species was recorded in trawl captures during 2009 (14 sharks and 17 batoides). Elasmobranch bycatch averaged 5.42% of the total landing (1.7% sharks and 3.7% batoides). The CPUE was estimated at 0.8 Kg/haul for all elasmobranchs. Specimens caught were mainly juveniles (Hamdaoui 2009).

-Purse seine

The purse seine captures few species and small quantities of elasmobranch especially pelagic sharks and rays. *Mobula mobular, Isurus oxyrinchus* and *Alopias vulpinus* were the most reported species.

Giant devil ray *Mobula mobular*

Information on the capture of this species was scarce in the past. Since the 1990s, captures have increased, with 1–3 individuals reported each year, mainly from purse seines and longlines. In March 2015, April 2019, and February 2024, 5, 9, and 7 specimens were landed in Kelibia (GSA 13) and subsequently marketed.
This species is among the least fertile sharks in the world, usually producing only one pup every two to three years. It is highly sensitive to purse seine fishing.
It is listed as Critically Endangered (IUCN) and its capture and sale are banned by the GFCM. Following captures in 2015 and 2019, Tunisia drafted a decree to protect the species in line with the relevant GFCM recommendation, but this decree has not yet been signed.

-Gillnets for elasmobranchs

A little fleet of small-scale vessel uses, in spring and summer in the south of the Gulf of Gabès, specific gillnets called locally "Gattatia" and "Garracia". "Gattatia" gillnet targets mainly adults of the blackchin guitarfish, the smouth-hound shark and the sandbar shark and "Garracia" gillnet targets Blackchin guitarfish and sandbar shark. Gillnets are in polyamide monofilament netting with a big size stretched mesh (Echouikhi *et al.* 2013).

IV-5 Critical habitats of elasmobranchs

Critical habitats should be identified for conservation purposes. In fact, a big lack of knowledge on critical habitats for this group was noted in the Mediterranean. However, some mapping of nursery areas and spawning ground for some species are being carried out by some countries (Bradai *et al.* 2012). The Tunisian waters provide a nursery area for the white shark *Carcharodon carcharias* (centre of Tunisia) and for the sandbar shark *Carcharinus plumbeus* in the Gulf of Gabès (Bradai *et al.* 2005). This area seems to be also a nursery for many other elasmobranchs (Saidi 2008; Enajjar 2009 and Enajjar *et al.* 2015). *Carcharhinus plumbeus, Mustelus mustelus, Rhinobatos rhinobatos* and *Glaucostegus cemiculus* use the area as a year- round primary and secondary nursery, with juveniles remaining in it up to the size at maturity (Bradai *et al.* 2005; Enajjar *et al.* 2015).
However, more knowledge on the presence of juveniles, gravid females, and other biological parameters (e.g. size at first maturity) is urgently needed to identify potential nursery areas and to draw solid conclusions on which zones should be protected, possibly through the establishment of MPAs, given that the Gulf of Gabès is the most heavily fished area in Tunisian waters.

Great white shark
Carcharodon carcharias

Records of the white shark in Tunisia have increased over time, mainly due to improved observation efforts and greater capacity for species identification. Between 2001 and 2022, the annual number of recorded individuals ranged from 1 to 25.
Over more than 50 years of monitoring, all life stages have been observed—newborns, juveniles, subadults, and adults. Juveniles account for more than 50% of the individuals recorded. Three pregnant females were also documented, carrying 2, 4, and 8 fetuses respectively.
These findings suggest that the Tunisian coast constitutes an essential habitat for the Critically Endangered great white shark. The species therefore requires strong protection in Tunisia.

IV-6 Legislation

For the protection of elasmobranch, Tunisia ratified many international conventions dealing with cartilaginous fishes and biodiversity and adopted the GFCM recommendations on the management and conservation of sharks and rays in the GFCM area of application (Rec. GFCM/36/2012/3 and Rec. GFCM/42/2018/2).
The protection of elasmobranch species is ensured at national level by the decree n° 94-13 on July 31, 1994 and the decree of September 28, 1995 of the Minister of Agriculture regulating the practice of fishing activities. The former one is currently being amended to mainly consider the conventions ratified by Tunisia and the recommendations of the CGPM (Enajjar *et al.* 2022).

CHECK-LIST OF TUNISIAN CONDRICHTHYANS

General data on the fish fauna of Tunisia are relatively abundant. The first inventory was established by Vinciguerra (1884) and then, in the first quarter of the 20th century, other exploration campaigns have succeeded (De Fages and Ponzevera 1903; Ponzevera 1910; Pruvot 1921; Le Danois 1925; Gruvel 1926). From 1928 to 1948, Heldt began studying several groups of fish (Heldt, 1932 and 1948). Between 1960 and 2000, numerous exploration campaigns were conducted along the north and east coasts, providing a clearer picture of the fish fauna in trawled areas: between 20 and 300 m depth in the south, and from 20 down to 500–800 m depth on the north coast (Maurin 1962; Maurin & Bonnet 1968; Lubet & Azouz 1969; Ktari-Chakroun & Azouz 1971; Ben Othman 1971a, 1971b, 1973; Azouz 1971 1974; Quignard & Ben Othman 1978; Bonnet 1980). Historically, cartilaginous fishes were often overlooked in studies of Tunisian ichthyofauna. Interest increased during the 1970s and 1980s, and since 2000 research has become more systematic and rigorous. According to the last comprehensive study of the ichthyofauna of Tunisia (Bradai *et al.* 2004), taking into account data available in 2002, Tunisian cartilaginous fish biodiversity can be summarized as follows: 60 species of Elasmobranchii (32 sharks and 28 batoids) belonging to 20 families and one species of Holocephali (Chimaeridae Family).

The present work updates this assessment, incorporating numerous new records of fishes, alongside research on fish biology and ecology published since 2002. Observations from fieldwork conducted during this period have been incorporated. The presence of certain species is discussed in light of recent taxonomic and genetic studies and non-valid species have been removed.

The species distribution along the Tunisian coasts is presented according to three Geographical subareas (GSA) defined by the General Fisheries Commission for the Mediterranean - GFCM: (1) GSA 12 (the North of Tunisia from the Algerian border to Kelibia) (2) GSA 13 (the Central sector from Kelibia to Ras Kapudia (3) GSA 14 (the south or the gulf of Gabès sensu lato from Ras Kapudia to the Libyan border. Species are further classified into four categories: very common (species caught very frequently throughout the region throughout the year), common (species captured in more or less abundant quantities in at least 1 sector of the region and during a period of the year), rare (species observed in the region but in a restricted group or in isolated specimens) and very rare (species observed accidentally in the region, cited no more than three times in the literature). Data on the biology of reproduction are given when available.

A total of 65 species of cartilaginous fishes: 64 Elasmobranchii (35 sharks and 29 batoids) belonging to 25 families (16 for sharks and 9 for batoids), 36 genera (23 for sharks and 13 for batoids) and 9 orders (respectively 5 and 4) and 01 Holocephali (1 Family and 1 Genera) are listed.

Chondrichthyes is a class that contains sharks, skates, rays and chimeras. They are jawed vertebrates (Gnathostomata). The class can be divided into two subclasses; Elasmobranchii (sharks, rays, skates, and sawfish) and Holocephali (chimaeras).

GNATHOSTOMATA CHONDRICHTHIOMORPHI

CLASS CHONDRICHTHYES

SUBCLASS ELASMOBRANCHII

SHARKS

Order: Hexanchiformes

Family Hexanchidae

Heptranchias perlo (Bonnaterre, 1788)

- **GSA 12** : Maurin 1968 ; Quignard & Capapé, 1971 ; Capapé 1974a and 1987 ; Rafrafi-Nouira *et al.* 2015.
- **GSA 13** : Enajjar *et al.* 2022
- **GSA 14** : Bradai 2000 ; Bradai *et al.* 2002 ; Bradai *et al.* 2004 ; Bradai *et al.* 2017 ; Saidi *et al.* 2023 ; Nuez *et al.* 2023
- **Occurrence**: Rare
- **Data on reproduction: Size maturity:** : ♂ 81cm TL/ ♀:85 cm TL / Fecundity: 2-8

Hexanchus griseus (Bonnaterre, 1788)

- **GSA 12** : Rafrafi-Nouira *et al.* 2015 ; Enajjar *et al.* 2022.
- **GSA 13** : Enajjar *et al.* 2022
- **GSA 14** : Ktari-Chakroun & Azouz 1971 ; Azouz 1971 ; Capapé 1987, Capapé *et al.* 2003,
- Nuez *et al.*2023
- **Occurrence**: Common in the GSA 13 and Rare elsewhere

Order : Lamniformes

Family Odontaspididae

Odontaspis ferox (Risso, 1810)

- **GSA 12** : Capapé 1975
- **GSA 13** : Ben Amor *et al.* 2020 ; Enajjar *et al.* 2022
- **Occurrence** : Very rare

Carcharias taurus Rafinesque,1810

- **GSA 12** : Capapé 1974 et 1987
- **Occurrence** : Very rare

Family Alopiidae

Alopias vulpinus (Bonnaterre, 1788)

- **N** : Quignard et Capapé 1971 ; Hattour and Nakamura 2004 ; Enajjar *et al.* 2022
- **C** : Quignard et Capapé 1971
- **S** : Quignard et Capapé 1971 ; Bradai *et al*. 1992 ; Bradai *et al.* 2002 ; Bradai *et al.* 2004 ; Enajjar *et al.* 2022
- **Occurrence**: Rare
- **Data on reproduction: Aplacental ovoviviparous / Size maturity**: ♂:81cm TL/♀ :85 cm TL / Fecundity: 2-8.

Alopias superciliosus Low, 1841

- **GSA 13** : Bouzidi *et al.* 2023 ; Enajjar *et al.* 2022.
- **Occurrence**: Very rare

Family Cethorinidae

Cethorinus maximus (Gunnerus, 1765)

- **GSA 12** : Chakroun 1966 ; Najaï 1980 ; Raîs & Baccar 1998 ; Enajjar *et al.* 2019 ; Enajjar *et al.* 2022.
- **GSA 13** : Bradai *et al.* 1992 ; Enajjar *et al.* 2019 ;
- **GSA 14** : Bradai *et al.* 1992 ; Capapé *et al.* 2005a; Bradai *et al.* 2002 ; Mancusi *et al.* 2005, Enajjar *et al.* 2019 ; Enajjar *et al.* 2022.
- **Occurrence** : Very rare

Family Lamnidae

Isurus oxyrinchus (Rafinesque, 1810)

- **GSA 12** : Vinciguerra 1882, 1983 et 1884 ; Postel 1958 ; Enajjar *et al.* 2022.
- **GSA 13** : Enajjar *et al.* 2022
- **GSA 14** : Quignard & Capapé 1972 ; Enajjar *et al.* 2022.
- **Occurrence** : Common

Carcharodon carcharias (Linnaeus, 1758)

- **GSA 12** : Postel 1958 ; Ben Mustapha 1966, Bradai and Saidi 2013; Rafrafi-Nouira *et al.* 2015; Enajjar *et al.* 2022.
- **GSA 13** : Bradai and Saidi 2013 ; Enajjar *et al.* 2022.
- **GSA 14** : Quignard & Capapé, 1972 ; Zammouri-Langar 1992, Bradai *et al.* 2002 ; Saidi *et al.* 2005a ; Bradai and Saidi 2013 ; Bradai *et al.* 2017 ; Saidi *et al.* 2023 ; Enajjar *et al.* 2022.
- **Occurrence** : Rare

Order: Charcharhiniformes

Family Scyliorhinidae

Scyliorhinus canicula (Linnaeus, 1758)

- **GSA 12** : Quignard & Capapé 1971 ; Enajjar *et al.* 2022.
- **GSA 13** : Quignard & Capapé 1971. Saidi *et al.* 2004 ; Enajjar *et al.* 2022.
- **GSA 14** : Quignard & Capapé 1971 ; Bradai *et al.* 2002 ; Saidi *et al.* 2004 ; Saidi *et al.* 2023; Enajjar *et al.* 2022.
- **Occurrence**: Very common in GSA 12 and 13, Common in GSA 14
- **Data on reproduction**: Size maturity: ♂:35-40 cm TL/♀ :35 cm TL / Fecundity: 38-190

Scyliorhinus stellaris (Linnaeus, 1758)

- **GSA 12** : Quignard & Capapé 1971 ; Bradai *et al*. 2004 ; Enajjar *et al.* 2022.
- **GSA 13** : Quignard & Capapé 1971 ; Bradai *et al*. 2004 ; Enajjar *et al.* 2022.
- **GSA 14** : Quignard & Capapé 1971 ; Bradai *et al*. 2002 ; Bradai *et al.* 2004 ; Enajjar *et al.* 2022.
- **Occurrence**: Rare in GSA 12 and 13, Very rare in GSA 14
- **Data on reproduction**: Size maturity: ♂:70 cm TL/♀ :82 cm TL / Size at birth: / Fecundity: 70-109

Family Pentanchidae

Galeus melastomus Rafinesque, 1809

- **GSA 12** : Bourgois-Farina 1961 ; Davidson 1963 ; Ben Mustapha 1966 ; Quignard & Capapé 1971; Enajjar *et al.* 2022.
- **GSA 13** : Bradai *et al.* 2000; Enajjar *et al.* 2022.
- **GSA 14** : Enajjar *et al.* 2022.
- **Occurrence**: Common in GSA 12 and 13, Rare in GSA 14
- **Data on reproduction**: Size maturity: ♂:36 cm TL/♀ :49 cm TL / Fecundity: 15-29

Family Triakidae

Mustelus mustelus (Linnaeus, 1758)

- **GSA 12** : Vinciguerra 1882,1883 and 1884 ; Ponzeverra 1910 ; Postel 1952, 1956 et 1958 ; Bourgois-Farina 1961 ; Ben Mustapha 1966 ; Lubet & Azouz 1969 ; FAO 1970 ; Quignard & Capapé 1971 ; Ben Othmen 1973 ; Bradai & Bouain 1994 ; Enajjar *et al.* 2022.
- **GSA 13** : Vinciguerra 1882,1883 and 1884 ; Ponzeverra 1910 ; Postel 1952, 1956 et 1958 ; Bourgois-Farina 1961 ; Ben Mustapha 1966 ; Lubet & Azouz 1969 ; FAO 1970 ; Quignard & Capapé 1971 ; Ben Othmen 1973 ; Bradai & Bouain 1994 ; Enajjar *et al.* 2022.
- **GSA 14** : Vinciguerra 1882,1883 et 1884 ; Ponzeverra 1910 ; Postel 1952, 1956 et 1958 ; Bourgois-Farina 1961 ; Ben Mustapha 1966 ; Lubet & Azouz 1969 ; FAO 1970 ; Quignard & Capapé 1971 ; Ben Othmen 1973 ; Bradai & Bouain 1994 ; Bradai *et al.* 2002 ; Saidi *et al.* 2008, 2009 and 2016 ; Echwikhi *et al.* 2013 and 2014 ; Bradai *et al.* 2017 ; Saidi *et al.* 2023; Enajjar *et al.* 2022.

- **Occurrence** : Very common
- **Data on reproduction**: Size maturity: ♂:97-108 cm TL/♀ :118-123 cm TL / Size at birth: 30-42 cm/ Fecundity: 4-18

Mustelus punctulatus Risso, 1826

- **GSA 12** : Quignard & Capapé 1972 ; Enajjar *et al.* 2022.
- **GSA 13** : Enajjar *et al.* 2022
- **GSA 14** : Saidi *et al.* 2009 ; Bradai *et al.* 2017 ; Saidi *et al.* 2023; ; Enajjar *et al.* 2022.
- **Occurrence** : Common
- **IUCN status**: VU
- **Data on reproduction**: Size maturity: ♂:81cm TL/♀ :87 cmTL / Size at birth: 40-43 cm/ Fecundity: 5-30

Mustelus asterias Cloquet, 1821

- **GSA 12** : Bourgois-Farina 1961 ; Davidson 1963 ; Ben Mustapha 1966 ; Quignard & Capapé 1971
- **GSA 13** : Enajjar *et al.* 2022.
- **GSA 14** : Bradai 2000 ; Bradai *et al.* 2002 ; Bradai *et al.* 2004 ; Enajjar *et al.* 2022.
- **Occurrence** : Rare
- **Reproduction**: Size maturity: ♂:75 cm TL/♀ :96 cm TL / Size at birth: 28-32 cm/ Fecundity: 10-35

Galeorhinus galeus (Linnaeus, 1758)

- **GSA 12** : Lubet & Azouz 1969 ; Quignard & Capapé 1971 ; Azouz 1971 ; Capapé & Mellinger 1988; Capapé *et al.* 2005b; Enajjar *et al.* 2022.
- **GSA 13** : Quignard & Capapé 1971; Enajjar *et al.* 2022.
- **GSA 14** : Le Danois 1925 ; Quignard & Capapé 1971 ; Ben Othmen 1973 ; Capapé & Mellinger 1988; Bradai *et al.* 2002 ; Capapé *et al.* 2005b ; Enajjar *et al.* 2022.
- **Occurrence** : Rare
- **Data on reproduction**: Size maturity: ♂:126 cm TL/♀ :140 cm TL / Size at birth: 24-32 cm/ Fecundity: 8-30

Family Carcharhinidae

Prionace glauca (Linnaeus, 1758)

- **GSA 12** : Azouz 1971 ; Capapé 1987; Rafrafi-Nouira *et al.* 2015 ; Enajjar *et al.* 2022.
- **GSA 13** : Capapé 1987 ; Quignard & Capapé 1971; Enajjar *et al.* 2022.
- **GSA 14**: Capapé 1987; Ktari - Chakroun & Azouz 1971; Azouz 1971; Bradai *et al.* 2002; Bradai *et al.* 2004; Enajjar *et al.* 2022.
- **Occurrence** : Common in GSAs 12 and 13, Rare in GSA 14

Carcharinus plumbeus (Nardo, 1827)

- **GSA 12** : Postel 1956 ; Quignard & Capapé 1971 ; Rafrafi-Nouira *et al.* 2015 ; Enajjar *et al.* 2022.
- **GSA 13** : Quignard & Capapé 1971 ; Enajjar *et al.* 2022.
- **GSA 14** : Pietschman 1906 ; Quignard & Capapé 1971 ; Capapé 1984 ; Bradai *et al.* 2002 ; Bradai *et al.* 2005 ; Saidi *et al.* 2005b ; Saidi *et al.* 2007 ; Echwikhi *et al.* 2013 ; Bradai *et al.* 2017 ; Saidi *et al.* 2023; Enajjar *et al.* 2022.
- **Occurrence** : Rare in GSA 12, Common in GSA 13 and Very common in GSA 14
- **Data on reproduction**: Size maturity: ♂:160 cm TL/♀ :172 cm TL / Size at birth: 50-65 cm/
- **Fecundity**: 7

Notes: The sandbar shark is the first recorded and the most commonly landed throughout the year in the gulf of Gabès. Investigations enabled us to find near-term females and small free swimming specimens. The area is a nursery for the species.

Carcharhinus melanopterus (Quoy & Gaimard, 1824)

- **GSA 14** : Quignard & Capapé 1971 ; Capapé 1987. ; Bradai *et al.* 2004 ; Bradai *et al.* 2002 ; Enajjar *et al.* 2022.
- **Occurrence** : Very rare

Note: The species is very rare in the region where it was first reported by Quignard & Capapé (1971). It is an Indo-Pacific species present in the Red Sea (Gohar & Mazhar 1964) and which seems to have colonised the south-eastern Mediterranean. Branstetter (1984) and Fischer *et al.* (1987) consider its presence doubtful in the western basin. The capture of a 1-meter-long male specimen in the Gulf of Gabès, in December 1993, confirms previous observations of the blacktip shark in the south from Tunisia. The presence of this species is questionable according to Serena *et al.* (2020).

Carcharinus limbatus (Valenciennes, 1841)

- **GSA 12** : Capapé 1975.
- **GSA 14** : Capapé 1974 ; Bradai *et al.* 2002 ; Enajjar *et al.* 2022.
- **Occurrence** : Very rare
- **Data on reproduction**: Size maturity: ♂:167 cm TL/♀ :178 cm TL / Size at birth: 61-65 cm/
- **Fecundity:** 6-8

Carcharinus brevipinna (Müller & Henle, 1839)

- **GSA 12** : Enajjar *et al.* 2022
- **GSA 13** : Enajjar *et al.* 2022
- **GSA 14** : Quignard & Capapé 1971 ; Capapé 1987, Bradai *et al.* 2002 and 2004 ; Bradai *et al.* 2017; Saidi *et al.* 2023; Enajjar *et al.* 2022.
- **Occurrence** : Rare in GSAs 12 and 13 and Common in GSA 14
- **Data on reproduction**: Size maturity: ♂:172 cm TL/♀ :176 cm TL / Size at birth: 61-69 cm/
- **Fecundity**: 6-10

Carcharinus obscurus (LeSueur, 1818)

- **GSA 12** : Capapé *et al.*1979.
- **GSA 14** : Bradai *et al.* 2002 ; Enajjar *et al.* 2022.
- **Occurrence** : Very rare

Carcharhinus falciformis (Bibron, 1841)

- **GSA 13**: Present work.
- **GSA 14** : Bradai *et al.* 2004 ; Enajjar *et al.* 2022.
- **Occurrence** : Very Rare.

Note: Recently, on August 16, 2023, a specimen male of about 3.5 m TL was caught as bycatch off Hammamet (GSA 13).

Rhizoprionodon acutus (Rüppell, 1837)

- **GSA 14** : Ben Amor *et al.* 2016.

Sphyraena zygaena (Linnaeus, 1758)

- **GSA 12** : Vinciguerra 1882, 1883 and 1884 ; Ponzeverra 1910 ; Le Danois 1925 ; Postel 1952, 1956 and 1958 ; Davidson 1963 ; Lubet & Azouz 1969 ; Quignard & Capapé 1971.
- **GSA 13** : Vinciguerra 1882, 1883 and 1884 ; Ponzeverra 1910 ; Le Danois 1925 ; Postel 1952, 1956 and 1958 ; Davidson 1963 ; Lubet & Azouz 1969 ; Quignard & Capapé 1971, Enajjar *et al.* 2022.
- **GSA 14** : Vinciguerra 1882, 1883 and 1884 ; Ponzeverra 1910 ; Le Danois 1925 ; Postel 1952, 1956 and 1958 ; Davidson 1963 ; Lubet & Azouz 1969 ; Quignard & Capapé 1971 ; Enajjar *et al.* 2022.
- **Occurrence** : Very rare

Order : Squaliformes

Family Oxynotidae

Oxynotus centrina (Linnaeus, 1758)

- **GSA 12** : Quignard & Capapé 1971 ; Enajjar *et al.* 2022.
- **GSA 13** : Enajjar *et al.* 2022.
- **GSA 14** : Bradai *et al.* 1992 ; Enajjar *et al.* 2022.
- **Occurrence** : Common in GSA 12 and 13, rare in GSA 14

Family Etmopteridae

Etmopterus spinax (Linnaeus, 1758)

- **GSA 12**: Bourgois-Farina 1961; Quignard & Capapé 1971; Enajjar *et al.* 2022.
- **GSA 13**: Enajjar *et al.* 2022
- **GSA 14**: Capapé *et al.* 2001
- **Occurrence** : Rare to very rare
- **Data on reproduction**: Size maturity: ♂:28 cm TL/♀ :34 cm TL / Size at birth: 9-11 cm/
- **Fecundity**: 5-18

Family Somniosidae

Somnosus rostratus (Risso,1827)

- **GSA 12** : Capapé *et al.* 2020
- **Occurrence** : Very Rare

Family Dalatiidae

Dalatias licha (Bonnaterre, 1788)

- **GSA 12** : Bourgois-Farina 1961 ; Azouz 1971 ; Quignard & Capapé 1971 ; Capapé *et al.* 2008. Enajjar *et al.* 2022.
- **GSA 13** : Enajjar *et al.* 2022
- **Occurrence** : Very Rare

Family Centrophoridae

Centrophorus uyato (Rafinesque, 1809)

- **GSA 12** : Bourgois-Farina 1961 ; Ben Mustapha 1966 ; Maurin 1968 ; Quignard & Capapé 1971; Enajjar *et al.* 2022.
- **GSA 13** : Enajjar *et al.* 2022
- **GSA 14** : Enajjar *et al.* 2022
- **Occurrence**: Rare to Very Rare

Note: Recorded in the literature as Centrophorus granulosus. Recently the Mediterranean species is named *Centrophorus uyato*.

Family Squalidae

Squalus blainvillei (Risso, 1826)

- **GSA 12** : Bourgois-Farina 1961 ; Ben Mustapha 1966 ; Maurin 1968 ; Quignard & Capapé 1971 ; Raibaut *et al.* 1971 ; Enajjar *et al.* 2022.
- **GSA 13** : Quignard & Capapé, 1971 ; Enajjar *et al.* 2022.

- **GSA 14** : Ben Othmen 1973 ; Marouani *et al.* 2007 ; Marouani *et al.* 2012 ; Saidi *et al.* 2023 ; Enajjar *et al.* 2022.
- **Occurrence** : Very common in GSA 12 and 13, common in GSA 14
- **Data on reproductio**n: Size maturity: ♂:52-55 cm TL/♀ :60-62 cm TL / Size at birth: 20-24 cm/
- **Fecundity**: 1-6

Squalus megalops (Macleay, 1881)

- **GSA 12** : Enajjar *et al.* 2022
- **GSA 13** : Enajjar *et al.* 2022
- **GSA 14** : Marouani *et al.* 2012 and 2013 ; Bradai *et al.* 2017 ; Saidi *et al.* 2023 Enajjar *et al.* 2022.
- **Occurrence** : Rare in GSA 12 and 13, common in GSA 14
- **Data on reproduction**: Size maturity: ♂:44 cm TL/♀ :56 cm TL / Size at birth: 18-23 cm/
- **Fecundity**: 1-6

Order: Squatiniformes

Family Squatinidae

Squatina oculata Bonaparte, 1840

- **GSA 12** : Quignard & Capapé 1971 ; Azouz 1971 ; Capapé 1974 ; Capapé *et al.* 1990 ; Rafrafi *et al.* 2022 and 2023 ; Enajjar *et al.* 2022.
- **GSA 13** : Enajjar *et al.* 2022
- **GSA 14** : Bradai 2002 ; Bradai *et al.* 2002 ; Bradai *et al.* 2004 ; Saidi *et al.* 2016 ; Enajjar *et al.* 2022.
- **Occurrence** : Rare
- **Data on reproduction**: Size maturity: ♂:70 TL/♀ :90 TL / Size at birth: 30-35 cm/
- **Fecundity**: 5-8

Squatina squatina (Linnaeus, 1758)

- **GSA 12** : Vinciguerra 1882, 1883 et 1884 ; Pietschmann 1906 ; Ponzeverra 1910 ; Le Danois 1925 ; Bourgois-Farina 1961 ; Davidson 1963 ; Ben Mustapha 1966 ; Lubet & Azouz 1969 ; Ktari-Chakroun & Azouz 1971 ; Azouz 1971 ; Quignard & Capapé 1971 ; Capapé & Roux 1980 ; Capapé *et al.*1990 ; Bradai *et al.* 2002 ; Enajjar *et al.* 2022.
- **GSA 13** : Vinciguerra 1882, 1883 and 1884 ; Pietschmann 1906 ; Ponzeverra 1910 ; Le Danois 1925 ; Bourgois-Farina 1961 ; Davidson 1963 ; Ben Mustapha 1966 ; Lubet & Azouz 1969 ; Ktari-Chakroun & Azouz 1971 ; Azouz 1971 ; Quignard & Capapé 1971 ; Capapé & Roux 1980 ; Capapé *et al.*1990; Bradai *et al.* 2002 ; Enajjar *et al.* 2022.
- **GSA 14** : Vinciguerra 1882, 1883 and 1884 ; Pietschmann 1906 ; Ponzeverra 1910 ; Le Danois 1925 ; Bourgois-Farina 1961 ; Davidson 1963 ; Ben Mustapha 1966 ; Lubet & Azouz 1969 ; Ktari-Chakroun & Azouz 1971 ; Azouz 1971 ; Quignard & Capapé 1971 ; Capapé & Roux 1980 ; Capapé *et al.*1990 ; Bradai *et al.* 2002 ; Enajjar *et al.* 2022.
- **Occurrence** : Rare
- **Data on reproduction**: Size maturity: ♂:80 TL/♀ :128 TL / Size at birth: -/
- **Fecundity**: 7-18

Squatina aculeata Duméril, 1865

- **GSA 12** : Quignard & Capapé 1971 ; Capapé & Roux 1980 ; Enajjar *et al.* 2022.
- **GSA 13** : Quignard & Capapé 1971 ; Capapé & Roux 1980 ; Enajjar *et al.* 2022.
- **GSA 14** : Quignard & Capapé 1971 ; Capapé & Roux 1980 ; Bradai *et al.* 2002 ; Enajjar *et al.* 2022.
- **Occurrence** : Rare
- **Data on reproduction**: Size maturity: ♂:120 cm TL/♀ :137 cm TL / Size at birth: 30-35 cm/ Fecundity: 8-12

BATOIDS

Order: TORPEDINIFORMES

Family Torpedinidae

Torpedo (Torpedo) torpedo (Linnaeus, 1758)

- **GSA 12** : Vinciguerra 1884 ; Bourgois-Farina 1961 ; Ben Mustapha 1966 ; Lubet & Azouz 1969 ; Quignard & Capapé 1971 ; Quignard & Capapé 1974 ; Neifar *et al.* 1995 ; Mejri *et al.* 2004 ; Bradai *et al.* 2004 ; El Kamel *et al.* 2009a ; El Kamel *et al.* 2009b ; El Kamel *et al.* 2013 ; Enajjar *et al.* 2022.
- **GSA 13** : Le Danois 1925 ; Quignard & Capapé 1971 ; Bradai *et al.* 2004 ; Enajjar *et al.* 2022.
- **GSA 14** : Pietschmann 1906 ; Le Danois 1925 ; Ben Othmen 1971b and 1973 ; Ktari-Chakroun & Azouz 197 ; Quignard & Capapé 1971 ; Bradai & Bouain 1994 ; Capapé *et al.* 2001 ; Bradai 2002 ; Enajjar *et al.* 2002 ; Bradai *et al.* 2004 ; Capapé *et al.* 2004 ; Enajjar *et al.* 2022.
- **Occurrence** : Very common
- **Data on reproduction**: Size maturity: ♂:19 cm TL/♀ :19 cm TL (GSA 12), ♂:23 cm TL/♀ :23 cm TL (GSA 14) / Size at birth: 8-9 cm (GSA 12)/ Fecundity: 1-9 (GSA 12), 7-15 (GSA 14)

Torpedo (Torpedo) marmorata Risso, 1810

- **GSA 12** : Le Danois 1925; Azouz 1971; Quignard & Capapé 1971 ; Capapé 1979b ; Mejri *et al.* 2004 ; Bradai *et al.* 2004 ;El Kamel *et al.* 2009a; Enajjar *et al.* 2022.
- **GSA 13** : Le Danois 1925 ; Azouz 1971 ; Quignard & Capapé 1971 ; Capapé 1979b ; Bradai *et al.* 2004; Enajjar *et al.* 2022.
- **GSA 14** : Le Danois 1925 ; Azouz 1971; Quignard & Capapé, 1971 ; Capapé 1979b ; Bradai 2002 ; Bradai *et al.* 2004; Enajjar *et al.* 2022.
- **Occurrence** : Common
- **Data on reproduction**: Size maturity: ♂:26 cm TL/♀ :40 cm TL (GSA 12); ♂:27.5 cm TL/♀ :34 cm TL (GSA 14) / Fecundity:2-17 (GSA 12); 8 (GSA 14).

Tetronarce nobiliana Bonaparte, 1835

- **GSA 12** : Maurin 1968 ; Quignard & Capapé 1971; Bradai *et al.* 2004 ; Capapé *et al.* 2006; Enajjar *et al.* 2022.
- **GSA 13**: Bradai *et al.* 2004; Capapé *et al.* 2006; Bradai *et al.* 2019; Enajjar *et al.* 2022.
- **Occurrence** : Rare

- **Data on reproduction**: Size maturity: ♂:55 cm TL/♀ :90 cm TL / Size at birth: 17-22 cm

Order RHINOPRISTIFORMES

Family Rhinobatidae

Rhinobatos rhinobatos (Linnaeus, 1758)

- **GSA 12** : Vinciguerra 1884 ; Lubet & Azouz 1969 ; Quignard & Capapé 1971; Capapé *et al.* 1975; Capapé & Zaouali, 1994 ; Bradai *et al.* 2004 ; Mejri *et al.* 2004; Enajjar *et al.* 2022.
- **GSA 13** : Quignard & Capapé 1971 ; Capapé *et al.* 1975; Capapé & Zaouali 1981; Capapé & Zaouali 1994; Bradai *et al.* 2004; Enajjar *et al.* 2022.
- **GSA 14** : Pietschmann 1906 ; Ktari-Chakroun & Azouz 1971 ; Quignard & Capapé 1971 ; Capapé *et al.* 1975; Capapé & Zaouali 1979 ; Capapé & Zaouali 1981 ; Zaouali 1982 ; Bradai & Bouain 1994 ; Capapé & Zaouali 1994 ; Neifar *et al.* 2001a ; Neifar *et al.* 2001b; Bradai 2002 ; Enajjar 2009; Bradai *et al.* 2004; Capapé *et al.* 2004; Enajjar *et al.* 2007; Enajjar *et al.* 2008; Bradai *et al.* 2012; Echwikhi *et al.* 2013; Echwikhi *et al.* 2014; Enajjar *et al.* 2015; Enajjar *et al.* 2022.
- **Occurrence** : Rare in GSA 12, common in GSA 13 and Very common in GSA14
- **Data on reproduction** (GSA 14): Size maturity: ♂:75 cm TL/♀ :87 cm TL / Size at birth: 31 cm/ Fecundity: 4-12

Family Glaucostegidae

Glaucostegus cemiculus E. Geoffroy Saint-Hilaire, 1817

- **GSA 12** : Quignard & Capapé 1971 ; Capapé *et al.* 1975 ; Capapé & Zaouali 1981 ; Capapé & Zaouali 1994 ; Mejri *et al.* 2004 ; Bradai *et al.* 2004 ; Rafrafi- Nouira *et al.* 2015.
- **GSA 13** : Quignard & Capapé 1971 ; Capapé *et al.* 1975 ; Capapé & Zaouali 1981 ; Capapé & Zaouali 1994 Bradai *et al.* 2004 ;
- **GSA 14** : Seurat 1934 ; Postel 1956 ; Quignard & Capapé 1971; Capapé *et al.* 1975 ; Capapé & Zaouali 1979 ; Capapé & Zaouali 1981 ; Zaouali 1982 ; Capapé & Zaouali 1994 ; Bradai 2000 ; Capapé *et al.* 2001; Neifar *et al.* 2001 ; Neifar *et al.* 2002 ; Bradai *et al.* 2004 ; Capapé *et al.* 2004; Enajjar *et al.* 2004 ; Bradai *et al.* 2006 ; Enajjar 2009 ; Enajjar *et al.* 2012 ; Bradai *et al.* 2012; Echwikhi *et al.* 2013; Echwikhi *et al.* 2014 ; Enajjar *et al.* 2015 ; Bradai *et al.* 2017 ; Enajjar *et al.* 2022.
- **Occurrence** : Rare in GSA 12, common in GSA 13 and Very common in GSA14
- **Data on reproduction** (GSA 14): Size maturity: ♂:112 cm TL/♀ :138 cm TL / Size at birth: 39 cm/ Fecundity: 8

Order RAJIFORMES

Family Rajidae

Raja (Raja) clavata Linnaeus, 1758

- **GSA 12**: Pietschmann 1906; Ponzeverra 1910 ; Le Danois 1925 ; Bourgois-Farina 1961 ; Ben Mustapha 1966 ; FAO 1970 ; Ktari-Chakroun & Azouz 1971 ; Azouz 1971 ; Quignard & Capapé 1971 ; Ben Othmen 1971b et 1973 ; Capapé 1977a ; Capapé 1979a; Enajjar *et al.* 2022.

- **GSA 13** : Pietschmann 1906 ; Ponzeverra 1910 ; Le Danois 1925 ; Bourgois-Farina 1961 ; Ben Mustapha 1966 ; FAO 1970 ; Ktari-Chakroun & Azouz 1971 ; Azouz 1971 ; Quignard & Capapé 1971 ; Ben Othmen 1971b and 1973 ; Capapé 1977a ; Capapé 1979a ; Enajjar *et al.* 2022.
- **GSA 14**: Pietschmann 1906; Ponzeverra 1910; Le Danois 1925 ; Bourgois-Farina 1961; Ben Mustapha 1966; FAO 1970 ; Ktari-Chakroun & Azouz 1971 ; Azouz 1971 ; Quignard & Capapé 1971 ; Ben Othmen 1971b and 1973 ; Capapé 1977 a; Capapé 1979a ; Capapé *et al.* 2001 ; Bradai 2002 ; Bradai *et al.* 2004; Capapé *et al.* 2004; Kadri *et al.* 2006 ; Kadri 2013 ; Kadri *et al.* 2014a ; Kadri *et al.* 2014b ; Bradai *et al.* 2017 ; Enajjar *et al.* 2022.
- **Occurrence** : Very Common
- **Data on reproduction**: Size maturity: ♂:75 cm TL/♀ :85 cm TL (GSA 12), ♂:65 cm TL/♀ :79 cm TL (GSA 14) / Fecundity: 108-262 (GSA 12), 36-144 (GSA 14).

Raja (Raja) miraletus Linnaeus, 1758

- **GSA 12**: Pietschmann 1906 ; Pruvot 1921 ; Le Danois 1925 ; Bourgois-Farina 1961 ; Ben Mustapha 1966 ; Lubet & Azouz 1969 ; Quignard & Capapé 1971 ; Capapé et Azouz 1975 ; Capapé & Quignard 1975; Enajjar *et al.* 2022.
- **GSA 13**: Pietschmann 1906 ; Pruvot 1921 ; Le Danois 1925 ; Bourgois-Farina 1961 ; Ben Mustapha 1966 ; Lubet & Azouz 1969 ; Quignard & Capapé 1971 ; Capapé & Quignard 1975 ; Enajjar *et al.* 2022.
- **GSA 14** : Pietschmann 1906 ; Pruvot 1921 ; Le Danois 1925 ; Bourgois-Farina 1961 ; Ben Mustapha 1966 ; Lubet & Azouz 1969 ; Quignard & Capapé 1971 ; Capapé & Quignard 1975 ; Capapé *et al.* 2001 ; Capapé *et al.* 2004 ; Kadri 2013; Kadri *et al.* 2012 ; Kadri *et al.* 2014c ; Kadri *et al.* 2014d ; Bradai *et al.* 2017 ; Enajjar *et al.* 2022.
- **Occurrence** : Common
- **Data on reproductions**: Size maturity: ♂:54 cm TL/♀ :57 cm TL (GSA 12); ♂:34 cm TL/♀ :41cm TL (GSA 14) / Fecundity: 12-60 (GSA 14)

Raja (Raja) asterias Delaroche, 1809

- **GSA 12** : Vinciguerra 1884 ; Lubet & Azouz 1969 ; Quignard & Capapé 1972 ; Quignard & Capapé 1972 ; Capapé 1980b ; Enajjar *et al.* 2022.
- **GSA 13** : Danois 1925
- **GSA 14** : Pietschmann 1906
- **Occurrence** : Very Rare (GSA 12)
- **Data on reproduction**: Size maturity: ♂:51 TL/♀ :56 TL (GSA 12)

Note: Investigations performed last 3 decades show the absence of this species in GSA 13 and 14.

Raja (Raja) radula Delaroche, 1809

- **GSA 12** : Vinciguerra 1884 ; Pietschmann 1906 ; Ponzeverra 1910 ; Pruvot 1921 ; Le Danois 1925 ; Bourgois-Farina 1961 ; Davidson 1963 ; Ben Mustapha 1966 ; Lubet & Azouz 1969 ; Ktari-Chakroun & Azouz 1971 ; Azouz 1971 ; Quignard & Capapé 1971 ; Ben Othmen 1973 ; Capapé & Quignard 1975 ; Capapé et Azouz 1975 ; Capapé 1985b and 1986b ; Mejri *et al.* 2004; Enajjar *et al.* 2022.
- **GSA 13** : Vinciguerra 1884 ; Pietschmann 1906 ; Ponzeverra 1910 ; Pruvot 1921 ; Le Danois 1925 ; Bourgois-Farina 1961 ; Davidson 1963 ; Ben Mustapha 1966 ; Lubet & Azouz 1969 ; Ktari-Chakroun & Azouz 1971 ; Azouz 1971 ; Quignard & Capapé 1971 ; Ben Othmen 1973 ; Capapé & Quignard 1975 ; Capapé 1985b and 1986b; Enajjar *et al.* 2022.
- **GSA 14** : Vinciguerra 1884 ; Pietschmann 1906 ; Ponzeverra 1910 ; Pruvot 1921 ; Le Danois 1925 ; Bourgois-Farina 1961 ; Davidson 1963 ; Ben Mustapha 1966 ; Lubet & Azouz 1969 ; Ktari-Chakroun & Azouz 1971 ; Azouz 1971 ; Quignard & Capapé 1971 ; Ben Othmen 1973 ; Capapé & Quignard 1975 ; Capapé 1985b and 1986b ; Capapé *et al.* 2001; Capapé *et al.* 2004; Echwikhi *et al.* 2013; Kadri *et al.* 2013a ; Kadri *et al.* 2013b; Bradai *et al.* 2017 ; Enajjar *et al.* 2022.
- **Occurrence** : Common to Very common
- **Data on reproduction**: Size maturity: ♂:68 cm TL/♀ :71cmTL (GSA 12); ♂:47 cm TL/♀ :57 cm TL (GSA 14)/ Fecundity: 120 (GSA 14).

Raja (Raja) polystigma Regan, 1923

- **GSA 12** : Maurin 1968 ; Quignard & Capapé 1971 ; Azouz 1971 ; Capapé *et al.* 1980 ; Enajjar *et al.* 2022.
- **GSA 13** : Maurin 1968 ; Quignard & Capapé 1971 ; Azouz 1971 ; Capapé *et al.* 1980 ; Enajjar *et al.* 2022
- **GSA 14** : Maurin 1968 ; Quignard & Capapé 1971 ; Azouz 1971 ; Capapé *et al.* 1980
- **Occurrence** : Rare
- **Data on reproduction**: Size maturity: ♂:53 cm TL/♀ :63 cm TL.

Raja (Leucoraja) melitensis (Clark, 1926)

- **GSA 12** : Bourgois & Farina 1961 ; Ben Mustapha 1966 ; Quignard & Capapé 1971 ; Ben Othmen 1971b and 1973 ; Capapé & Desoutter 1979 ; Capapé 1980a ; Enajjar *et al.* 2022.
- **GSA 13** : Bourgois & Farina 1961 ; Ben Mustapha 1966 ; Quignard & Capapé 1971 ; Ben Othmen 1971b and 1973 ; Capapé & Desoutter 1979 ; Capapé 1980a; Enajjar *et al.* 2022.
- **GSA 14** : Bourgois & Farina 1961 ; Ben Mustapha 1966 ; Quignard & Capapé 1971 ; Ben Othmen 1971b and 1973 ; Capapé *et al.* 1979 ; Capapé & Desoutter 1979 ; Capapé 1980a ; Bradai *et al.* 2004; Enajjar *et al.* 2022.
- **Occurrence** : Rare
- **IUCN status**: Common to Rare
- **Data on reproduction**: Size maturity: ♂:40 cm TL/♀ :40 cm TL (GSA 12) / Fecundity: 10-56.

Raja (Rostroraja) alba (Lacepède, 1803)

- **GSA 12** : Pietschmann 1906 ; Quignard & Capapé 1971 ; Capapé 1985b and 1986b ; Enajjar *et al.* 2022.

- **GSA 13** : Pietschmann 1906 ; Quignard & Capapé 1971 ; Capapé 1985b and 1986b ; Enajjar *et al.* 2022.
- **GSA 14** : Pietschmann 1906 ; Quignard & Capapé 1971 ; Capapé 1985b and 1986b ; Kadri, 2013 ; Kadri *et al.* 2013c, Kadri *et al.* 2014e ; Enajjar *et al.* 2022.
- **Occurrence** : Rare
- **Data on reproduction**: Size maturity: ♂:91 cm DW/♀ :98 cm DW (GSA 12); ♂:94 cm DW/♀ :95 cm DW (GSA 14) / Fecundity: 6-16 (GSA 14).

Raja (Raja) montagui Fowler, 1910

- **GSA 12**: Capapé 1975 ; Enajjar *et al.* 2022.
- **GSA 13** : Enajjar *et al.* 2022
- **Occurrence** : Very Rare (GSA 13)

Raja (Raja) brachyura Lafont, 1873

- **GSA 12** : Quignard & Capapé 1972 ; Enajjar *et al.* 2022.
- **GSA 13**: Enajjar *et al.* 2022
- **Occurrence** : Very Rare in GSAs 12 and 13

Raja (Leucoraja) circularis (Couch, 1838)

- **GSA 12** : Le Danois 1925 ; Bourgois-Farina 1961 ; Ben Mustapha 1966 ; Quignard & Capapé 1972 ; Mnasri *et al.* 2009 ; Enajjar *et al.* 2022.

Dipturus oxyrhynchus (Linnaeus, 1758)

- **GSA 12** : Le Danois 1925 ; Bourgois-Farina 1961 ; Ben Mustapha 1966 ; Lubet & Azouz 1969 ; Quignard & Capapé 1971 ; Ben Othmen 1973 ; Enajjar *et al.* 2022.
- **GSA 13** : Le Danois 1925 ; Bourgois-Farina 1961 ; Ben Mustapha 1966 ; Lubet & Azouz 1969 ; Quignard & Capapé 1971 ; Ben Othmen 1973 ; Enajjar *et al.* 2022.
- **GSA 14** : Le Danois 1925 ; Bourgois-Farina 1961 ; Ben Mustapha 1966 ; Lubet & Azouz 1969 ; Quignard & Capapé 1971 ; Ben Othmen 1973; Bradai *et al.* 2004; Kadri 2013 ; Kadri *et al.* 2010 ; Kadri *et al.* 2015; Enajjar *et al.* 2022.
- **Occurrence** : Common in GSAs 12 and 13 and Rare in GSA 14.
- **Data on reproduction**: Size maturity: ♂: 72.05 cm TL/♀: 82.1 cm TL (GSA 14).

Order MYLIOBATIFORMES

Family Dasyatidae

Bathytoshia lata (Garman, 1880)

- **GSA 12** : Pruvot 1921 ; Le Danois 1925 ; Quignard & Capapé 1971 ; Capapé 1993 ; Bradai *et al.* 2004 ; Enajjar *et al.* 2022.
- **GSA 13:** Enajjar *et al.* 2022.

- **GSA 14**: Enajjar *et al.* 2022.
- **Occurrence** : Common in GSAs 12 and 13 and Rare in GSA 14
- **Data on reproduction**: Size maturity: ♂: 80 cm DW/♀: 100 cm DW / Fecundity: 2-6.
- **Data on reproduction**: Size maturity: ♂: 72.05 cm TL/♀: 82.1 cm TL (GSA 14).

Note: Recorded in Tunisia in the past as Dasyatis centroura witch is not a Mediterranean species following new studies, the Mediterranean species is named currently Bathytoshia lata.

Dasyatis pastinaca (Linnaeus, 1758)

- **GSA 12** : Pietschmann 1906 ; Ponzeverra 1910 ; Le Danois 1925 ; Postel 1956 ; Bourgois-Farina 1961 ; Ben Mustapha 1966 ; Lubet & Azouz 1969 ; Quignard & Capapé 1971 ; Azouz 1971 ; Ben Othmen 1971b and 1973 ; Capapé 1983 ; Neifar *et al.* 1995. Mejri *et al.* 2004 ; El Kamel *et al.* 2009a ; Enajjar *et al.* 2022.
- **GSA 13**: Enajjar *et al.* 2022.
- **GSA 14** : Pietschmann 1906 ; Ponzeverra 1910 ; Le Danois 1925 ; Postel 1956 ; Bourgois-Farina 1961 ; Ben Mustapha 1966 ; Lubet & Azouz 1969 ; Quignard & Capapé 1971 ; Azouz 1971 ; Ben Othmen 1971b and 1973 ; Capapé 1983 ; Neifar *et al.* 1995 and 1998 ; Saadaoui *et al.* 2013; Saadaoui *et al.* 2015 ; Saadaouie *et al.* 2016 ; Enajjar *et al.* 2022.
- **Occurrence** : Common in GSAs 12 and 13 and Very common in GSA 14
- **Data on reproduction**: Size maturity: ♂: 32 cm DW/♀: 38 cm DW (GSA 12); ♂: 33 cm DW/♀: 40 cm DW (GSA 14)/ Size at birth: 12 cm (GSA 12); 11.13 (GSA 14) / Fecundity: 3-6 (GSA 12); 10 (GSA 14).

Dasyatis tortonesei Capapé, 1975

- **GSA 12** : Capapé 1983 ; El Kamel *et al.* 2009a ; Capapé *et al.* 2012; Enajjar *et al.* 2022.
- **GSA 13**: Enajjar *et al.* 2022.
- **GSA 14** : Bradai 2002 ; Bradai *et al.* 2004; Saadaoui *et al.* 2016; Enajjar *et al.* 2022.
- **Occurrence** : Common in GSAs 12 and 13 and Very common in GSA 14;
- **Data on reproduction**: Size maturity: ♂: 30 cm DW/♀: 32 cm DW (GSA 12); ♂: 38 cm DW/♀: 46 cm DW (GSA 14)/ Size at birth: 15.7 cm (GSA 14)/ Fecundity: 3-8 (GSA 12); 3-10 (GSA 14)

Pteroplatytrygon violacea (Bonaparte, 1832)

- **GSA 12** : Hemida *et al.* 2003; Enajjar *et al.* 2022.
- **GSA 13** : Hemida *et al.* 2003; Enajjar *et al.* 2022.
- **GSA 14** : Ktari-Chakroun & Azouz 1971 ; Quignard & Capapé 1971 ; Azouz 1971 ; Capapé 1983 ; Neifar *et al.* 2000 ; Hemida *et al.* 2003; Echwikhi *et al.* 2013; Taktek *et al.* 2020; Enajjar *et al.* 2022.
- **Occurrence** : Common in GSAs 12 and 13 and Rare in GSA 14
- **Data on reproduction**: Size maturity: ♂: 42 cm DW/♀: 45 cm DW (GSA 12) / Fecundity: 2-7.

Taeniurops grabatus (E. Geoffroy Saint - Hilaire, 1817)

Synonymous*: Taeniura grabata*

- **GSA 12** : Quignard & Capapé 1972 ; Neifer *et al.* 1999a ; Enajjar *et al.* 2022.
- **GSA 13**: Enajjar *et al.* 2022.
- **GSA 14** : Postel 1956 ; Quignard & Capapé 1971 ; Neifar *et al.* 1999 ; Bradai *et al.* 2004 ; Bradai *et al.* 2017 ; Saidi *et al.* 2023 ; Enajjar *et al.* 2022.
- **Occurrence** : Common

Dasyatis marmorata (Steindachner, 1892)

- **GSA 12** : El Kamel *et al.* 2009a ; Enajjar *et al.* 2022.
- **GSA 13**: Enajjar *et al.* 2022.
- **GSA 14** : Capapé & Zaouali 1992, 1993 and 1995 ; Capapé *et al.* 1995 and 1996 ; Neifar *et al.* 1999 ; Capapé *et al.* 2001 ; Bradai *et al.* 2004 ; Capapé *et al.* 2004 ; Saadaoui *et al.* 2016 ; Enajjar *et al.* 2022.
- **Occurrence** : Very rare in GSAs 12 and 13; Common in GSA 14; Enajjar *et al.* 2022.
- **Data on reproduction**: Size maturity: ♂: 30 cm DW/♀: 32 cm DW (GSA 14)/ Size at birth: 11.8 cm (GSA 14) / Fecundity: 2-4 (GSA 14).

Family Gymnuridae

Gymnura altavela (Linnaeus, 1758)

- **GSA 12** : Quignard & Capapé 1971 ; Azouz 1971 ; Raibaut *et al.* 1971 ; Capapé *et al.* 1992 ; El Kamel *et al.* 2009a ; Enajjar *et al.* 2022.
- **GSA 13** : Le Danois 1925 ; Quignard & Capapé 1971 ; Enajjar *et al.* 2022.
- **GSA 14** : Pietschmann 1906 ; Le Danois 1925 ; Postel 1956 ; Ktari-Chakroun & Azouz 1971 ; Quignard & Capapé 1971 ; Capapé 1981 ; Capapé *et al.* 1992 ; Neifar *et al.* 2002 b ; Bradai *et al.* 2004 ; Bradai *et al.* 2017 ; Saidi *et al.* 2023 ; Enajjar *et al.* 2022.
- **Occurrence** : Rare in GSAs 12 and 13; Common in GSA 14
- **Data on reproduction**: Size maturity: ♂: 78 cm DW/♀: 108 cm DW (GSA 12)/ Size at birth: 29 (GSA 12) / Fecundity: 6-8 (GSA 12).

Family Myliobatidae

Myliobatis aquila (Linnaeus, 1758)

- **GSA 12** : Postel 1956 ; Bourgois-Farina 1961 ; Ben Mustapha 1966 ; Lubet & Azouz 1969 ; Quignard & Capapé 1971 ; Azouz 1971 ; El Kamel *et al.* 2009 a ; Enajjar *et al.* 2022.
- **GSA 13** : Le Danois 1925 ; Quignard & Capapé 1971 ; Enajjar *et al.* 2022.
- **GSA 14** : Le Danois 1925 ; Ktari-Chakroun & Azouz 1971 ; Ben Othmen 1971b ; Quignard & Capapé 1971 ; Azouz 1971 ; Bradai *et al.* 2004 ; Bradai *et al.* 2017 ; Saidi *et al.* 2023 ; Enajjar *et al.* 2022.
- **Occurrence** : Rare
- **Data on reproduction**: Size maturity: ♂: 50 cm DW/♀: 70 cm DW (GSA 12)/ Size at birth: 21-29 (GSA 12) / Fecundity: 8-12 (GSA 12).

Family Aetobatidae

Aetomylaeus bovinus (Pteromylaeus bovinus) (E. Geoffroy Saint-Hilaire, 1817)

- **GSA 12** : Quignard & Capapé 1971 ; Postel 1956 ; Mejri *et al.* 2004 ; El Kamel *et al.* 2009a ; Enajjar *et al.* 2022.
- **GSA 13** : Quignard & Capapé 1971 ; Enajjar *et al.* 2022.
- **GSA 14** : Bradai & Bouain 1994 ; Quignard & Capapé 1971 ; Neifar *et al.* 1999b ; Bradai *et al.* 2004 ; Bradai *et al.* 2017 ; Saidi *et al.* 2023 ; Enajjar *et al.* 2022.
- **Occurrence** : Common in GSAs 12 and 13; Very Common in GSA 14.
- **Data on reproduction**: Size maturity: ♂: 80 cm DW/♀: 90 cm DW (GSA 12)/ Fecundity: 2-6 (GSA 12).

Family Mobulidae

Mobula mobular (Bonnaterre, 1788)

- **GSA 12** : Capapé & Zaouali 1976 ; Enajjar *et al.* 2022.
- **GSA 13** : Enajjar *et al.* 2022
- **GSA 14**: Bradaï & Capapé 2001; Bradai *et al.* 2002; Bradai *et al.* 2004.
- **Occurrence** : Rare in GSAs 12 and 14; Common in GSA 13

SUBCLASS HOLOCEPHALI

Order CHIMERIFORMES

Family Chimaeridae

Chimaera monstrosa (Linnaeus, 1758)

- **GSA 12:** Lubet & Azouz 1969; Azouz 1974, Bradai *et al*. 2004 ; Rafrafi-Nouira *et al*. 2019.

Species with doubtful presence

9 species cited in literature are not considered in this list because their record seems to be doubtful for mainly incorrect identification or not observed during many decades: the spiny dogfish (*Squalus acanthias*), the porbeagle (*Lamna nasus*), the cuckoo ray (*Leucoraja naevus*), the african ray (*Raja Africana*), the halavi guitarfish *(Glaucostegus halavi)*, *Raja (Leucoraja) fullonica, Raja (Dipturus) batis, R. undulata* and the spinetail mobula *Mobula japanica*.

Family Squalidae

Squalus acanthias Linnaeus, 1758

The spiny Dogfish *Squalus acanthias Linnaeus*, 1758 was recorded in GSA 12 (Bourgois-Farina 1961; Le Danois 1925; Davidson 1963; Azouz 1971 and in GSA 14 (Chakroun & Azouz 1971 and Azouz 1971) more than 50 years ago. Since then no sightings have been reported. The occurrence of this shark seems doubtful (Quignard & Capapé 1971) but it is possible that the species accessed in our regions before while it is not observed since many decades now.

Family Lamnidae

Lamna nasus (Bonnaterre, 1788)

This species was recorded in GSA 12 by Davidson (1963) and Capapé (1975). Since then no sightings have been reported

Family Glaucostegidae

Glaucostegus halawi (Forskal, 1775)

The specimens of *G. halawi* (Forskal, 1775) recorded by Vinciguerra (1884) and Ben Souissi *et al.* (2007) respectively in the north (GSA 12) and in the gulf of Gabès (GSA 14) seem to be dubtful.

Family Rajidae

Raja (Raja) africana Capapé, 1977

The presence of Raja *(Raja) africana* Capapé, 1977b, described by Capapé 1977 in north of Tunisia (GSA 12) seems to be doubtful; the paratypes of specimens from Tunisia were not found.

Raja (Leucoraja) fullonica, Raja (Dipturus) batis and R. undulata

Raja (Leucoraja) fullonica, Raja (Dipturus) batis and *R. undulata* were recorded from 50 to 100 years ago, in GSAs 12 and 13 (Ponzeverra 1910 ; Le Danois 1925 and Azouz 1971), while they are not recorded in recent monitorings performed along Tunisian coasts last 2 decades. The absence of these species in new monitorings could be explained by wrong identification or an extinction of these species in our area, the second reason is low probable. Moreover, following Serena *et al.* (2020), the presence of the 2 first species is questionable in the Mediterranean. For this, we consider the presence of these 3 species as doubtful.

Family Mobulidae

Mobula japanica (Müller et Henle, 1841)

Recently Captures of the spinetail devil rays *Mobula japanica* (Müller & Henle, 1841) were reported from the northern coast of Tunisia (GSA 12 / central Mediterranean) (Capapé *et al.* 2015; Rafrafi Nouira *et al.* 2016). Comparison with the partial mitogenome of *M. japanica* suggests sister-cryptic species complex and two different taxonomic units. However, the limited divergence within the species (>99.9% genetic identity) may be the result of a geographically and numerically restricted population of *M. mobular* within the Mediterranean Sea (Bustamante *et al.* 2016). Another genetic study Combined genetic and morphological data challenge the notion that *M. mobular* and *M. japanica* are two separate species. However, additional and population-level sampling, combined with genetic analysis and morphological examination are necessary before any conclusions can be drawn about the species status of *M. japanica* (Poortvli *et al.* 2015).

According its status, *M. japonica* is not considered in this work.

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APPENDIX I

SHARK, SKATE & RAY EGGCASES TUNISIA

SHARK TRUST | Great Eggcase Hunt

SKATE/RAYS

DESPITE TRULY BEING SKATE, MANY SPECIES ARE REFERRED TO AS RAYS IN THEIR COMMON NAMES.

Capsule lengths are for soaked eggcases and exclude horns.

7-8 cm

THORNBACK RAY
Raja clavata
Capsule length: 7-8 cm

MALTESE SKATE
Leucoraja melitensis
Capsule length: 4-4.5 cm

STARRY RAY
Raja asterias
Capsule length: 3-4.5 cm

LONGNOSED SKATE
Dipturus oxyrinchus
Capsule length: 3.5-13 cm

BLONDE RAY
Raja brachyura
Capsule length: 11.5-14.5cm

BROWN SKATE
Raja miraletus
Capsule length: 4-5 cm

SPOTTED RAY
Raja montagui
Capsule length: 5.5-6.5 cm

WHITE SKATE
Rostroraja alba
Capsule length: 12-18 cm

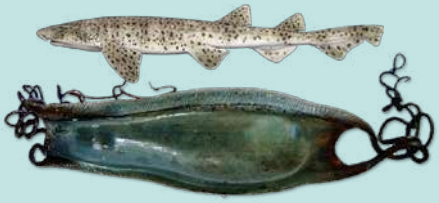
ROUGH SKATE
Raja radula
Capsule length: 5-7 cm

SPECKLED SKATE
Raja polystigma
Capsule length: 3.5-4.5 cm

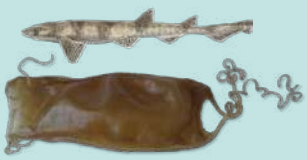
CATSHARKS

ALSO KNOWN AS DOGFISH - HOWEVER TRUE DOGFISH GIVE BIRTH TO LIVE YOUNG.

BLACKMOUTH CATSHARK
Galeus melastomus
Capsule length: 4.5-6.5 cm



NURSEHOUND
Scyliorhinus stellaris
Capsule length: 8-10 cm



SMALLSPOTTED CATSHARK
Scyliorhinus canicula
Capsule length: 5-7 cm

Record your eggcase here!
www.eggcase.org

www.ascob.net

أكياس بيض القروش و الريات
تونس

SHARK TRUST | Great Eggcase Hunt

الريات

طول كيس البيضة رطب و بدون محاليق
8-7 سم

قرشلة\اربة مشوكة
Raja clavata
طول كيس البيضة 7-8 صم

قرشلة\اربة مالطة
Leucoraja melitensis
طول كيس البيضة 4-4.5 صم

قرشلة\اربة نجمية
Raja asterias
طول كيس البيضة 3-4.5 صم

قرشلة\اربة أبو منقار
Dipturus oxyrinchus
طول كيس البيضة 3.5-13 صم

قرشلة\اربة ملساء
Raja brachyura
طول كيس البيضة 11.5-14.5 صم

قرشلة\اربة ذات عيون
Raja miraletus
طول كيس البيضة 4-5 صم

قرشلة\اربة مبرقشة
Raja montagui
طول كيس البيضة 5.5-6.5 صم

قرشلة\اربة خشنة
Raja radula
طول كيس البيضة 5-7 صم

قرشلة\اربة منقطة
Raja polystigma
طول كيس البيضة 3.5-4.5 صم

قرشلة\اربة بيضاء
Rostroraja alba
طول كيس البيضة 12-18 صم

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القروش

كاتارلي\قط اسود الفم
Galeus melastomus
طول كيس البيضة 4-5.5 صم

كاتارلي\قط كبير مبقع
Scyliorhinus stellaris
طول كيس البيضة 8-10 صم

كاتارلي\قط صغير مبرقس
Scyliorhinus canicula
طول كيس البيضة 3.5-7.5 صم

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APPENDIX II
Updated list of cartilaginous fishes in the Mediterranean Sea

VALID SPECIES RECORDED	Occurring in Tunisia	Annex II (SPA/BD)
SHARKS		
Order HEXANCHIFORMES. Cow & frilled sharks		
Family ***HEXANCHIDAE***. *Sixgill & sevengill sharks*		
Heptranchias perlo (Bonnaterre, 1788). Sharpnose sevengill shark		
Hexanchus griseus (Bonnaterre, 1788). Bluntnose sixgill shark		
Hexanchus nakamurai Teng, 1962. Bigeye sixgill shark		
Order SQUALIFORMES. Dogfish sharks		
Family **ECHINORHINIDAE**. *SBramble sharks*		
Echinorhinus brucus (Bonnaterre, 1788). Bramble shark		
Family **SQUALIDAE**. Dogfish sharks		
Squalus acanthias Linnaeus, 1758. Piked dogfish		
Squalus blainvillei (Risso, 1826). Longnose spurdog		
Squalus megalops (Macleay, 1881). Shortnose spurdog		
Family **CENTROPHORIDAE**. Gulper sharks		
Centrophorus uyato (Rafinesque, 1810)		
Family **ETMOPTERIDAE**. Lantern sharks		
Etmopterus spinax (Linnaeus, 1758). Velvet belly		
Family **SOMNIOSIDAE**. Sleeper sharks		
Centroscymnus coelolepis Bocage & Capello, 1864. Portugese dogfish		

Somniosus rostratus (Risso, 1810). Little sleeper shark		
Family **OXYNOTIDAE**. Roughsharks		
Oxynotus centrina (Linnaeus, 1758). Angular roughshark		
Family **DALATIIDAE**. Kitefon sharks		
Dalatias licha (Bonnaterre, 1788). Kitefin shark		
Order SQUATINIFORMES. Angel sharks		
Family **SQUATINIDAE**. Angel sharks		
Squatina aculeata Cuvier, 1829. Sawback angelshark		
Squatina oculata Bonaparte, 1840. Smoothback angelshark		
Squatina squatina (Linnaeus, 1758). Angelshark.		
Order LAMNIFORMES. Mackerel sharks		
Family **ODONTASPIDIDAE**. Sand tiger sharks		
Carcharias taurus Rafinesque, 1810. Sand tiger shark		
Odontaspis ferox (Risso, 1810). Smalltooth sand tiger		
Family **ALOPIIDAE**. Thresher sharks		
Alopias superciliosus (Lowe, 1839). Bigeye thresher		
Alopias vulpinus (Bonnaterre, 1788). Thresher shark		
Family **CETORHINIDAE**. Basking sharks		
Cetorhinus maximus (Gunnerus, 1765). Basking shark.		
Family **LAMNIDAE**. Mackerel sharks		
Carcharodon carcharias (Linnaeus, 1758). Great white shark.		
Isurus oxyrinchus Rafinesque, 1810. Shortfin mako		
Isurus paucus Guitart Manday, 1966. Longfin mako		

Lamna nasus (Bonnaterre, 1788). Porbeagle shark.		
Order CARCHARHINIFORMES. Ground sharks		
Family **SCYLIORHINIDAE**. Cat sharks		
Scyliorhinus canicula (Linnaeus, 1758). Smallspotted catshark		
Scyliorhinus stellaris (Linnaeus, 1758). Nursehound		
Family **PENTANCHIDAE** Deep water catsharks		
Galeus atlanticus (Vaillant, 1888). Atlantic catshark		
Galeus melastomus Rafinesque, 1810. Blackmouth catshark		
Family **TRIAKIDAE**. Hound sharks		
Galeorhinus galeus (Linnaeus, 1758). Tope shark		
Mustelus asterias Cloquet, 1821. Starry smoothhound		
Mustelus mustelus (Linnaeus, 1758). Smoothhound		
Mustelus punctulatus Risso, 1826. Blackspot smoothhound		
Family **CARCHARHINIDAE**. Requiem sharks		
Carcharhinus altimus (Springer, 1950). Bignose shark		
Carcharhinus brachyurus (Günther, 1870). Bronze whaler shark		
Carcharhinus brevipinna (Müller & Henle, 1839). Spinner shark		
Carcharhinus falciformis (Bibron, in Müller & Henle, 1839). Silky shark		
Carcharhinus limbatus (Valenciennes, in Müller & Henle, 1839). Blacktip shark		
Carcharhinus melanopterus (Quoy & Gaimard, 1824). Blacktip reef shark		
Carcharhinus obscurus (Lesueur, 1818). Dusky shark		
Carcharhinus plumbeus (Nardo, 1827). Sandbar shark		

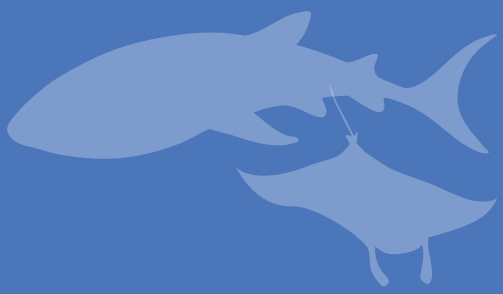
Galeocerdo cuvier (Peron & Lesueur, in Lesueur, 1822). Tiger shark		
Prionace glauca (Linnaeus, 1758). Blue shark		
Rhizoprionodon acutus (Rüppell, 1837). Milk shark		
Family **SPHYRNIDAE**. Hammerhead sharks		
Sphyrna (Sphyrna) lewini (Griffith & Smith, 1834). Scalloped hammerhead		
Sphyrna (Sphyrna) mokarran (Rüppell, 1837). Great hammerhead		
Sphyrna (Mesozygaena) tudes (Valenciennes, 1822). Smalleye hammerhead		
Sphyrna (Sphyrna) zygaena (Linnaeus, 1758). Smooth hammerhead		
BATOIDS (SKATES and RAYS)		
Order RHINOPRISTIFORMES. Guitarfishes		
Family **RHINOBATIDAE**. Guitarfishes		
Rhinobatos (Rhinobatos) rhinobatos (Linnaeus, 1758). Common guitarfish		
Family **Glaucostegidae**		
Glaucostegus cemiculus St. Hilaire, 1817. Blackchin guitarfish		
Glaucostegus halavi (Forsskål, 1775)		
Family **PRISTIDAE**. Sawfishes		
Pristis pectinata Latham, 1794. Smalltooth sawfish		
Pristis pristis (Linnaeus, 1758). Common sawfish		
Order TORPEDINIFORMES. Electric rays		
Family **TORPEDINIDAE**. Torpedo rays		
Tetronarce nobiliana Bonaparte, 1835. Great torpedo		
Torpedo sinuspersici Olfers, 1831		
Torpedo marmorata Risso, 1810. Spotted torpedo		

Torpedo torpedo (Linnaeus, 1758). Ocellate torpedo		
Order RAJIFORMES. Skates		
Family **RAJIDAE**. Skates		
Dipturus batis (Linnaeus, 1758). Blue skate		
Dipturus oxyrhynchus Linnaeus, 1758. Sharpnose skate		
Dipturus nidarosiensis (Storm, 1881). Norwegian skate		
*Leucoraja circularis (*Couch, 1838). Sandy skate		
Leucoraja fullonica (Linnaeus, 1758). Shagreen skate		
Leucoraja melitensis (Clark, 1926). Maltese skate		
Leucoraja naevus (Müller & Henle, 1841). Cuckoo skate		
Raja undulata Lacepede, 1802. Undulate skate		
Raja asterias Delaroche, 1809. Atlantic starry skate		
Raja brachyura Lafont, 1873. Blonde skate		
Raja clavata Linnaeus, 1758. Thornback skate		
Raja miraletus Linnaeus, 1758. Twineye skate		
Raja montagui Fowler, 1910. Spotted skate		
Raja polystigma Regan, 1923. Speckled skate		
Raja radula Delaroche, 1809. Rough skate		
Rostroraja alba (Lacepède, 1803). White skate		
Order MYLIOBATIFORMES. Stingrays		
Family **DASYATIDAE**. Whiptail stingrays		
Bathytoshia lata (Garman, 1880)		

Dasyatis marmorata (Steindachner, 1892). Marbled stingray		
Dasyatis pastinaca (Linnaeus, 1758). Common stingray		
Dasyatis tortonesei Capape, 1975. Tortonese's stingray		
Himantura uarnak (Gmelin, 1789). Honeycomb whipray		
Himantura leopard Manjaji-Matsumoto & Last, 2008		
Pteroplatytrygon violacea (Bonaparte, 1832). Pelagic stingray		
Taeniurops grabatus (Geoffroy St. Hilaire, 1817). Round fantail stingray		
Family **GYMNURIDAE**. Butterfly rays		
Gymnura altavela (Linnaeus, 1758). Spiny butterfly ray		
Family **MYLIOBATIDAE**. Eagle rays		
Myliobatis aquila (Linnaeus, 1758). Common eagle ray		
Family **AETOBATIDAE**		
Aetomylaeus bovinus (Geoffroy St. Hilaire, 1817). Bullray		
Family **RHINOPTERIDAE**. Cownose rays		
Rhinoptera marginata (Geoffroy St. Hilaire, 1817). Lusitanian cownose ray		
Family **MOBULIDAE**. Devil rays		
Mobula mobular (Bonnaterre, 1788). Giant devilray		
CHIMAERAS		
Order CHIMAERIFORMES		
Family **CHIMAERIDAE**		
Chimaera monstrosa Linnaeus, 1758		
Hydrolagus mirabilis (Collett, 1904)		

APPENDIX III


Mediterranean Sea Batoids
Mobula mobular
Myliobatis aquila
Rhinoptera marginata
Aetomylaeus bovinus
Bathytoshia lata
Taeniurops grabatus
Himantura urnak
Dasyatis pastinaca
Dasyatis marmorata
Pteroplatytrygon violacea
Raja clavata
Raja miraletus
Raja montagui
Leucoraja naevus
Dipturus oxyrinchus
Rostroraja alba
Raja radula
Leucoraja melitensis
Leucoraja fullonica
Raja polystigma
Raja brachyura
Raja undulata
Raja asterias
Raja circularis
Torpedo torpedo
Torpedo marmorata
Torpedo sinuspersici
Tetronarce nobiliana
Gymnura altavela
Glaucostegus cemiculus
Rhinobatos rhinobatos



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