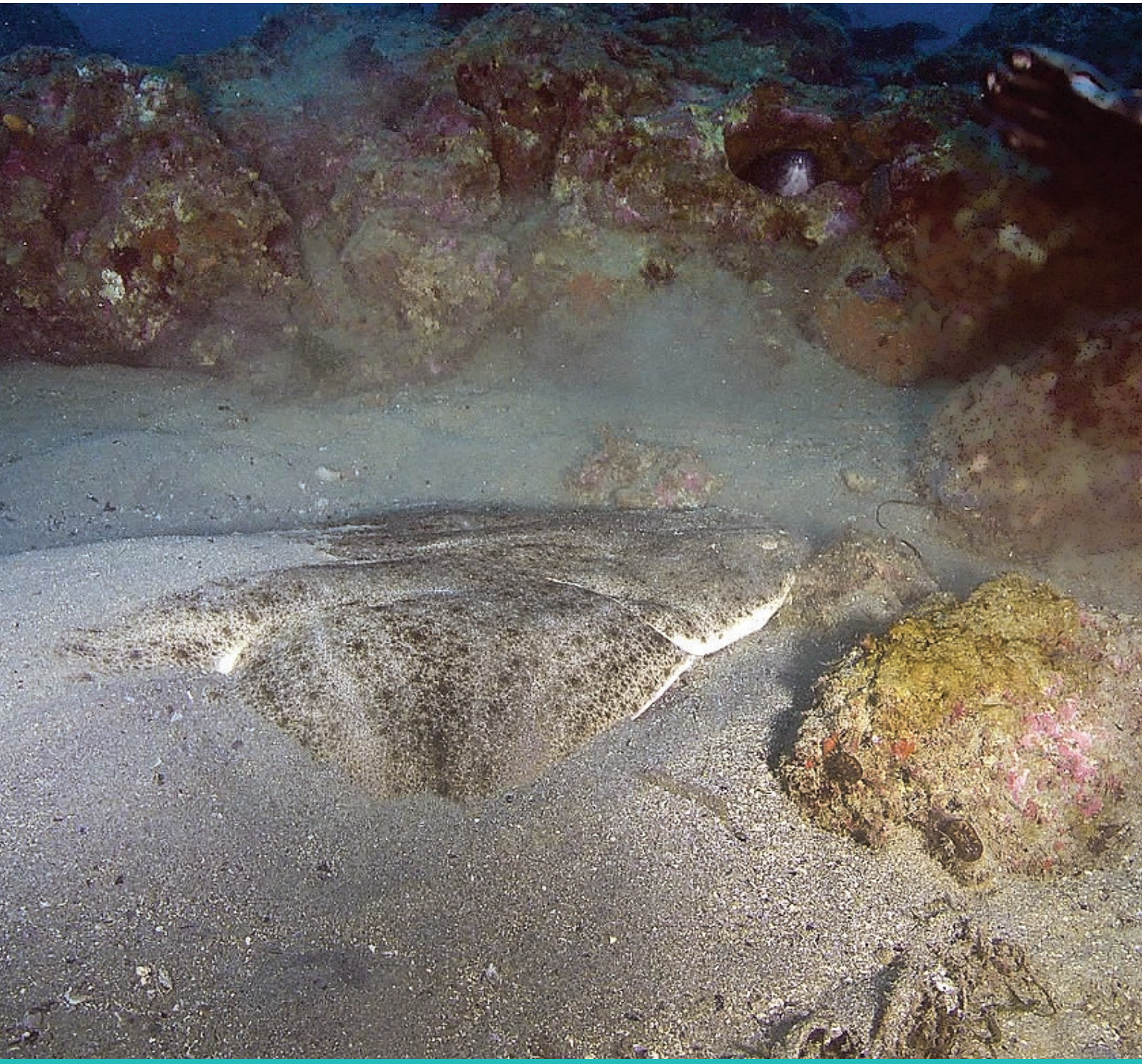
Mediterranean Angel Sharks:
Regional Action Plan



COLLABORATORS

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ANGEL SHARK CONSERVATION NETWORK (ASCN)

The ASCN represents a community working to better protect angel sharks. The Network was established by the Angel Shark Project, International Union for the Conservation of Nature (IUCN) Species Survival Commission Shark Specialist Group, Shark Trust, and Submon to facilitate dialogue and information sharing on angel shark conservation efforts, in particular across the range of *Squatina aculeata*, *S. oculata*, and *S. squatina*. It has since expanded to include additional collaborators. The success of the Eastern Atlantic and Mediterranean Angel Shark Conservation Strategy and associated Action Plans (such as this) requires cooperation between different stakeholders, working together towards a common vision. All interested parties are invited to join the network to receive updates and help to deliver the objectives laid out in the Strategy and associated Action Plans – visit ***www.angelsharknetwork.com***.

MEDITERRANEAN WORKSHOP

An expert workshop was hosted by the Shark Trust at the National Institute of Sciences and Technologies of the Sea (INSTM) in Salammbô, Tunisia from the 25th – 27th March 2019 to initiate the development of this *Mediterranean Angel Sharks: Regional Action Plan*.

WORKSHOP PARTICIPANTS

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Forewords

Nick Dulvy
Co-Chair of the IUCN Shark Specialist Group

Below the silvery surface of the ocean lies another world. One of the greatest challenges is to look under this thin veneer to see what lies beneath. Through our work we now know that nearly one-quarter of the world's 1,200 or so sharks and rays are threatened with extinction. The IUCN Shark Specialist Group has worked hard for nearly a decade to translate our new global understanding to prioritize those species groups at greatest risk of extinction.

Few people are aware that the most endangered species are the bottom-dwelling species of coastal waters, including the skates, sawfishes, wedgefishes, and guitarfishes. As well as these rays, there is a group of flattened sharks that share this plight, the angel sharks.

Angel sharks are sit-and-wait ambush predators, that use flicks of their broad fins to camouflage themselves in the seabed sand, before lunging from their lair to snap small fishes out of the water column with incredible speed and power. This incredible predatory adaptation is also their downfall as they are easily scooped up by trawlers and entangled in nylon gillnets.

Our challenge has been to travel from our global overview of the status of sharks to bring conservation to the ground, first to priority species within priority regions. The next step is to work within regions to detail where these incredibly rare species may still be found in sufficient numbers. This report lays out a vital plan to share out angel shark conservation opportunities and responsibilities through the Mediterranean Sea. I have great hope that this plan will provide a focus around which to build a community of dedicated and effective conservationists to secure a future for angel sharks.

IUCN

IUCN SSC
Shark Specialist Group

Fabrizio Serena and Alen Soldo
Co-Regional Vice Chairs of the IUCN Shark Specialist Group for the Mediterranean

The Mediterranean is a small semi-enclosed sea with peculiar physical characteristics but, regarding chondrichthyans, contributes as much as 7% to global biodiversity. Some species are vagrant while many others are resident. Several of the latter live on the continental shelf, an area where fishing effort is extremely high and cartilaginous fish suffer the most impact. In fact, due to their morphological features, chondrichthyans are captured throughout their life cycles – from juveniles through to adults. For this reason, they require very different management solutions to bony fish. Large pelagic elasmobranchs are caught by artisanal fisheries (often as bycatch), while demersal species are mainly caught by industrial bottom trawlers. Among the latter, the most penalized species are the laziest ones which move slowly in their environment, such as angel sharks or guitarfishes.

The situation is worrying for these species in industrialized areas of the Mediterranean. For example, in the Western Mediterranean subregion there have been no official catches of angel sharks and guitarfishes for >50 years. In contrast, in areas where industrial fishing is almost absent (e.g. Levantine basin), these species are more abundant. Certainly, we need careful and uniform management throughout the Mediterranean, with a reduction in fishing effort and methods to mitigate bycatch.

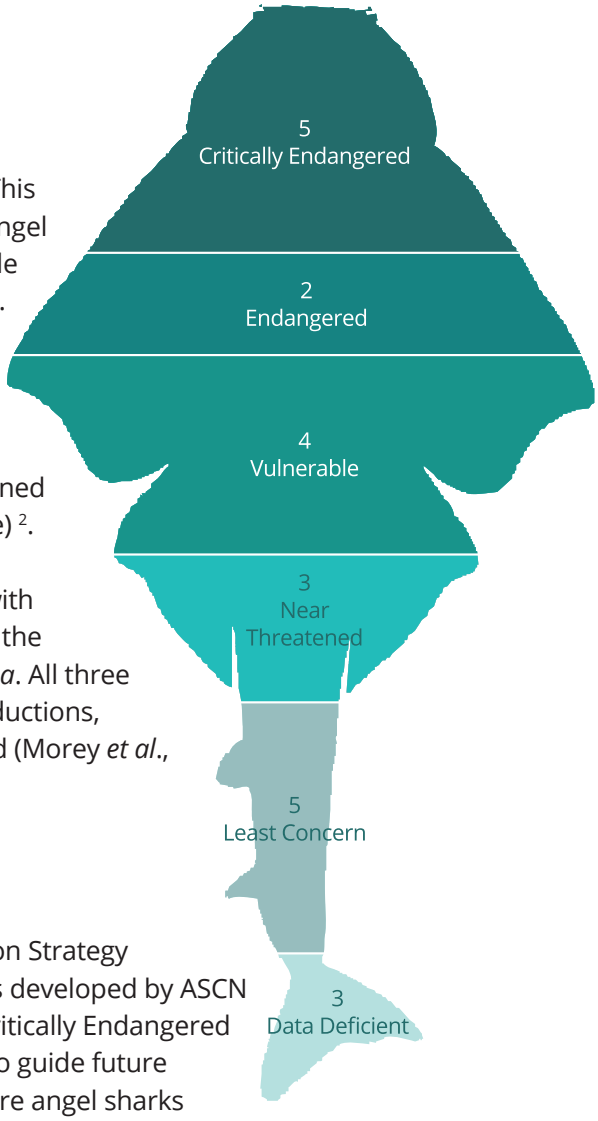
There are over 20 countries and territories bordering the Mediterranean with very different cultures and religions. For sustainable fisheries, we must all agree and there is a need to coordinate the varied approaches; this role is played by the General Fisheries Commission for the Mediterranean (GFCM). Despite this, it is necessary to integrate actions with suggestions from IUCN along with work programmes that aim to improve species conservation, such as the Mediterranean Angel Sharks: Regional Action Plan. In fact, it is these programmes that can stimulate decisions and exert the right pressure in the right places to ultimately encourage countries to follow the best path towards improved conservation measures.

Contents

1. Introduction

1.1 FAMILY

Within the order Squatiniformes, *Squatinidae* is the only family. This contains just one genus (*Squatina*) and 22 described species of angel sharks[1]. These large-bodied, coastal species are highly susceptible to bottom-fishing and are easily entangled in large-mesh gillnets. As a result, angel sharks have been identified as one of the most threatened families of chondrichthyans (sharks, skates, rays, and chimaeras) in the world, with many requiring urgent conservation action (Dulvy *et al*., 2014). Of the described species, 11 are listed in a threat category on the IUCN Red List of Threatened Species (5 Critically Endangered, 2 Endangered, and 4 Vulnerable) [2].



Three species of angel shark are present in the Mediterranean with overlapping ranges – the Sawback Angelshark *Squatina aculeata*, the Smoothback Angelshark *S. oculata*, and the Angelshark *S. squatina*. All three are classified as Critically Endangered due to past population reductions, meaning they face an extremely high risk of extinction in the wild (Morey *et al*., 2019 abc).

1.2 CONSERVATION ACTION PLANNING

The Eastern Atlantic and Mediterranean Angel Shark Conservation Strategy (Gordon *et al*., 2017) – hereafter referred to as the Strategy – was developed by ASCN partners as a framework for improved protection of the three Critically Endangered angel sharks in this geographic range. The Strategy is designed to guide future research, management, policy, and conservation actions to ensure angel sharks are restored to robust populations and safeguarded throughout their range. Work guided by the Strategy has already raised the overall profile of angel sharks; helped increase the number of sightings reported; built a better understanding of current distribution; contributed to IUCN Red List re-assessments, and identified new opportunities for collaboration.

Four regions – the Northeast Atlantic, Mediterranean Sea, West Africa, and the Canary Islands – are covered by the Strategy. For the latter, the Angelshark Action Plan for the Canary Islands (Barker *et al*., 2016), developed by ASCN partners, provides a clear roadmap for conservation action in this unique stronghold for *S. squatina*. Progress on the Strategy and Regional Action Plans is reported through the ASCN e-bulletin and website.

The Mediterranean has revealed itself to be a priority region for conservation action for chondrichthyans (WWF, 2019), including for all three species of angel shark native to the region (Dulvy *et al*. 2016). This Regional Action Plan (RAP) is designed to focus efforts and will aid in increasing the profile of angel sharks in the Mediterranean, classifying threats faced, reconstructing past baselines, understanding causes of decline, and fostering collaboration between stakeholders and governments of coastal states and territories in determining and implementing legislation and effective conservation actions.

SubRegional Action Plans (SubRAPs) for the Mediterranean will be developed to facilitate further coordinated action, starting with GFCM (General Fisheries Commission for the Mediterranean) areas identified as high priority for angel sharks (having factored in threats, contemporary sightings, capacity etc.). A SubRAP proforma

1 Angel shark (as two words) refers to multiple species in the family *Squatinidae*, Angelshark (as one word) is used for species common names.
2 For the remaining species, 3 are classified as Near Threatened, 5 are Least Concern, and 3 are Data Deficient.

has been created to use as a template for establishing threats, goals, objectives and actions. For consistency, the Mediterranean SubRAP process (see chapter 4) will be co-ordinated by the Shark Trust working in partnership with lead organisations and individuals in each subarea. Once completed, these documents will be available as additional annexes to this Plan.

Beyond the Mediterranean, additional RAPs and SubRAPs will be developed in the broader geographic areas identified in Figure 1 and will sit within the wider framework of the Strategy. To ensure approaches are consistent and to reduce duplication, the SubRAP proforma could be used as a template for establishing threats, goals, objectives and actions in other regions.

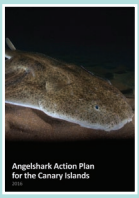
ANGEL SHARKS

- Three species present in the Mediterranean (*Squatina aculeata, S. oculata, S. squatina*)
- All three are Critically Endangered (Global and Mediterranean assessments)
- There are no longer any targeted angel shark fisheries in the Mediterranean
- It is prohibited to retain angel sharks under a GFCM binding Recommendation
- *S. squatina* is listed under CMS Appendix I and II and on Annex I of CMS Sharks MOU.

Global Conservation Strategy
All 22 species of angel sharks

Eastern Atlantic and Mediterranean Angel Shark Conservation Strategy

S. aculeata, S. oculata, S. squatina



Angelshark Action Plan for the Canary Islands

S. squatina

Mediterranean Angel Sharks: Regional Action Plan

S. aculeata
S. oculata
S. squatina

Regional Action Plan

Northeast Atlantic

S. squatina

Regional Action Plan

West Africa (Eastern Atlantic)

S. aculeata
S. oculata

Not yet developed for other geographies

SubRegional Action Plan

e.g. for GFCM subarea 22 (Aegean Sea)

SubRegional Action Plan

e.g. for Wales

SubRegional Action Plan

e.g for Senegal

Figure 1 *– Strategic conservation plans for angel sharks. Tint represents those plans which have been developed or are currently in development*

2. Species

2.1 *Squatina aculeata* Cuvier, 1829

COMMON NAMES: Sawback Angelshark **(EN)** | Angelote espinudo, Angelote espinoso **(ES)**, Àngel espinós, Escat espinós **(CA)** | Ange de Mer Épineaux **(FR)** | Ακανθορίνα **(GR)** | Squadrolino **(IT)** | Mal'ach yam meguvshash מלאך-ים מגובשש **(IW)** | شكاطلو Chkatlo **(LY Eastern)**, سفن مشوك Sfen Moshaok **(LY Western)**

SIZE

Size at birth: 30 – 35 cm
Maturity ♂: 120 cm **Maturity** ♀: 175 cm
Max size: 188 cm
Reproduction: 8 – 12 pups every 2 years

RANGE and HABITAT

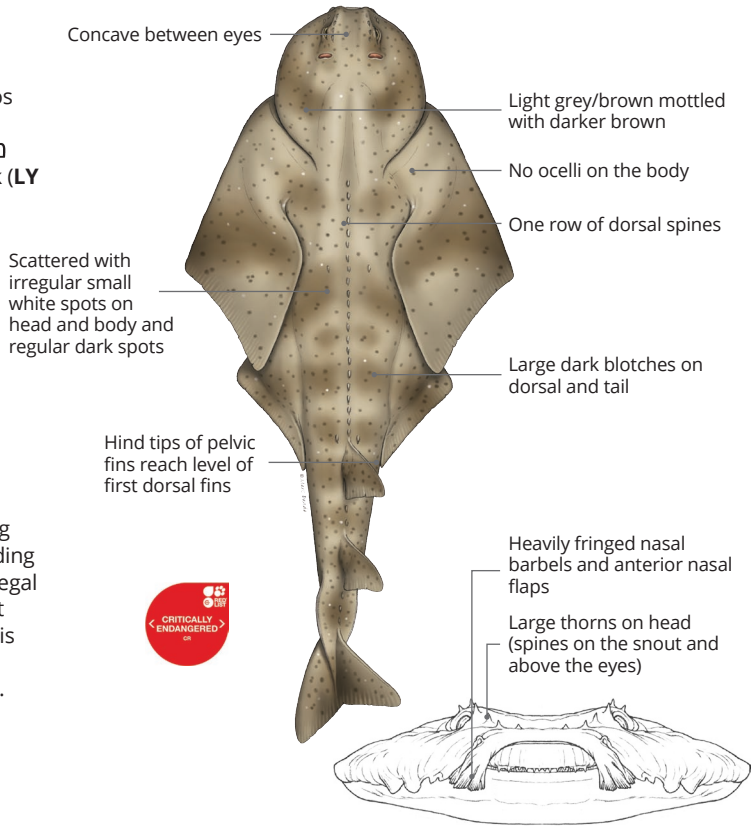
Historical: Once widespread in the Eastern Atlantic (West African coasts from Morocco to Angola) and throughout the Mediterranean Sea.

Contemporary: Mainly documented in the central basin along the southern Mediterranean coast to the eastern basin, including the Aegean Sea. Also present in the Eastern Atlantic from Senegal to Sierra Leone (with presence uncertain beyond this). Habitat has been subject to intense demersal fisheries and as such this species is now rarely reported from large areas of its former range and only occasional reports are now received (Figure 3).

Habitat: Offshore, outer continental shelf and upper slope, usually on mud.

Depth: 30 – 500m.

Diet: Small sharks, bony fishes, cuttlefishes and crustaceans.



2.2 *Squatina oculata* Bonaparte, 1840

COMMON NAMES: Smoothback Angelshark **(EN)** | Angelote manchado, Angelote, Pez ángel **(ES)**, Àngel d'ulls, Àngel, Escat **(CA)** | Ange de Mer Ocellé **(FR)** | Ματορίνα **(GR)** | Sklat žutan **(HR, BA, ME)**, Sklat okač, Sklat blatar **(HR)** | Squadro pelle rossa, Squadro pelle chiara, Squadrolino pelle rossa **(IT)**, Squadra **(Bari)**, Squadro di bianco **(Livorno)** | Mal'ach yam nakod מלאך ים נקוד **(IW)** | شكاطلو Chkatlo **(LY Eastern)**, سفن مبقع Sfen Mobaka **(LY Western)** | Xkatlu tal-Għajnejn **(MT)** | Pegasti sklat **(SI)** | Benekli Keler **(TR)**

SIZE

Size at birth: 23 – 27 cm
Maturity ♂: 71 (Tunisia) – 82 cm (Senegal)
Maturity ♀: 89 cm (Senegal) – 100 cm (Tunisia)
Max size: 145 cm (♂) 160 cm (♀)
Reproduction: 3 – 8 pups (February to April) after 12 month gestation, every 2 years

RANGE and HABITAT

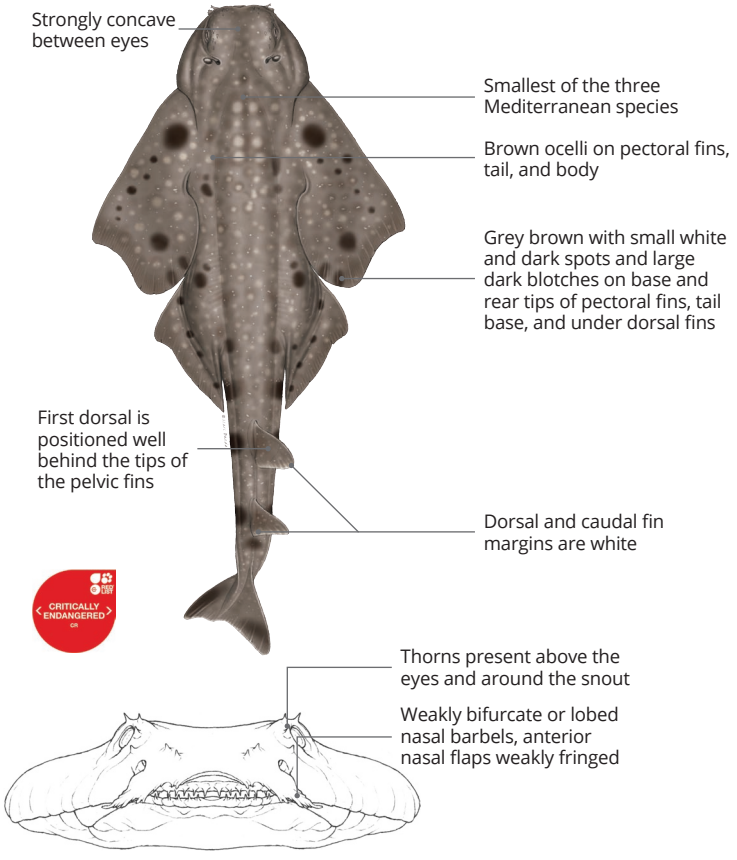
Historical: Formerly common over coastal and outer continental shelf areas in the Eastern Atlantic (southern Iberian Peninsula to Namibia) and the Mediterranean Sea.

Contemporary: Sightings have been clustered in the central and eastern Mediterranean basins, predominantly in the Strait of Sicily, the Levant Sea, and the North Aegean Sea. Also present in the Eastern Atlantic from Senegal to Ghana (with presence uncertain further south and east). This species is now absent from many areas that have been subject to heavy fishing pressure (Figure 4).

Habitat: Continental shelves and upper slopes on sandy/muddy substrates.

Depth: usually 20 – 500 m (mainly 50 – 100 m).

Diet: Small fishes, squid, octopus, shrimp and crabs.



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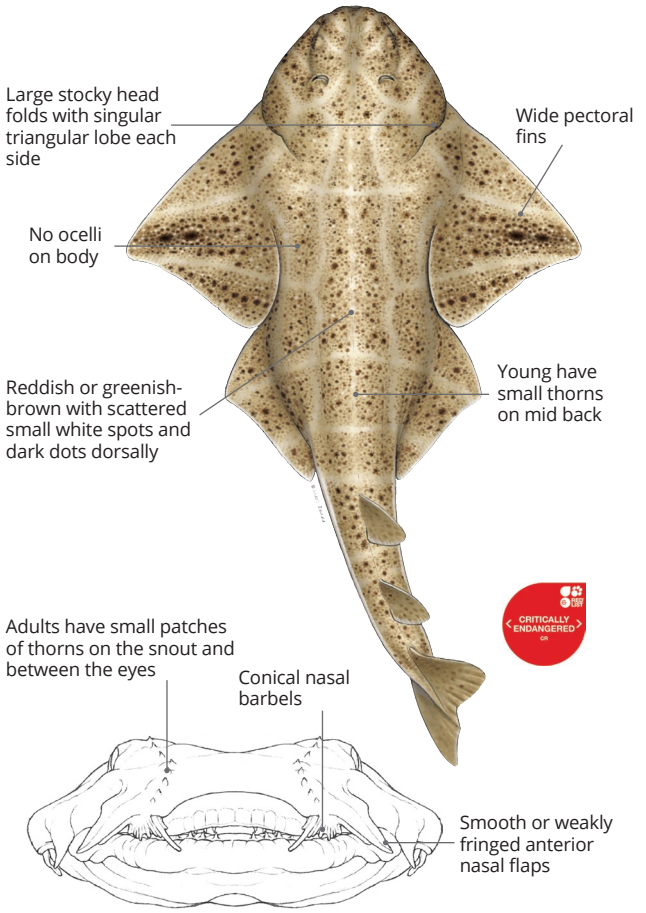


▲ *Squatina squatina* caught in Cyprus © Robin Snape

2.3 *Squatina squatina* (Linnaeus, 1758)

COMMON NAMES: Skladhina **(AL)** | Anđeoski Morski Pas **(BA)** | Angelshark **(EN)** | Angelote, Tiburón ángel, Pez ángel, Peje ángel **(ES)**, Peix Àngel, Angelot comú, Escat, Escat veixigal, Àngel, Escat comú **(CA)** | Ange de Mer Commun **(FR)**, Sguerru, Pisci angiulu **(Corsica)** | Αγγελοκαρχαρίας, Ρίνα **(GR)** | Sklat sivac **(HR, BA, ME)** | Sokol **(HR)**, Squain **(Rovinj)** | Pesce Angelo, Squadro **(IT)**, Squadrolino **(Ancona, Roma)**, Angeo, Pesciu angiou **(Genova)**, Squadro **(Livorno, Roma, Terracina)**, Pesce angelo **(Terracina)**, Squatrolino **(Toscana)**, Squadre arena, Squattro verace, Squadro, Trezzino **(Napoli)**, Squadru **(Reggio Calabria)**, Squatru lisciu, Squatru monicu, Squadro lisciu, Squadro monicu **(Catanzaro, Golfo di Squillace)**, Squadre, Squadra, Squatre **(Bari, Pescara, Taranto)**, Pesce squadro **(Ancona)**, Angelo **(Chioggia)**, Squalena, Sagrin **(Venezia)**, Squaena **(Trieste)**, Pisci squadru, **(Cagliari, Olbia)**, Squadru **(Cagliari, Olbia, Sicilia)**, Squatrucéfalo **(Messina)**, Squadro pellenera **(Civitavecchia)**, Squadro di nero **(Livorno)** | Mal'ach yam canuf מלאך-ים בנוף **(IW)** | Chkatlo شكاطلو **(LY Eastern)**, Sfen سفن **(LY Western)** | Skaten, Scátlu, Xkatlu **(MT)** | Navadni sklat **(SI)** | Zamzamah **(SY)** | Sfen سفن, Wakass وقاس **(TN)**

SIZE

Size at birth: 20 – 30 cm
Maturity ♀: 126 – 167 cm **Maturity** ♂: 80 – 132 cm
Max size: 183 cm (♂) ~244 cm (♀)
Reproduction: Ovoviviparous, no yolk sac placenta. 7 – 25 pups after 8 – 10 month gestation (born Dec-Feb in Med), every 2 years

RANGE and HABITAT

Historical: Historically common over large areas of the coastal, continental and insular shelf of the Northeast Atlantic (southern Norway to Western Sahara), and the Mediterranean and Black Seas.

Contemporary: Sightings have been widespread across the Mediterranean including the southern coast of the western and central basins, the Ligurian, Northern Tyrrhenian and Adriatic Seas on the northern coast, and the Levant and Aegean Seas in the eastern basin. It has also been documented in the Sea of Marmara and is the only angel shark species known to have been present in the Black Sea (Serena, 2005), with contemporary captures around the Bosporus Strait. This is the only species present in the Northeast Atlantic, with recent reports from the Celtic Seas ecoregion. The Canary Islands provide a unique stronghold for this species, where it can be regularly encountered (Meyers *et al*., 2017) (Figure 5).

Habitat: Inshore on mud or sand.

Depth: 5 – 150 m.

Diet: Flatfishes, skates, crustaceans, molluscs.

▼ *Squatina aculeata* caught in Greece © iSea

▼ *Squatina oculata* caught in Cyprus © iSea

2.4 WHAT'S IN A NAME?

Records from fishing data often only assign angel sharks to genus level as their similar characteristics can cause difficulties in identifying individuals to species level. Angel sharks are usually grouped together with other flattened species as aggregated catch (e.g. Angelsharks, sand devils nei (not elsewhere included)) so precise landings data are scarce (FAO FishStat Plus).

***Squatina squatina* caught in Şarköy, Sea of Marmara (March 2018) © Hakan Kabasakal**

In addition, angel shark declines have been masked due to misreporting in fisheries or marketing under alternative common names. In some regions, angel sharks have historically been confused with, or substituted for Monkfish/Anglerfish (*Lophius* spp.) and continue to be misreported as rays (particularly guitarfishes). In Greece, Rina (Ρίνα) is the historic common name used for *Squatina* species and it was once highly prized seafood. After the species suffered from steep declines, fishmongers would sell batoid wings as Rina as they could be sold at a higher price. Nowadays, it is well known that Rina is a batoid, and the prices reflect this. However, there is not normally a distinction between the three species and so the common names Ρίνα or Αγγελοκαρχαρίας are used for angel sharks in general. Many other regions have common names that refer solely to 'angel sharks' (e.g. in Catalan Escat is used generically, as is Angelote in Spain), and not by specific species. In Libya, shark meat (including angel sharks) is often marketed as 'sea dog' without further clarification of species.

Angel sharks were once such an important component of fisheries across the Mediterranean, that numerous specialised fishing gears were developed to catch them and were named after them. Gill nets called 'squaenera' were used in Italy and 'sklatara' in Croatia – both derived from the local names for angel sharks 'squaena' and 'sklat' (EVOMED, 2011; Fortibuoni *et al*., 2016). In addition, in the Balearic Islands, Spain, the fishing gear 'escatera' were used, suggesting angel sharks were once common (Morey *et al*., 2006), and in France 'martramaou' were used (Quéro and Cendrero, 1995). These historical gear type names indicate that target fisheries for angel sharks did exist and may have been responsible for early depletions. The origin of the name Baie des Anges ('Bay of Angels') in southeast France between Nice and Antibes, is derived from the former abundance of angel sharks (Gag and Arnulf 1985), however there are no recent records from this area.

2.5 GLOBAL RED LIST ASSESSMENTS

Based on inferred historical declines, suspected declines in extent of occurrence (EOO) and area of occupancy (AOO), and the contemporary rarity of these species, it is suspected that population reductions of at least 80% (but likely closer to 90%) have occurred over the past three generations (~45 years). Therefore, all three species meet the criteria of being Critically Endangered A2bcd.

Further to this, population declines of *S. aculeata* and *S. oculata* are expected to continue with reductions in AOO, EOO and/or habitat quality, meaning they also qualify for listing as A3cd.

In the Mediterranean regional assessments, all three species are classified as Critically Endangered, with *S. aculeata* meeting the criteria A2bcd and *S. oculata* and *S. squatina* meeting the criteria A2bcd+3cd (Soldo & Bariche, 2016; Ferretti *et al*., 2016 a, b).

S. aculeata – Critically Endangered A2bcd+3cd *(*Morey *et al. 2019a)*

S. oculata – Critically Endangered A2bcd+3cd (Morey *et al*. 2019b)

S. squatina – Critically Endangered A2bcd (Morey *et al*. 2019c)

3. Characterising the Mediterranean

3.1 SHARKS IN THE MEDITERRANEAN

Bordered to the north by Europe, the east by Asia, and in the south by Africa, the Mediterranean is bounded by over 20 countries and territories. The complex and multijurisdictional nature of the Mediterranean creates a need for collaborative action to build capacity for angel shark conservation. Chapter 7.5 addresses legislation and regulation in the region.

Regional Fisheries Management Organisations (RFMOs) and key conventions

Mediterranean waters are covered by two Regional Fisheries Management Organisations **(RFMOs)** – the International Commission for the Conservation of Atlantic Tunas **(ICCAT)** and the General Fisheries Commission for the Mediterranean **(GFCM)**.

While the Mediterranean falls under the area of competence for ICCAT, it is responsible for tuna and tuna-like species (including pelagic sharks and rays), as such demersal species such as angel sharks are not within their remit.

GFCM comprises 24 Parties (including the European Union), as well as three Cooperating non-Contracting Parties (CPCs). Applying to all marine waters of the Mediterranean and Black Seas, it has the authority to adopt binding recommendations for fisheries conservation and management in its area of application and plays a critical role in fisheries governance in the region.

Established by the Contracting Parties to the Barcelona Convention and its Protocols, the Specially Protected Areas Regional Activity Centre **(SPA/RAC)** assists Mediterranean countries in implementing the Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean.

The Convention of Migratory Species **(CMS)** is a framework convention with legally binding treaties (Agreements) and Memorandums of Understanding (MoU) for species that cross national boundaries. CMS serves as an intergovernmental platform to bring Range States together to agree internationally coordinated conservation measures throughout the migratory ranges of species listed under CMS. The CMS Sharks MOU, is a global agreement under the umbrella of the sharks MOU, which aims to maintain and achieve a favourable conservation status for migratory sharks and rays.

Historically, the diversity of chondrichthyans was greatest in the western Mediterranean, particularly in the coastal waters of Morocco, Algeria, and Tunisia, with the lowest diversity in the eastern sub-region (Dulvy *et al*., 2016). There has been a significant decline in species richness throughout the Mediterranean resulting from human impacts (including exploitation, pollution, and habitat degradation), with historical declines in elasmobranch abundance reported (Ferretti *et al*., 2008; Fortibuoni *et al*., 2010; Ferretti *et al*., 2015).

An analysis of threat levels across all sharks, skates, rays, and chimaeras has revealed the Mediterranean as a key hotspot of extinction risk (Dulvy *et al*., 2014). The principal driver of decline & local extinction is overfishing. Most species are taken, and retained, as valuable bycatch in small-scale and large-scale multispecies fisheries (trawl and net). Bycatch mortality represents a particular conservation concern for large marine vertebrates (Tudela, 2004; Sacchi, 2008) including sharks (Ferretti *et al*., 2008; Dulvy *et al*., 2016; FAO, 2018).

More than a decade since they were first assessed (Cavanagh & Gibson, 2007), there is no sign of improvement in the status of Mediterranean sharks and rays. Of the 73 species of Mediterranean chondrichthyans assessed

by IUCN, 50% of rays (16/32) and 54% of sharks (22/41) face an elevated risk of extinction, and angel sharks are an example of one of the families where all species present in the region are threatened (Dulvy *et al*., 2016). Although once an important component of fisheries across the Mediterranean (Fortibuoni *et al*., 2016), nowadays there are no known target fisheries for angel sharks. Yet quantifying the specific level of angel shark bycatch is hampered by the significant level of aggregated catches: 68% of all reported elasmobranch catches in the Mediterranean are landed in aggregated categories (2012 – 2017, FAO FishStat Plus).

Surrounding a semi-enclosed sea, generally, Mediterranean coastal states and territories have restricted exclusive economic zones (EEZs) and consequently stocks are shared among fleets from different countries. The fishery sector has always played an important economic role in the region (FAO, 2018).

International protections have been adopted for elasmobranchs through the Barcelona Convention and GFCM, which include a ban on trawling in immediate coastal waters (3 nm of the coast or within the 50 m isobath – see chapter 7.5.4), a comprehensive shark finning regulation[3], and prohibitions on species retention – which includes all three species of angel sharks (GFCM/36/2012/3, amended to GFCM 42/2018/2) – observations on the efficacy of this are discussed in chapter 7.5.

3.2 MEDITERRANEAN FISHERIES

Small-scale and large-scale (or industrial) fisheries (LSF) coexist in the region, using a large variety of fishing gears. The Mediterranean fleet is divided into: polyvalent; seiners; dredgers; trawlers; and longliners. The dominant vessel group is polyvalent which account for 77.8% of the vessels in the Mediterranean Sea and 91.3% in the Black Sea – these vessels use more than one gear type. Trawlers > 6 m in length make up 8.6% of the fleet fishing in the Mediterranean Sea (FAO, 2018).

Definitions (FAO 2018)

Small-scale (or artisanal) fisheries (SSF) – Definitions vary between countries, however SSF generally operate close to shore, are relatively small fishing vessels, require low capital investment, make short fishing trips, and fish mainly for local consumption. This currently includes all polyvalent vessels and longliners under 12 m. 70,000 vessels in the Mediterranean and Black Seas are SSF (equating to 84% of total fleet).

Recreational and sports fisheries – Relates to non-commercial fishing activities exploiting marine resources and comprises of leisure, sport, underwater, and charter fisheries. Recreational fisheries involve use of different techniques (e.g. rod and line, speargun, traps, longlines, hand-gathering), can be exerted from different locations (i.e. shore, boat, underwater), and target a broad range of taxa.

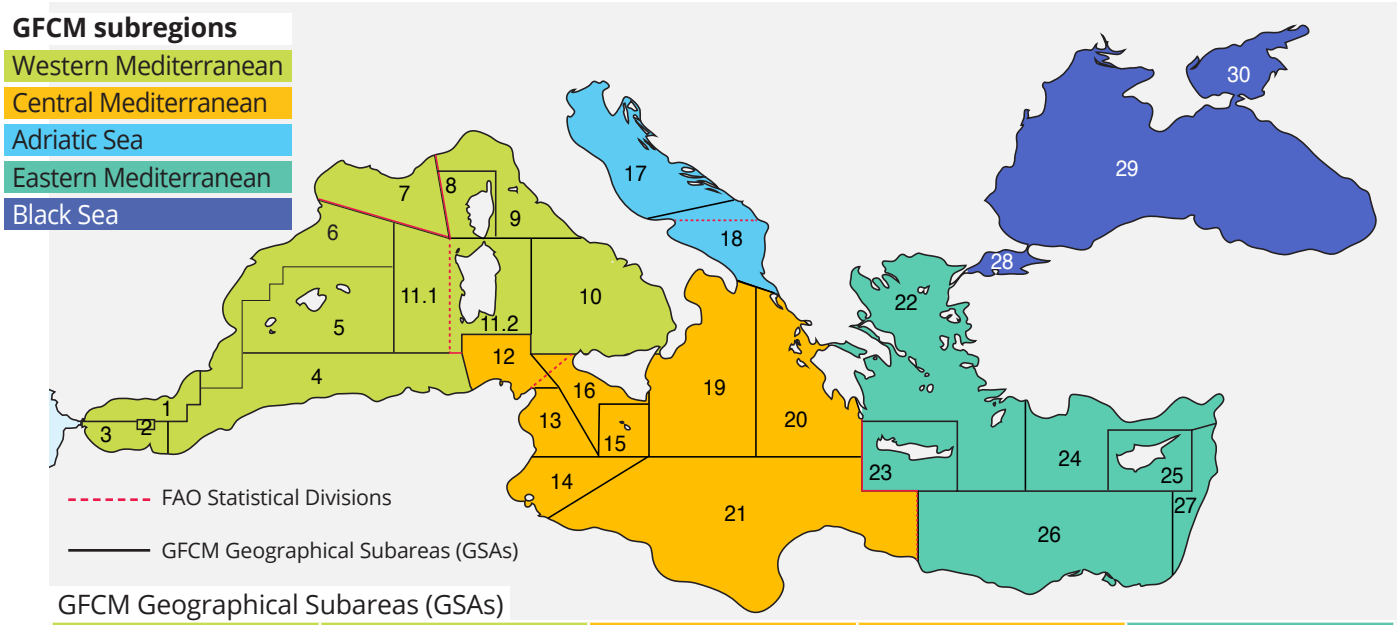
(see FAO 2018 for more detail)

3 The GFCM adopted a shark finning ban in 2012, going on to strengthen this in 2018 with the adoption of fins-naturally-attached. GFCM/42/2018/2 stating "it shall be prohibited to remove shark fins on board vessels and to retain, tranship or land shark fins". However, it should be noted that there is no known market specifically for angel shark fins.

4. SubRegional Action Plans

4.1 MEDITERRANEAN SUBREGIONS

This RAP acknowledges the challenges associated with delivering actions across numerous coastal states and territories. There are five GFCM subregions, which are further divided into 30 GFCM Geographical Subareas (GSAs) across the Mediterranean and Black Seas (Figure 2). Subareas differ in size and may represent the waters and coastline of one or more coastal state, or a sub-section of a country's EEZ (e.g. Tunisia).



GFCM Geographical Subareas (GSAs)

01 – Northern Alboran Sea	07 – Gulf of Lion	13 – Gulf of Hammamet	19 – Western Ionian Sea	25 – Cyprus
02 – Alboran Island	08 – Corsica	14 – Gulf of Gabes	20 – Eastern Ionian Sea	26 – South Levant
03 – Southern Alboran Sea	09 – Ligurian Sea and Northern Tyrrhenian Sea	15 – Malta	21 – Southern Ionian Sea	27 – Eastern Levant Sea
04 – Algeria	10 – South and Central Tyrrhenian Sea	16 – South of Sicily	22 – Aegean Sea	e28 – Marmara Sea
05 – Balearic Islands	11.1 – Sardinia (west) 11.2 – Sardinia (east)	17 – Northern Adriatic Sea	23 – Crete	29 – Black Sea
06 – Northern Spain	12 – Northern Tunisia	18 – Southern Adriatic Sea	24 – North Levant Sea	30 – Azov Sea

Figure 2 – GFCM subregions and geographical subareas. Map sourced from FAO (2018). The State of Mediterranean and Black Sea Fisheries. General Fisheries Commission for the Mediterranean. (Reproduced with permission).

4.2 SubRAP STRUCTURE

Central to the effective delivery of the RAP will be the recognition of threats characteristic of the subregions, allowing the tailoring of actions and the identification of key local partners. As such, a series of SubRegional Action Plans (SubRAPS) will be developed for areas considered high priority for angel sharks. These SubRAPs may cover one or more GFCM GSAs.

Following a provided template, a proforma can be used to:

- Identify and connect key individuals and organisations active in subregions.
- Detail the status of angel sharks in the area.
- Outline existing conservation measures.
- Consider threats and constraints.
- Review Goals and Objectives.
- Set detailed Actions.

Actions aimed at gathering robust data or better evidence are crucial, analysis at the subregional scale is of primary importance, and cooperation among countries/territories is essential. In order to develop a holistic approach, existing information must be shared, approaches standardised, and monitoring schemes established or expanded.

5. Distribution maps

Angel shark sightings and captures can be recorded through the centralised ASCN Angel Shark Sightings Map at ***www.angelsharknetwork.com/#map*** where the most recent sightings can also be viewed. With angel sharks now so rarely encountered in the Mediterranean, reliance falls on fisheries data and reports of bycatch (including incidental catch), as well as novel approaches such as citizen science, social media, and interviews with fishers to increase knowledge on distribution (Fortibuoni *et al*., 2016, Giovos *et al*., 2019, Lawson *et al*., in press). The effectiveness of scientific surveys in detecting rare species has been questioned, demonstrated by the complete absence of angel sharks in scientific trawl surveys conducted in the Adriatic Sea since 1958 (Holcer and Lazar, 2017; Fortibuoni *et al*., 2016). However, during a 2018 scientific survey in the Strait of Sicily, Tyrrhenian Sea, rare footage of *S. oculata* was filmed by a Remotely Operated Vehicle (ROV) at 160 m by the Italian National Institute for Environmental Protection and Research (ISPRA) (L. Tunesi, pers. comm.).

Additional recording programmes exist in the Mediterranean and feed information into the ASCN Angel Shark Sightings Map. These include the following:

- The Mediterranean Elasmobranchs Citizen Observations (MECO) collaborative network document elasmobranch sightings data across the Mediterranean. By utilising citizen science reports, interviews with fishers, literature reviews, and fisheries data, many new records of *S. aculeata, S. oculata,* and *S. squatina* have been discovered (details of 18 individuals are outlined in Giovos *et al*., 2019).
- The Mediterranean Large Elasmobranchs Monitoring (MEDLEM) programme collates cartilaginous fishes in the Mediterranean Sea, with bycatch, incidental catch, sightings, strandings, and historical references all evaluated. Twenty different countries participate in MEDLEM and up until 2017, 21 *S. aculeata*, 10 *S. oculata*, and 8 *S. squatina* were reported (Mancusi *et al*., 2019 in prep.).
- SharkPulse is a recording platform which collects images of sharks from around the world, using citizen science to support research on ecology and conservation (Ferretti *et al*., 2019).

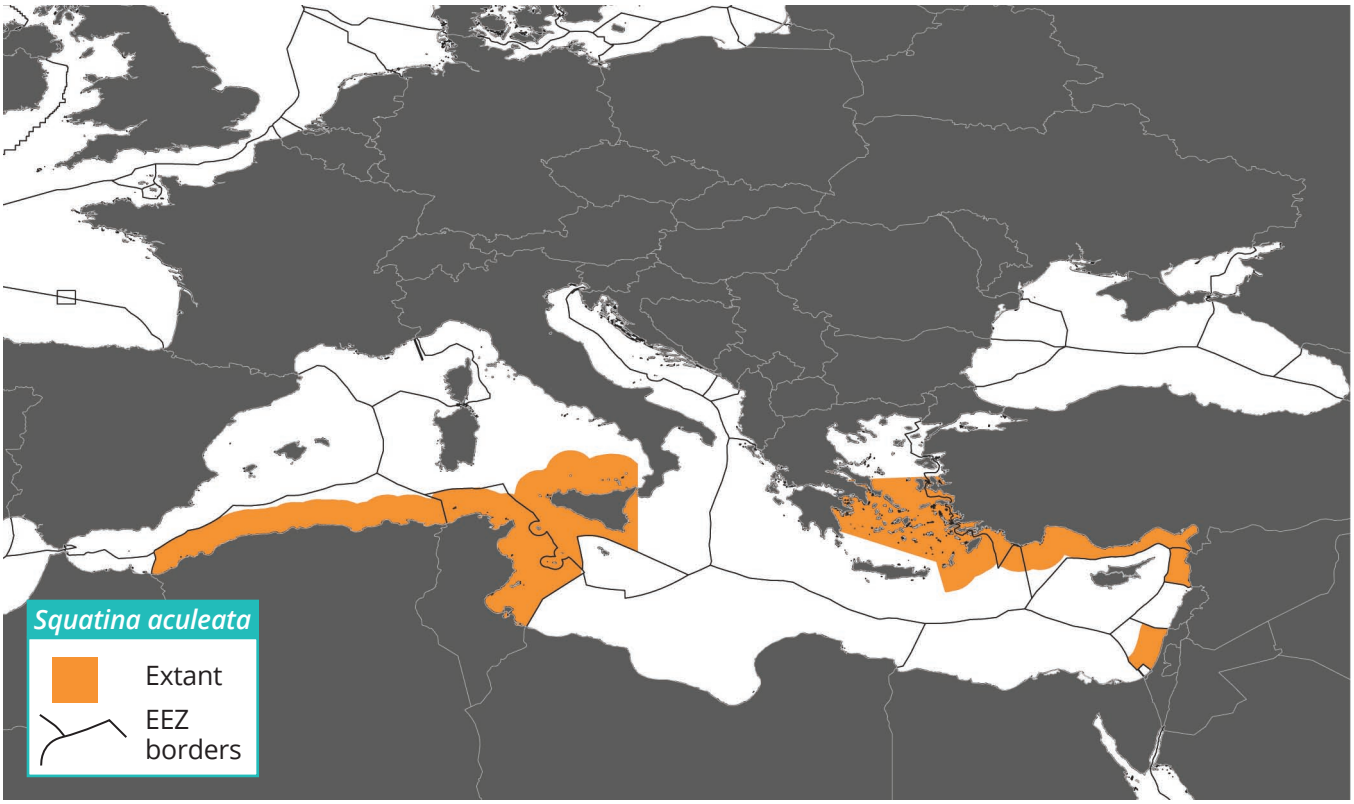


Figure 3. Known contemporary distribution of Squatina aculeata.

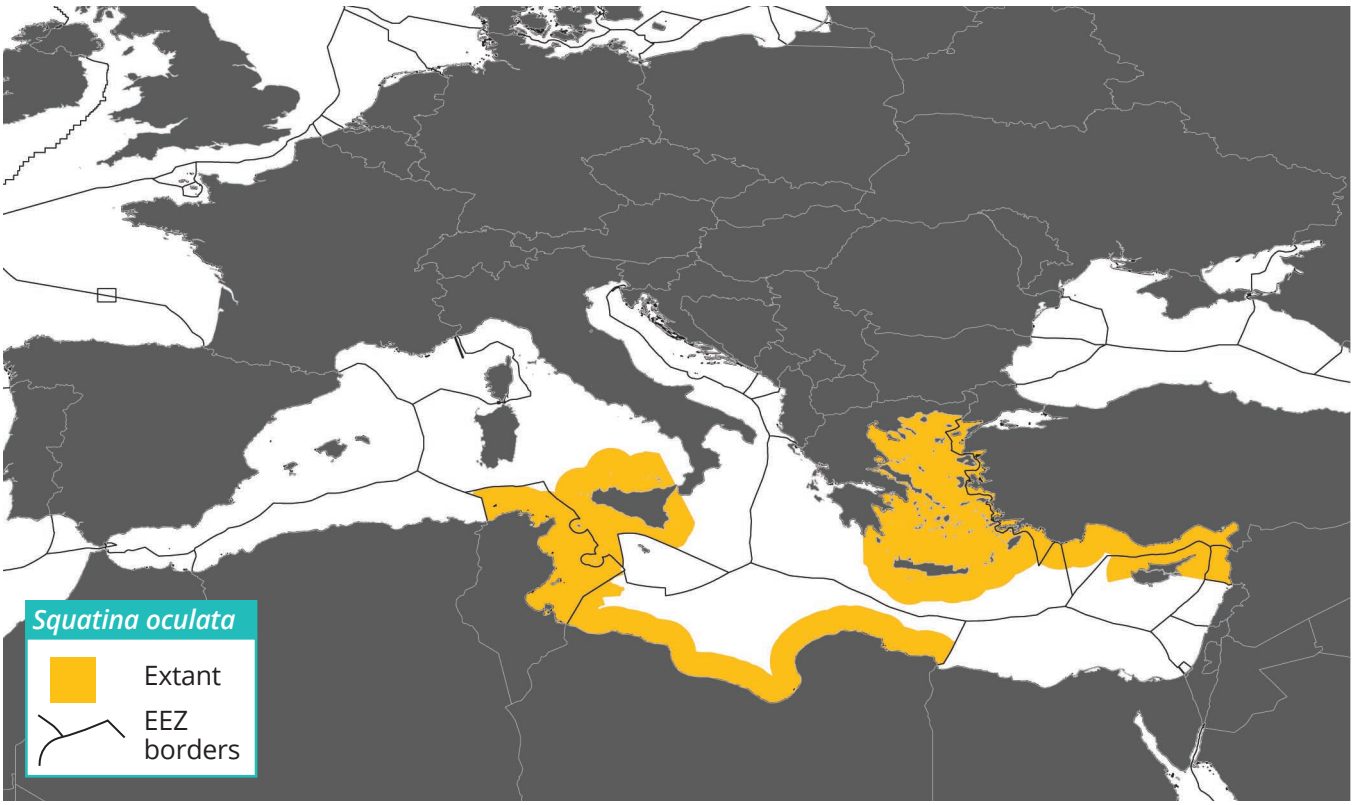


Figure 4. Known contemporary distribution of Squatina oculata.

Distribution maps (Figures 3, 4 and 5) have been constructed from sightings documented through a range of sources, including: fish market surveys, fishers observations and interviews, published literature, personal communications, social media posts, citizen science projects, and submissions to the ASCN Angel Shark Sightings Map.

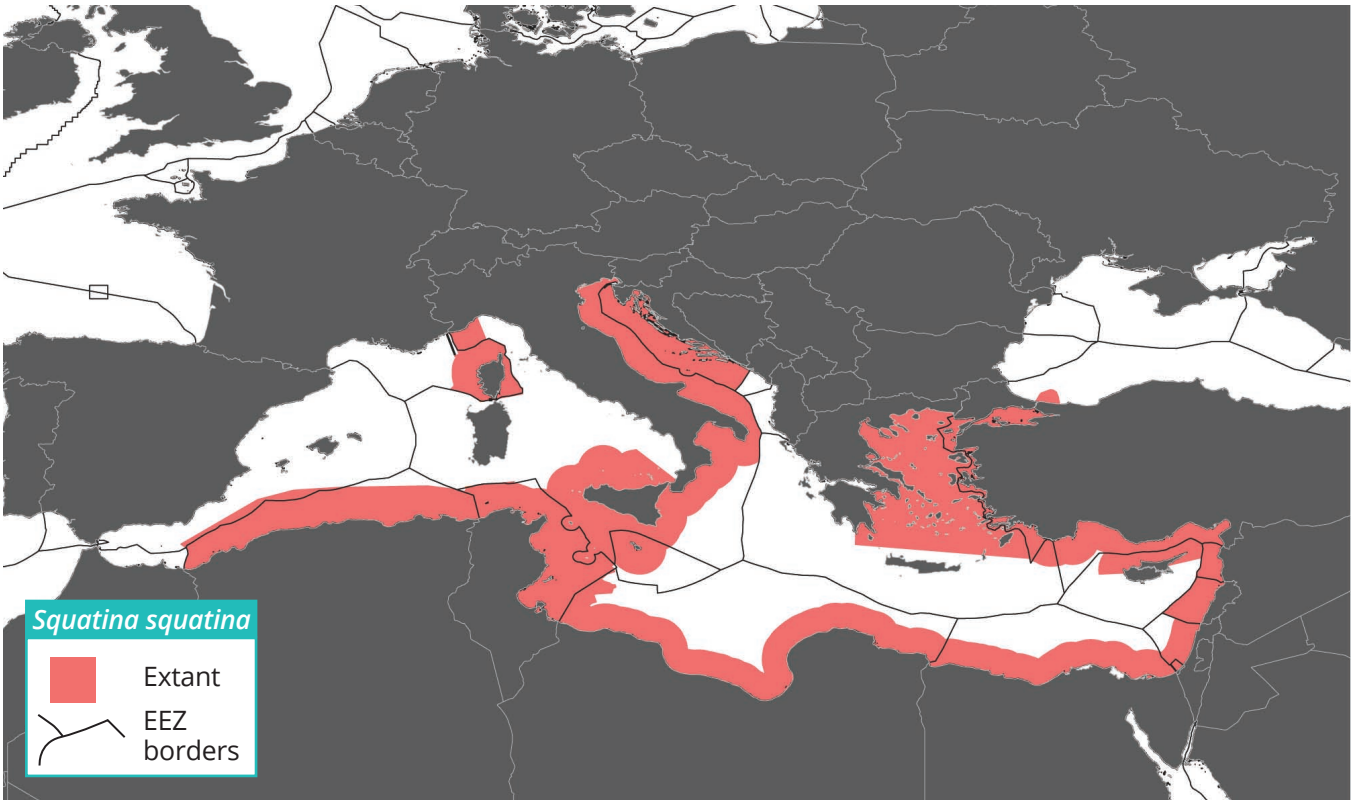


Figure 5. Known contemporary distribution of Squatina squatina.

6. Threats in the Mediterranean

6.1 THREAT TABLE

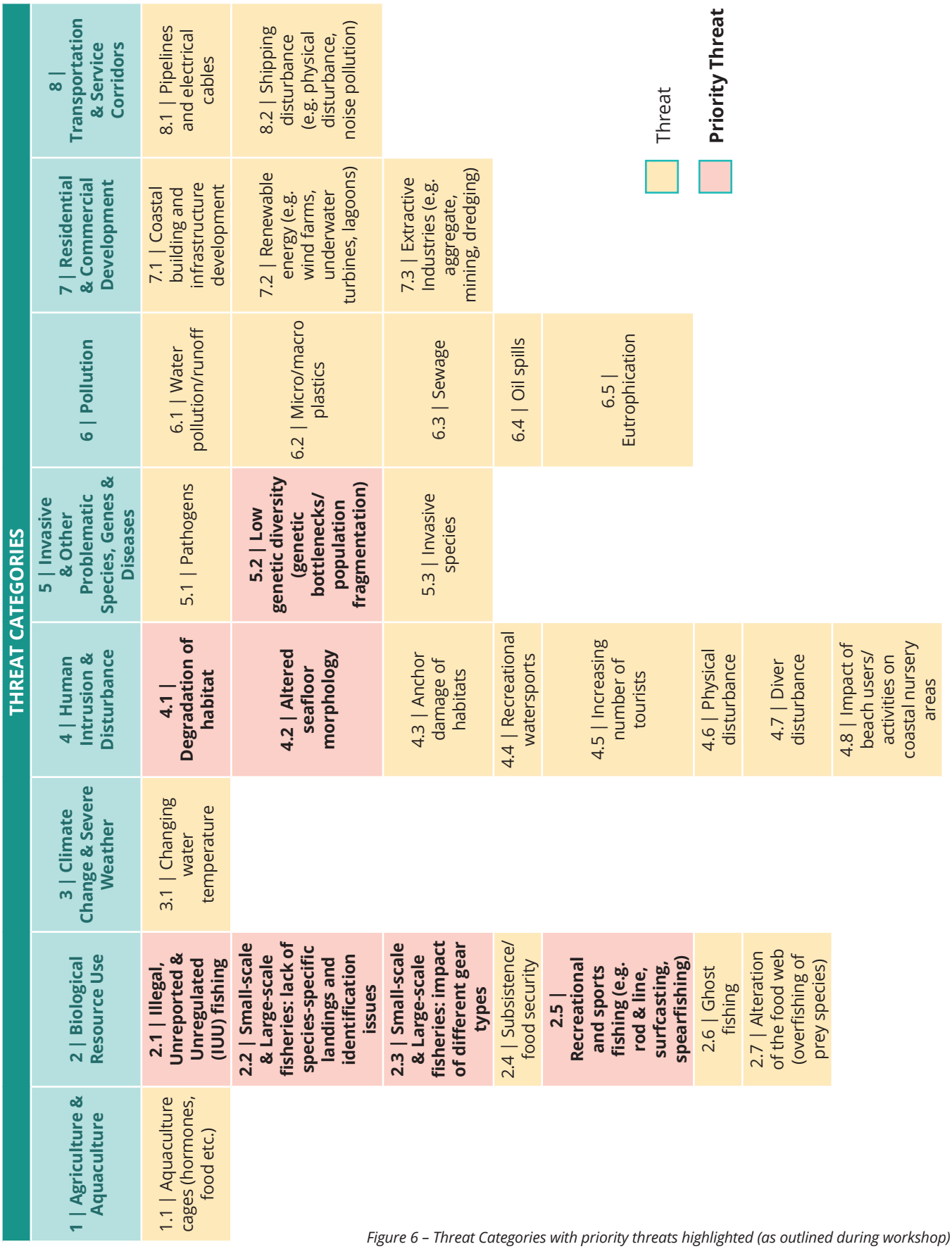


Figure 6 – Threat Categories with priority threats highlighted (as outlined during workshop)

6.2 MEDITERRANEAN THREAT ANALYSIS

Headline threat categories were determined using the IUCN Red List Threat Classification Scheme Version 3.2 (Salafsky *et al*., 2008, IUCN/SSC 2008). Each first-level entry is then sub-divided into second-level entries. These second-level entries are adapted from those identified during the development of the Strategy and the Angelshark Action Plan for the Canary Islands (Figure 6). Most of the direct threats are proximate human activities that have impacted, are currently impacting, or may impact the status of angel sharks – these could be countered with appropriate actions.

Eight first-level threat categories from the classification criteria were identified as relevant, with 30 threats outlined beneath these. Seven second-level entries are highlighted as priority threats in the Mediterranean, with the remaining threats considered less pertinent at this time, however this may change once further research is conducted in subregions. Priority threats were clustered in three categories: Biological Resource Use; Human Intrusion and Disturbance; Natural System Modification.

Most threats grouped under Biological Resource Use relate to fishing activities. This is unsurprising given that the Mediterranean and Black Seas (FAO major fishing area 37) have been subject to intense fishing activities since ancient times (FAO, 2018). As well as fishing, habitat destruction is considered here to be a significant threat for angel sharks in the Mediterranean.

More detailed analysis of these threats will be conducted during the SubRAP process, with potential impacts on angel sharks and their habitats carefully considered in each region.

Definitions (IUCN/SSC 2008)

THREAT: A factor which causes either a substantial decline in numbers of individuals of that species, or a substantial contraction of the species' geographic range. Proximate threats are immediate causes of population decline, usually acting on birth or death rates (e.g. habitat loss, overfishing). Ultimate threats are root causes of proximate threats and are usually anthropogenic e.g. habitat loss (a proximate threat) may be driven by human population growth (an ultimate threat).

CONSTRAINTS: Factors which contribute to or compound the threats (e.g. lack of political will and resources might contribute to a lack of law enforcement, leading in turn to over-exploitation).

6.3 CONSTRAINTS

General constraints were discussed by participants during the Tunisia workshop[4]. The list below provides examples and is not exhaustive. These will be built on and refined when looking at specific subregions and subareas in SubRAPs.

Political, Economic, and Legal factors

- The complex multijurisdictional nature of the Mediterranean with > 20 bounding countries.
- Weak implementation of existing regulations and protection measures.
- A lack of resources and capacity, including that of governments to implement measures.
- Widespread landing sites challenge efforts to perform Monitoring, Control, and Surveillance.
- Political instability affecting some Mediterranean coastal states and territories.
- Coastal communities' reliance on subsistence fishing.

Social factors, including that which relates directly to conservation actors

- The number of languages in the region, making communications more challenging.
- Lack of fishers' knowledge of legislation and conservation measures.
- Limited coordination of conservation efforts and limited capacities.
- Widespread overfishing in the Mediterranean making it challenging to prioritise actions for angel sharks.
- A "culture of non-compliance" in some areas.
- Limited funding for conservation.

Scientific and other knowledge

- Lack of data (on sightings etc.) due to the low frequency of catches.
- Lack of knowledge on habitat change.
- Lack of knowledge on critical habitats.
- Misidentification with other species (e.g. guitarfishes).
- Most fisheries are multispecies and rarely record to species level.
- Scientific trawl surveys are not covering areas where angel sharks are likely to occur.
- A full understanding of the impact of climate change is absent.
- Lack of understanding of non-fishing human activities (e.g. tourism).

Interventions should then be aimed at minimising or mitigating threats, while addressing constraints as necessary.

4 The workshop used a Political, Economic, Social, Technological, Legal, Environmental, (PESTLE) framework to map constraints which have been collated under generic headings.

7. Mediterranean Regional Action Plan

7.1 VISION

Mediterranean angel sharks are restored to robust populations fulfilling their ecological roles in healthy ecosystems.

7.2 GOALS

With the predominant threats to angel sharks in the Mediterranean being centred around fisheries and habitat degradation, the priority Goals of the Regional Action Plan are focused on these two threats and grouped under Fisheries or Habitats/Human Activities. In addition, an underlying goal focusing on the implementation of legislation and regulations is outlined to ensure both the species and their critical habitats are better protected. Actions that will be undertaken to help realise these Goals and Objectives seek to address or mitigate relevant constraints and will vary according to geographic region.

Ensuring a healthy ecosystem is beyond the scope of the conservation work outlined here. Better protection of Critical Angel Shark Areas (CASAs) will, however, benefit the wider marine ecosystem. We also recognise that as well as the ecological role angel sharks play, they have several other values, including cultural, social, touristic, historic, intrinsic, and naturalistic values; as well as important considerations in communication and education considering the former abundance and steep declines in some areas.

While many of the actions outlined here can be applied across the Mediterranean, specifics (including timescales and approximate costs) will be detailed within SubRAPs. In addition, all materials (including guidance documents) will be translated into appropriate languages (where feasible) as part of the SubRAPs.

VISION ***Mediterranean angel sharks are restored to robust populations fulfilling their ecological roles in healthy ecosystems.***	
GOAL 1	**GOAL 2**
Fisheries-based angel shark mortality is minimised in the Mediterranean	Angel shark habitat is identified and protected
UNDERLYING GOAL 3	
National legislation for angel sharks is established, implemented and enforced	

7.3 GOAL 1 – FISHERIES

The following overview of Mediterranean fisheries draws on the most recent assessment: *The State of Mediterranean and Black Sea Fisheries 2018* (FAO 2018).

The officially reported fishing fleet operating in the Mediterranean and Black Seas in 2017 comprised around 86,500 vessels. The fishing fleet is unevenly distributed across the GFCM subregions, with the Eastern Mediterranean accounting for the largest share of vessels (30.6%), followed by the Central Mediterranean (26.4%), the Western Mediterranean (17.3%), the Black Sea (13.4%) and the Adriatic Sea (12.3%) (FAO 2018).

Governments of coastal states and territories party to the GFCM agreed in 2012 to a binding Recommendation (GFCM/36/2012/3, later amended to GFCM/42/2018/2) which prohibits the retention, transhipment, landing, storage, display, and sale of 24 species of elasmobranch including the three *Squatina* species. This regulation is operational and requires transposition into national legislation for coastal states and territories to be compliant.

***Squatina squatina* in Libya**
© Sara Al Mabruk

Subsistence or small-scale fisheries (SSF) are deeply rooted in the fabric of the Mediterranean and Black Seas. SSF play a significant social and economic role in the Mediterranean: representing 84% of the fishing fleet (70,000 vessels), 26% of the total revenue and 60% of total employment (150,000). SSF usually exploit coastal waters closer to their homeport, making an important contribution to food security in local communities. Exemptions from spatial aspects of the GFCM shark Recommendation (GFCM/42/2018/2) are available for the SSF fleet. Although no applications to the Secretariat have been made at this time, exemptions could result in the SSF representing a significant threat to angel sharks in coastal waters.

The historic naming of fishing gear after angel sharks demonstrates that they were once an important component to fisheries across the Mediterranean. Reported landings of angel sharks in the Mediterranean have fluctuated, from 108 tonnes in 2009 to a peak of 185 tonnes in 2015 (FAO FishStat Plus). Although Tunisia alone reported landings of over 100 tonnes of angel sharks each year between 2014 – 2017 (FAO FishStat Plus), there appears to be confusion with these statistics as angel sharks are rarely seen by observers or recalled in interviews with fishermen (M. Bradai pers. comm.). Data reporting is exceptionally poor, and these official landings could be misidentification (likely with guitarfishes[5]) or entered into an incorrect category. With so many landings recorded in aggregated categories, captures of angel shark, and therefore population declines, could be further masked.

Despite anecdotal evidence suggesting that marine recreational fisheries constitute significant fishing activity, data collection for this sector is limited and varies between countries. Only 14 of the coastal states/territories have licence requirements for recreational angling (FAO 2018). Actions aimed at gathering robust data or better evidence are crucial. SPA/RAC developed guidelines for recreational fishers designed to promote catch and release, improve post-release survival, encourage data collection, and increase public knowledge of sharks and rays in the Mediterranean (UNEP-MAP RAC/SPA 2012). These guidelines should be drawn upon when considering recreational fisheries in the region. In addition, a GFCM Recreational Fisheries Handbook is in prep.

5 Blackchin Guitarfish and Common Guitarfish are also highly threatened and are prohibited under GFCM/42/2018/2

Vital steps include ensuring good practice for handling angel sharks accidentally caught, as well as encouraging fishing practices that reduce angel shark bycatch and/or facilitate live release with low post-release mortalities. Necessary capacity building includes training and education on identification and handling for fishers and enforcement bodies, with specific actions identified in the SubRAPs.

This Goal addresses the priority threats outlined in Threat 2 – Biological Resource Use – which are (2.1) Illegal, Unreported and Unregulated (IUU) fishing, (2.2) lack of species-specific landings and identification issues in SSF and LSF fisheries, (2.3) impact of differing gear types in SSF and LSF fisheries, and (2.5) recreational fishing. Constraints are extensive and include weak implementation of existing regulations, lack of resources and capacity to implement measures, widespread landing sites challenging monitoring efforts, political instability, lack of fishers' knowledge of legislation and conservation measures, non-compliance, misidentification with other species, and aggregated landings. More specific actions will be developed in individual SubRAPs. See also Underlying Goal 3, Objectives 3.1 and 3.2 which address protective measures.

GOAL 1 **Fisheries-based angel shark mortality is minimised in the Mediterranean.**		**By who?***	**SubRAP specific?****
Objective 1.1	**Reporting and monitoring in all segments of Mediterranean fisheries, including recreational, is improved for the three species of angel shark.**		
Action 1.1.1	Produce identification materials featuring the three species of angel sharks and lookalike/similar species (e.g. guitarfishes) so species-specific reporting is improved.	ASCN	
Action 1.1.2	Develop guidance documents for reporting procedure in line with GFCM Recommendations for data recording and ensure the document is accessible to industry.	GFCM Governments Fishing industry NGOs	
Action 1.1.3	ASCN Angel Shark Sightings Map widely advertised through social media to encourage submissions from recreational anglers.	ASCN	
Action 1.1.4	Engage with regional observer programmes to ensure collation of angel shark records.	NGOs ASCN RAC/SPA	
Action 1.1.5	Comply with existing GFCM and national reporting procedures.	Fishing industry Governments	
Objective 1.2	**Incidental catch of angel sharks by all segments of Mediterranean fisheries is minimised.**		
Action 1.2.1	Collate data on incidental catch to inform management measures (liaise with programmes such as the Med Bycatch Project).	GFCM NGOs	
Action 1.2.1	Ascertain the level of bycatch and incidental catch by gear type in order to inform further necessary action.	Governments Fishing industry NGOs	✔
Action 1.2.2	Map hotspots for bycatch of angel sharks (spatially and temporally).	NGOs ASCN Researchers	✔
Action 1.2.3	Secure spatial/temporal management and gear restrictions based on collated data.	Governments ASCN NGOs GFCM	✔

GOAL 1 (continued) **Fisheries-based angel shark mortality is minimised in the Mediterranean.**		**By who?***	**SubRAP specific?****
Objective 1.3	**Retention is reduced, and post-release survival enhanced, through information, training, and education for fishers.**		
Action 1.3.1	Develop angel shark handling guides for fishers to improve post-release survival in the Mediterranean (using existing guidance materials as a basis).	ASCN	
Action 1.3.2	Identification (see Action 1.1.1) and handling guides (see Action 1.3.1) to be disseminated amongst fishing industry, recreational anglers, enforcement bodies, fish markets, governments etc..	NGOs GFCMs Governments	
Action 1.3.3	Develop training programmes to educate fishers about conservation status and prohibited status of angel sharks, as well as best practice handling techniques.	Governments NGOs	✔
Action 1.3.4	Ascertain other drivers to angel shark retention to inform actions.	NGOs ASCN	✔
Objective 1.4	**The extent of interaction between marine recreational fishing activities and angel sharks is ascertained and minimised.**		
Action 1.4.1	Quantify the level of recreational fishing activity in the Mediterranean, guided by GFCM recreational fisheries handbook.	GFCM Governments	(GFCM hand-book in prep.)
Action 1.4.2	Collate information on whether licence systems are in force in each subregion and what requirements are stipulated.	NGOs ASCN	✔
Action 1.4.3	Determine how often recreational fishers encounter angel sharks (contemporary and historical records).	GFCM NGOs ASCN	✔
Action 1.4.4	Create recreational fishing best practice guidelines specific to the three *Squatina* species in the Mediterranean drawing on existing recreational guidelines where available.	NGOs ASCN	
Action 1.4.5	Identify angling clubs/shops in each region where guidelines can be distributed.	NGOs ASCN	✔
Action 1.4.6	Encourage participation of recreational fishers in data collection.	NGOs ASCN	✔

** Broad categories have been used here to give an indication of who will be involved. Actions have not been assigned to specific stakeholders (e.g. reference to GFCM could include actions of the Secretariat and/or the Parties) at this level and details will be drawn out in the SubRAP process with input from regional authorities and collaborators.*

*** While most actions will be relevant across the Mediterranean, those identified with a tick are particularly applicable at a subregional level and more detailed actions should be developed.*

7.4 GOAL 2 – HABITATS & NON-FISHING HUMAN IMPACT

Due to their demersal nature, human-induced habitat degradation poses a significant threat to angel sharks. Human impact in this instance is non-fishing related, and could include extractive and renewable energy industries, coastal developments, and tourism. Threats to habitat will vary across the Mediterranean and need to be addressed accordingly in each region during the SubRAP process.

In order to assess human impact on habitats, there is first a need to better understand the distribution of all three species in the Mediterranean, including ideal substrate and bathymetry. While *S. squatina* inhabit shallower coastal waters (5-150 m), *S. aculeata* and *S. oculata* are thought to be found further offshore (20-500 m) on soft substrates. In recent ROV footage documented by ISPRA, a *S. oculata* was filmed resting on sand at 160 m. In the Canary Islands, *S. squatina* are known to predominantly use areas of sand strips adjacent to reefs but have also been observed resting on reefs and in seagrass meadows. Habitat use has been documented to change according to body size and sex, with juveniles occurring in shallower waters (Meyers *et al*., 2017). Predator avoidance and availability of prey may also have a bearing on habitat. While preferred habitat is largely unknown in the Mediterranean, other species within the family *Squatinidae* are likely to have similar preferences so they can bury themselves for camouflage, both to shelter from potential predators and to capture prey.

***Squatina squatina* neonates following capture of female in trawl off Gökçeada Island (2010) © Çetin Keskin**

CRITICAL ANGEL SHARK AREAS (CASAs): a specific geographic area that contains essential features necessary for the conservation of angel sharks. This may include an area that is not currently occupied by the species that will be needed for its recovery or conservation e.g. nursery, mating, aggregation and foraging areas.

Marine Protected Areas (MPAs) can be effective tools for protecting the marine environment. Most of the protected areas in the Mediterranean occur in coastal waters in the north, highlighting the importance of identifying MPAs along the southern and eastern coasts, as well as on the high seas (Bradai *et al*., 2018).

With so little known about *S. aculeata* and *S. oculata* in particular, understanding the habitat preferences for these species is vital. Therefore, critical habitats must be identified and mapped. In addition, mapping key spatial information drawn from a broad range of disciplines (e.g. MPAs, shipping areas, tourism sites, fishing activities, oceanographic data) and overlaying this with known distribution will help inform which areas need particular attention. Critical Angel Shark Areas (CASAs) should be protected and while some may already fall within protected areas, others may need measures (spatial or temporal) in place to safeguard from potentially destructive activities.

Goal 2 mainly addresses Threat 4 – Human Intrusion and Disturbance. With so little known about habitat preference and the effect of human activities (beyond fishing), at present the priority threats are perceived to be (4.1) degradation of habitat and (4.2) altered seafloor morphology. Relevant constraints to consider include lack of resources and capacity, political instability, lack of knowledge on habitat change and critical habitat, lack of understanding of non-fishing human activities. More specific actions will be developed for relevant Geographical Subareas in the SubRAPs.

GOAL 2 **Angel shark habitat is identified and protected.**		**By who?***	**SubRAP specific?****
Objective 2.1	**Angel shark distribution is better understood.**		
Action 2.1.1	Increase the profile of three species to encourage public reporting to ASCN Angel Shark Sightings Map, complementing fisheries data.	ASCN NGOs	
Action 2.1.2	Liaise with scientific surveys operating throughout the Mediterranean and encourage engagement with this RAP (e.g. through data provision, assessments etc.).	ASCN NGOs Researchers	
Action 2.1.3	Use fisheries data and other reporting methods to improve spatial data on distribution.	GFCM Governments Fishing industry	
Objective 2.2	**The impact of non-fishing activities on angel sharks in the Mediterranean is better understood.**		
Action 2.2.1	Engage dive clubs across the Mediterranean to look out for signs of presence (e.g. angel shark 'beds').	ASCN NGOs	✔
Action 2.2.2	Identify and map popular beaches and dive sites and compare with sightings data.	Researchers NGOs ASCN	✔
Action 2.2.3	Investigate the impact of beach users at tourist hotspots near CASAs.	Researchers NGOs ASCN	
Action 2.2.4	Confirm if noise impacts angel sharks and if there are ways this can be mitigated.	Researchers ASCN	
Action 2.2.5	Identify if areas with high levels of pollution (plastics, agriculture etc.) overlap with important areas for angel sharks.	Researchers	
Objective 2.3	**Angel shark habitat is identified, specifically Critical Angel Shark Areas (CASAs).**		
Action 2.3.1	Determine general features of potential CASAs based on those habitats in which angel sharks have been sighted on previously.	Researchers	
Action 2.3.2	Based on Action 2.3.1, examine models to predict potential CASAs.	Researchers	
Action 2.3.3	Increase engagement with SPA/RAC habitat mapping programmes to identify potential CASAs.	NGOs SPA/RAC Governments	
Action 2.3.4	Evaluate spatial distribution of threats and existing conservation measures (e.g. MPAs, Natura 2000).	Researchers	
Action 2.3.5	Identify key habitats that are not protected/not sufficiently protected and make suggestions for improved management of areas (with involvement from stakeholders).	Researchers	
Action 2.3.6	Identify activities and develop management plans aiming to conserve and restore CASAs in CMS Range States, in line with CMS Appendix I obligations.	CMS Parties	

GOAL 2 (continued) **Angel shark habitat is identified and protected.**		**By who?***	**SubRAP specific?****
Objective 2.4	**Angel shark habitat is reflected in marine spatial planning and coastal development.**		
Action 2.4.1	Engage with Environmental Impact Assessment (EIA) process prior to coastal developments near CASAs.	Governments Wider industry NGOs	✔
Action 2.4.2	Monitor coastal developments near CASAs and mitigate impacts where possible.	Governments Wider industry NGOs	✔
Action 2.4.3	Identify what spatial/temporal management measures would be most appropriate according to each subarea.	GFCM Governments Input from NGOs	✔
Action 2.4.4	Include CASAs in MPA processes and EIA to ensure these areas are managed sustainably, that important habitat features are conserved and maintained or re-established and that impacts on angel sharks are kept at acceptable levels.	Governments	

** Broad categories have been used here to give an indication of who will be involved. Actions have not been assigned to specific stakeholders (e.g. reference to GFCM could include actions of the Secretariat and/or the Parties) at this level and details will be drawn out in the SubRAP process with input from regional authorities and collaborators.*

*** While most actions will be relevant across the Mediterranean, those identified with a tick are particularly applicable at a subregional level and more detailed actions should be developed.*

7.5 UNDERLYING GOAL 3 – LEGISLATION AND REGULATIONS

While the status of angel sharks in the Mediterranean is especially concerning, there are several existing measures which if effectively implemented could assist in achieving the vision of this RAP. Engagement of all Mediterranean coastal states and territories is essential, and advocacy for greater implementation and compliance a key activity. The number of protective measures is greater for *Squatina squatina* than for *S. aculeata* and *S. oculat*a – as shown in Table 1.

INTERNATIONAL

The listing of Angelshark (*S. squatina*) under the Convention on the Conservation of Migratory Species of Wild Animals (CMS) was accompanied by a Concerted Action for the Angelshark (CMS/Sharks/MOS3/Inf.10 2018). This document provides a framework of activities, reflecting those in the Eastern Atlantic and Mediterranean Angel Shark Conservation Strategy. While the Concerted Action aims to deliver conservation specifically for Angelshark (*S. squatina*), it explicitly benefits all three angel shark species with overlapping ranges. Government engagement is being sought to ensure wider implementation of the RAP by CMS Parties. A CMS Range States focal point meeting is planned to negotiate a CMS annex to this RAP which will outline high priority activities for governments. Additional consultation with governments and authorities will be sought during the SubRAP processes.

REGIONAL

A binding Recommendation adopted by the 24 Parties to the GFCM (GFCM/36/2012/3, amended to GFCM 42/2018/2) agrees to prohibit the retention and sale of 24 elasmobranchs listed on Annex II of the Barcelona Convention, including all three species of angel sharks. The European Union (EU) transposed the GFCM Recommendation into EU Regulation (EU 2015/2102), prohibiting the retention of all three species of angel sharks in the Mediterranean and augmenting the prior listing of Angelshark (*S. squatina*) as a Prohibited Species under the Common Fisheries Policy annual fisheries quotas. Adoption of full protection measures at national levels to cover additional activities (e.g. recreational angling) by the EU Member States has been disappointing to date.

The Action Plan for the Conservation of Cartilaginous Fishes (Chondrichthyans) in the Mediterranean Sea (UNEP/MAP) provides a framework for species conservation and habitat protection. The success of the UNEP/MAP requires increasing cooperation between different jurisdictions and sectors at national, regional and international levels (UNEP MAP RAC/SPA, 2003 – under review in 2019).

NATIONAL

Transposition of the GFCM binding Recommendation into national legislation has been poor, with limited or incomplete implementation in approximately half of the jurisdictions. National legislation (where in place) vary from total bans on shark fishing to listing all or a subset of species from the GFCM Recommendation. Very few explicitly name angel sharks within the legislation (Table 1). Even within those coastal states and territories with legislation prohibiting retention of angel sharks, landings continue to be reported and enforcement is inadequate.

Transposition of legal obligations under CMS should be evidenced for species and habitat requirements.

***Squatina oculata* ROV footage in the Strait of Sicily (October 2018) © Simonepietro Canese & Leonardo Tunesi/ISPRA**

FISHERIES MANAGEMENT MEASURES

Under EU regulation, the use of towed gears is prohibited within 3 nm of the coast, or within the 50 m isobath where that depth is reached at a shorter distance from the coast (Council Regulation (EC) No 1967/2006 Article 13). This measure is reflected in GFCM/36/2012/3 (retained in GFCM/42/2018/2) to protect coastal sharks and rays as well as benthic communities throughout the GFCM area of application. Similar regulations providing protection for coastal areas are in place in different countries (e.g. Italy). While derogations could undermine the value of the GFCM Recommendation, no formal applications for exemptions have been made to the GFCM Secretariat at this time. Where effectively enforced, this measure could reduce the pressure on angel sharks and possible CASAs.

Temporary closures of fishing grounds, demanding the complete cessation of trawling fleet activity for a variable period, are imposed in several regions of the Mediterranean. These closures relate to more commercial species (e.g. teleosts) and aim to protect demersal resources during the most vulnerable stage of their life cycle, recruitment. The duration and seasonality of these closures vary amongst countries, ranging from 30–45 days in Italy to two months in Spain, three months in the Gulf of Gabes, Tunisia and four to five months in Greece.

UNDERLYING GOAL 3

It is the intention that this RAP will work synergistically with national and regional instruments (e.g. UNEP/MAP, EU Community Plan of Action for Sharks, National Action Plans) to provide a framework and impetus for effective delivery. The route to securing national legislation, or improving implementation, will be tailored to each coastal state/territory and the details reflected in specific SubRAPs.

This Underlying Goal is linked to Goals 1 and 2 as it relates to legislation and regulations needed for species and habitats – it is an essential element of this RAP. Constraints to consider include the complex multijurisdictional nature of the region, weak implementation of existing measures, lack of resources and capacity, widespread landing sites challenging Monitoring, Control and Surveillance, political instability, challenging communication, lack of knowledge of legislation, widespread overfishing, culture of non-compliance, and aggregated landings. The actions outlined here are relevant to all Mediterranean countries where angel sharks are present, with more specific actions targeted at Geographical Subareas detailed in the SubRAPs.

UNDERLYING GOAL 3 **National legislation for angel sharks is established, implemented and enforced.**		**By who?***	**SubRAP specific?****
Objective 3.1	**Angel sharks are protected by regional and national management measures (where GFCM/42/2018/2 has been adopted, go to Action 3.1.5 or Objective 3.2).**		
Action 3.1.1	Review national legislation and identify gaps in the implementation of relevant international and regional obligations, including those under GFCM and CMS.	Governments CMS GFCM ASCN	(CoP14)
Action 3.1.2	Transpose GFCM/42/2018/2 into national legislation where lacking.	Governments	
Action 3.1.3	Fulfil obligations under CMS App I & II listing and CMS Sharks MoU Annex I.	Governments CMS	
Action 3.1.4	Engage with governments/CMS Range States and industry to aid compliance with existing legislation/policies/regulations.	NGOs ASCN	✔
Action 3.1.5	Where absent, seek adoption of full protective measures to cover recreational activities and disturbance.	NGOs Governments	✔
Objective 3.2	**Management measures are implemented and enforced.**		
Action 3.2.1	Implement and enforce GFCM/42/2018/2 & national legislations.	Governments Fishing industry NGOs	
Action 3.2.2	Implement CMS Appendix I listing in all Mediterranean and Black Sea Range States.	Governments NGOs	
Action 3.2.3	Reinforce compliance reporting processes at regional fora, requiring more detailed documentation.	Governments GFCM NGOs	
Action 3.2.4	Highlight cases of non-compliance with existing legislation/ policies/regulations to key regional and international fora (e.g. GFCM, SPA/RAC, CMS).	NGOs ASCN	
Action 3.2.5	Engage with CMS Focal Points to seek comment on the RAP.	CMS	
Action 3.2.6	Promote RAP at relevant fora (e.g. CMS, GFCM, SPA/RAC).	ASCN	
Action 3.2.7	Ensure regulatory obligations are reflected in training for fishers, accommodating subregional constraints (see Action 1.3.3).	NGOs Governments	✔
Objective 3.3	**CASAs are protected through appropriate spatial and/or temporal management of non-fishing as well as fishing activities (in line with Goal 2).**		
Action 3.3.1	Advocate for the adoption of spatial/temporal management in appropriate fora (e.g. GFCM, SPA/RAC) and at country level.	NGOs	✔
Action 3.3.2	Ensure CMS obligations are reflected in marine spatial planning (e.g. MPAs, FRAs, SPAs) and coastal development processes.	Government NGOs CMS	✔

** Broad categories have been used here to give an indication of who will be involved. Actions have not been assigned to specific stakeholders (e.g. reference to GFCM could include actions of the Secretariat and/or the Parties) at this level and details will be drawn out in the SubRAP process with input from regional authorities and collaborators.*

*** While most actions will be relevant across the Mediterranean, those identified with a tick are particularly applicable at a subregional level and more detailed actions should be developed.*

Table 1 – International, regional and national regulations/legislation for angel sharks

REGULATION/ LEGISLATION	LISTING DATE & WHETHER BINDING†	WHERE IT APPLIES	SPECIES	WHAT IT MANDATES
International				
Appendix I and II – Convention on the Conservation of Migratory Species of Wild Animals (CMS)	2017	Mediterranean & Black Sea Parties to CMS (Albania, Algeria, Bosnia & Herzegovina, Bulgaria, Croatia, Cyprus, Egypt, France, Georgia, Greece, Israel, Italy, Lebanon, Libya, Malta, Monaco, Montenegro, Morocco, Romania, Slovenia, Spain, Syria, Tunisia, Ukraine)	*S. squatina*	CMS Appendix I – species must be strictly protected by Parties that are Range States. Parties shall work collaboratively toward regional protection. CMS Appendix II – species require an international agreement for their conservation and management. Range States are encouraged to develop regional agreements.
Annex I – CMS Memorandum of Understanding on the Conservation of Migratory Sharks (CMS Sharks MoU)	2018	MoU Signatories (Egypt, France, Italy, Libya, Monaco, Romania, Syria)	*S. squatina*	Annex I – The Sharks MOU and its Conservation Plan in Annex 3, applies to all migratory species of chondrichthyans that are included in Annex I of the MOU.
Regional				
Annex II – Barcelona Convention Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean Sea (SPA/ BD Protocol)[7]	2009†	The Contracting Parties to the Barcelona Convention and its Protocols are 21 Mediterranean, riparian countries (Albania, Algeria, Cyprus, Croatia, Bosnia & Herzegovina, Egypt, France, Greece, Israel, Italy, Lebanon, Libya, Malta, Morocco, Montenegro, Monaco, Slovenia, Spain, Syria, Tunisia and Turkey) and the European Union.	*S. aculeata* *S. oculata* *S. squatina*	Annex II – List of endangered and threatened species (last amended in 2017).

7 SPA/BD Protocol initially included *S. squatina* in Annex III (species whose exploitation is regulated), until 2009 when all three species were added to Annex II (endangered or threatened species).

REGULATION/ LEGISLATION	LISTING DATE & WHETHER BINDING†	WHERE IT APPLIES	SPECIES	WHAT IT MANDATES
Regional				
Binding Recommendation GFCM/36/2012/3 amended to GFCM/42/2018/2	2012/ 2018†	24 Parties to GFCM (Albania, Algeria, Bulgaria, Croatia, Cyprus, Egypt, EU, France, Greece, Israel, Italy, Japan, Lebanon, Libya, Malta, Monaco, Montenegro, Morocco, Romania, Slovenia, Spain, Syria, Tunisia, Turkey)	*S. aculeata* *S. oculata* *S. squatina*	Bans retention, landing, transhipment, display, and sale of the 24 species listed on Annex II of the Barcelona Convention. Requires transposition into national legislation.
Council Regulation (EU) No. 2019/124 (Common Fisheries Policy annual fisheries quotas) [8]	2010†	EU fleet and third country vessels fishing in EU waters	*S. squatina*	Prohibited to target, retain, tranship or land in all EU waters including the Mediterranean
EU Regulation transposed from GFCM Recommendation (EU 2015/2102)	2015†	EU fleet in Mediterranean waters	*S. aculeata* *S. oculata* *S. squatina*	Prohibition on retention by the EU fleet in the Mediterranean Sea
Technical Measure – Regulation (EU) 2019/1241	2019†	EU fleet and third country vessels fishing in EU waters and EU vessels fishing in the Mediterranean (includes recreational fishing).	*S. squatina*	Technical measures covered include: the taking and landing of marine biological resources (including species covered by GFCM/42/2018/2) and the interaction of fishing activities with marine ecosystems.
National				
Official Gazette 80/13, 15/18, 14/19	2013†	Croatia	*S. oculata* *S. squatina*	Fishing for angel sharks (along with 21 other elasmobranchs) is prohibited
Decree 444/20112	2012†	Egypt	*S. aculeata* *S. oculata* *S. squatina*	Prohibited to fish sharks of all species in the Mediterranean Sea and to place sharks (whole or parts) on the market
National Parks, Nature Reserves, National Sites and Memorial Sites (Protected Nature Values). Proclamation enacted by the National Parks, Nature Reserves, National Sites and Memorial Sites Law, 1998.	2005†	Israel	*S. aculeata* *S. oculata* *S. squatina*	Prohibited to fish for all sharks and rays

8 Regulation number amended annually with renewal of legislation.

REGULATION/ LEGISLATION	LISTING DATE & WHETHER BINDING†	WHERE IT APPLIES	SPECIES	WHAT IT MANDATES
		National		
Flora, Fauna and Natural Habitats Protection Regulations (LN311/06)	2006†	Malta	*S. aculeata* *S. oculata* *S. squatina*	Prohibited to disturb, capture, kill, retain, transport, sell, buy, import or export species listed in Schedule VI
Article 0.244-8 of the Monaco Maritime Code	2011†	Monaco	*S. aculeata* *S. oculata* *S. squatina*	Prohibits capture, import, possession, killing, trade, transport and exhibition for commercial purposes of endangered or threatened species as referred to in Annex II of the Barcelona Protocol
Spanish list of Wild Species under Special Protection (LESPRE) – Orden AAA/75/2012	2012†	Spain	*S. aculeata* *S. oculata* *S. squatina*	Protection from capture, injury, trade, import and export.
Communique 2018/19 – updates to Article 5 of the Turkish Prohibited Species lists (Communique 2016/35)	2018†	Turkey	*S. aculeata* *S. oculata* *S. squatina*	Prohibits targeting and retention

8. How to engage with this action plan

This Regional Action Plan sits within the framework of the Eastern Atlantic and Mediterranean Angel Shark Conservation Strategy (Gordon *et al*. 2017). The threats, goals and objectives relevant to the Mediterranean have been extracted from the wider Strategy and expanded upon here. While some will apply to the Mediterranean as a whole, others will be specific to different geographic regions. Although planning is required at a regional level, specific conservation actions will be under the authority of national or local governments. SubRegional Action Plans (SubRAPs) will therefore be developed in priority locations where angel sharks are known to be present and so protection is of the utmost importance. These SubRAPs will have a consistent approach and be developed to complement each other. Given the complex multijurisdictional nature of the Mediterranean, engagement with key partners and stakeholders is essential to ensure a coordinated approach for implementation.

8.1 ANNEXES

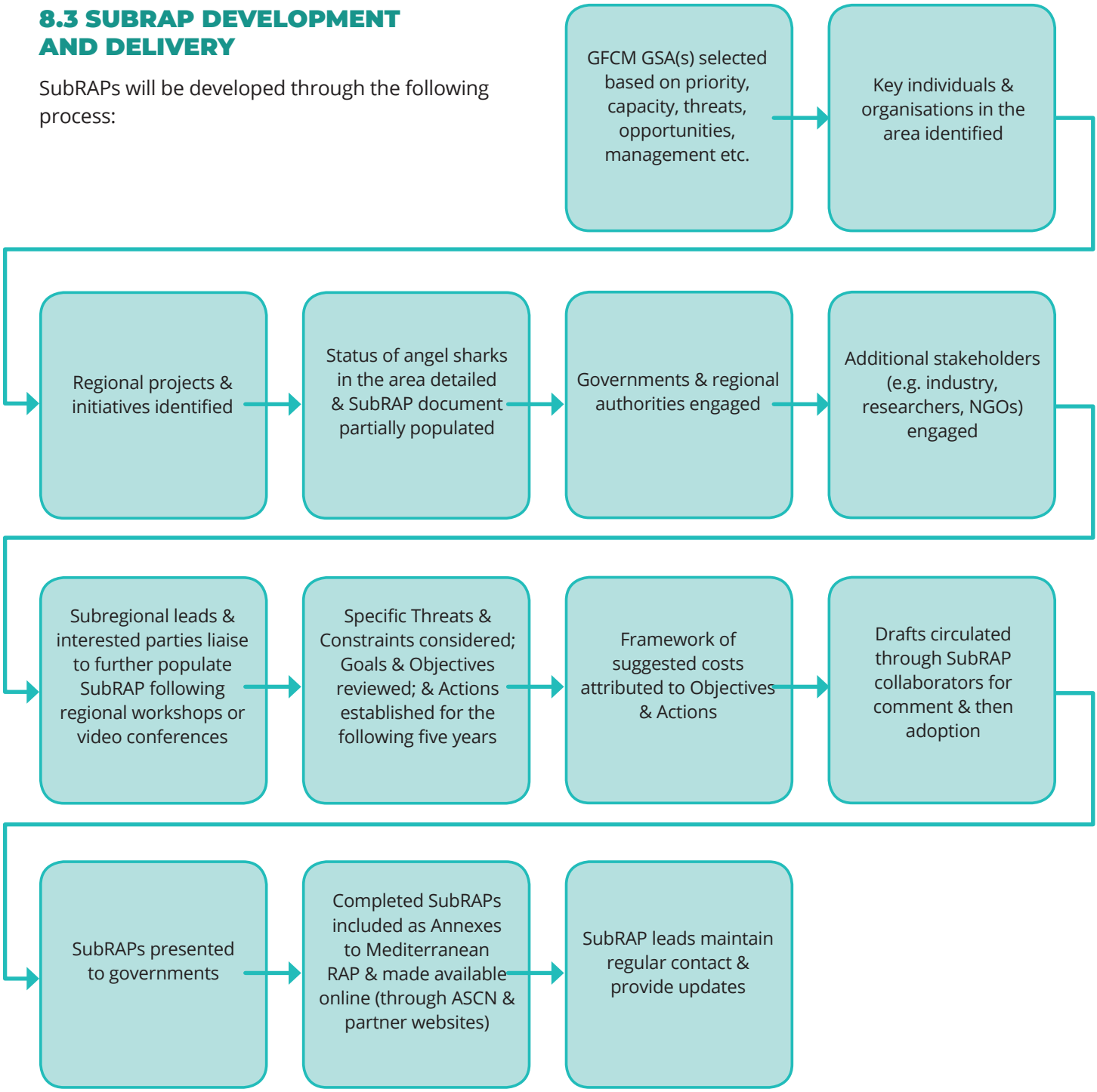
- Proforma documents for SubRAPs will be drafted by regional partners with the Shark Trust's guidance and in consultation with stakeholders and relevant authorities.
- This RAP will be presented to CMS Range State focal points to provide opportunity to develop an annex as a companion document. This annex will include high priority activities which need to be implemented on a governmental level by CMS Parties. A CMS Range States focal point meeting to consolidate comments and agree upon final activities is planned for 2020. Actions of the RAP are also relevant to governments which are not Parties to CMS, who will also be invited to participate in the development process.
- Additional annexes will be welcomed from interested regional bodies (e.g. SPA/RAC, GFCM).

8.2 ENGAGEMENT AND PROGRESS

- This RAP will be available to download from the collaborative ASCN website as well as on the websites of partner organisations.
- A 'working' version of this RAP featuring progress and updates will be maintained by the Shark Trust.
- Updates on the progress of the Strategy/Action Plans and work in different regions will be provided through the ASCN quarterly e-bulletin.
- Anyone working on angel sharks or who has any information about them in the Mediterranean is invited to complete the online questionnaire at *www.bit.ly/2qeVzDJ*
- Sightings or captures for any species of angel shark can be submitted through the ASCN Angel Shark Sightings Map: *www.angelsharknetwork.com/#map*
- Anyone interested in collaborating or developing a SubRAP is encouraged to get in touch with *angels@sharktrust.org*

8.3 SUBRAP DEVELOPMENT AND DELIVERY

SubRAPs will be developed through the following process:



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10. Glossary/Acronyms

AOO – Area of Occupancy

ASCN – Angel Shark Conservation Network

Bycatch – The non-targeted part of the catch made up of discarded plus retained catch

CASAs – Critical Angel Shark Areas

Chondrichthyans – Class comprising cartilaginous fishes (sharks, skates, rays, chimaera)

CMS – Convention on the Conservation of Migratory Species of Wild Animals

Constraints – Factors which contribute to or compound the threats. (For example, lack of political will and resources might contribute to a lack of law enforcement, leading in turn to over-exploitation).

COP – Conference of Parties

CPC – Contracting Parties and Cooperating non-Contracting Parties

Critical Angel Shark Areas – A specific geographic area that contains essential features necessary for the conservation of angel sharks. This may include an area that is not currently occupied by the species that will be needed for its recovery or conservation e.g. nursery, mating, aggregation and foraging areas.

EEZ – Exclusive Economic Zones

EOO – Extent of Occurrence

FAO – Food and Agriculture Organisation of the United Nations

GFCM – General Fisheries Commission for the Mediterranean

GFCM 36/2012/3 is amended by GFCM/42/2018/42

Goal – A description in operational terms to capture what needs to be done where to save the species

GSA – GFCM Geographical Subarea

ICCAT – International Commission for the Conservation of Atlantic Tunas

Incidental catch – Unintentional captures of vulnerable species (a subset of bycatch)

IUCN – International Union for Conservation of Nature

LSF – Large-Scale Fisheries

MECO – Mediterranean Elasmobranchs Citizen Observations

MEDLEM – Mediterranean Large Elasmobranchs Monitoring

MPA – Marine Protected Area

UN – United Nations

Objective – Summary of the approach to be taken to achieve the Vision and Goals, normally relating to a set of threats and constraints

POA – Plan of Action

Prohibited species – Any species which must, by law, be returned to the sea

RAP – Regional Action Plan

Recreational Fisheries – Fishing activities (including leisure, sport, underwater, charter) exploiting marine aquatic resources from which it is prohibited to sell or trade the catch obtained

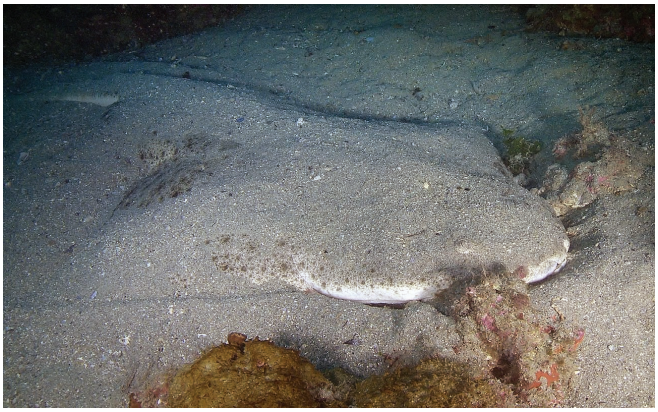
SPA/RAC – Specially Protected Areas Regional Activity Centre

SSF – Small-Scale Fisheries

SubRAP – SubRegional Action Plan

Threat – A factor which causes either a substantial decline in numbers of individuals of that species, or a substantial contraction of the species' geographic range.

Vision – An inspirational short statement that describes the desired future state for the species



Squatina squatina **in Dardanelles Strait at 30 m depth (Dec 2015) © Mert Gokalp**

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