Squatina squatina © Carlos Suarez, Oceanos de Fuego

Eastern Atlantic and Mediterranean Angel Shark Conservation Strategy

Angelshark
Squatina squatina

Sawback Angelshark
Squatina aculeata

Smoothback Angelshark
Squatina oculata

CRITICALLY ENDANGERED CR

Species background

Angel sharks* rank as the second most threatened family of elasmobranch (sharks, skates and rays) after sawfishes[1]. Characteristics linking the two families include their body shape and preferred habitat, as both are large, flat-bodied coastal species.

The family Squatinidae contains at least 23 species, half of which are listed as threatened (Critically Endangered, Endangered or Vulnerable) on the IUCN Red List of Threatened Species™. Most of the remaining species are either Data Deficient or Not Evaluated. The slow growth and demersal nature of angel sharks leaves them especially vulnerable to inshore fishing activities. Consequently, many species in this family have suffered steep population declines and now face a significant risk of extinction.

Once found throughout the temperate waters of the Northeast Atlantic, Mediterranean and Black Seas, angel sharks have now been depleted from much of their former range. Of the three species that occur in these regions – the Angelshark* *Squatina squatina*, Sawback Angelshark *Squatina aculeata* and Smoothback Angelshark *Squatina oculata* - most information is known regarding the distribution, ecology and declines of *Squatina squatina*. All three species are Critically Endangered.

About this Strategy

This Angel Shark Conservation Strategy provides a framework for improved protection of the three Critically Endangered species present in the Eastern Atlantic and Mediterranean. The Strategy aims to: improve the overall profile of angel sharks; increase the number of sightings reported; generate a better understanding of current distribution; contribute to IUCN Red List re-assessments and identify new collaboration opportunities to increase conservation action.

Some of the key threats to these species are outlined within this Strategy. Three priority goals and associated headline objectives have been identified as crucial to achieving the vision that: **Angel sharks in the Eastern Atlantic and Mediterranean are restored to robust populations and safeguarded throughout their range**.

The recommended next steps outlined in this document act as guidelines for targeted conservation actions. Researchers and advocates in all regions are invited to contribute additional information to support this Strategy and help develop specific actions to safeguard these Critically Endangered species.

angel shark (as two words) refers to multiple species in the family Squatinidae, while Angelshark (as one word) is used for species common names.

Angelshark *Squatina squatina*[2]
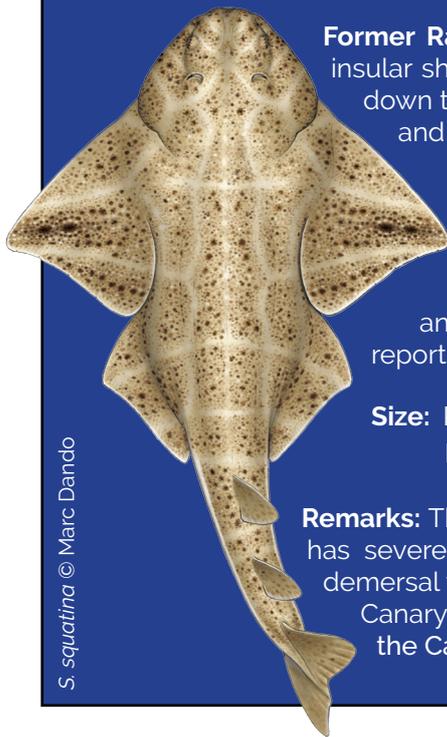
Former Range: Historically common over large areas of the coastal, continental, and insular shelf of the Northeast Atlantic (from southern Norway and the Shetland Islands down to Morocco, West Sahara, and the Canary Islands), as well as the Mediterranean and Black Seas.

Current Range: The Canary Islands provide a unique stronghold for this species, offering the last known location where it can be regularly encountered. The remainder of its range has drastically contracted and only occasional reports are now received from the Eastern and Central Mediterranean, Adriatic Sea, and Celtic Seas ecoregion. However, in recent years, there have been increased reports from Cardigan Bay (Irish Sea).

Size: Reported to mature at 80 - 132 cm (♂) and 128 - 169 cm (♀)
Maximum length 183 cm (♂) and ~244 cm (♀)

Remarks: This is the only species of angel shark known in northern European seas. Range has severely contracted during the past century, largely due to the intensification of demersal fishing practices. Ugent action is still required to further protect *S. squatina* in its Canary Islands stronghold, to address this, a collaborative **Angelshark Action Plan for the Canary Islands**[3] was launched in late 2016.
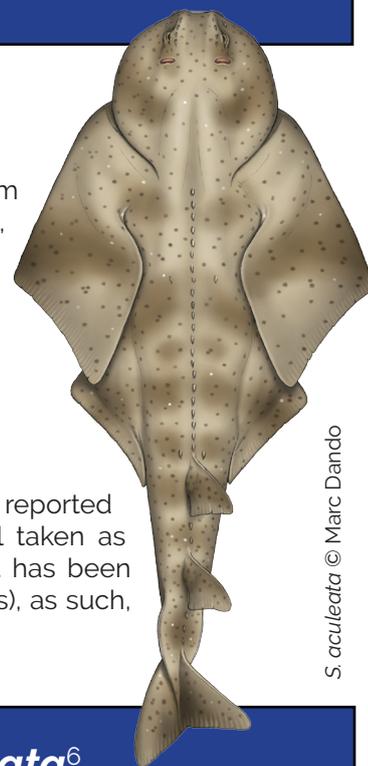
S. squatina © Marc Dando

Sawback Angelshark *Squatina aculeata*[4]

Former Range: Once widespread in the Eastern Atlantic (West African coasts from Morocco to Angola) and Mediterranean Sea (Western and Central basins, Ionian Sea, and Egyptian coasts).

Current Range: Only occasional reports of this species are now received, including from the Eastern Mediterranean and parts of the West African coast.

Size: Estimated average length at maturity 124 cm
Maximum length ~188 cm

Remarks: It is difficult to confirm contemporary range as angel shark landings are reported in aggregated categories[5], masking species specific landings. Although likely still taken as incidental catch, the total number of individuals caught is unquantified. Its habitat has been subject to intense demersal fisheries (including trawls, set nets and bottom longlines), as such, this species is now rarely reported from large areas of its former range.
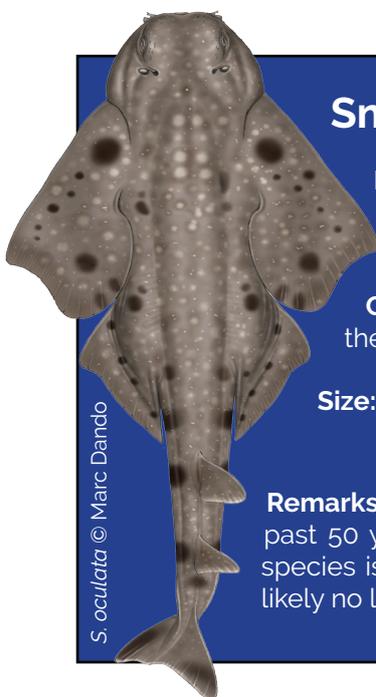
S. aculeata © Marc Dando

Smoothback Angelshark *Squatina oculata*[6]

Former Range: Formerly common over large areas of coastal and outer continental shelf areas in the Eastern Atlantic (from the southern Iberian peninsula down to Namibia) and the Mediterranean Sea (more frequent in southern regions, e.g. Tunisia).

Current Range: Occasional reports are received from the West African coast as well as the Eastern and Central Mediterranean.

Size: Reported to mature at 71 – 82 cm (♂) and 89–100 cm (♀)
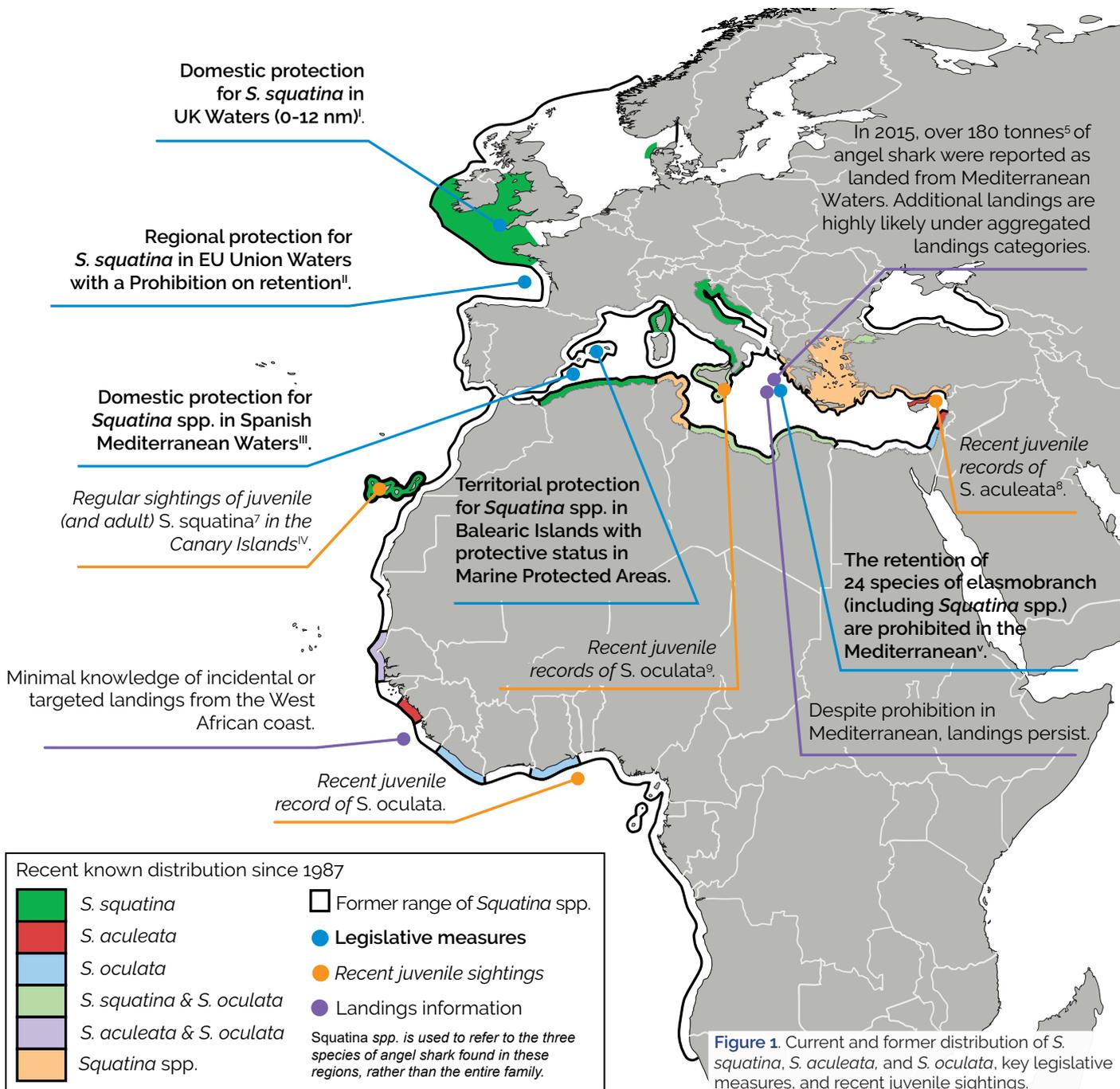Maximum length 145 cm (♂) and 160 cm (♀)

Remarks: As with *S. squatina* and *S. aculeata*, abundance has declined considerably during the past 50 years due to intense demersal fisheries operating throughout its range. Although this species is likely still taken as incidental catch in trawl and gillnet fisheries in some regions, it is likely no longer present in large areas of the Mediterranean and parts of the West African coast.

S. oculata © Marc Dando

Distribution and Management Measures

The distribution of these three angel shark species overlaps substantially and there is still a great deal of uncertainty regarding contemporary range. Figure 1 reflects the paucity of landings data and current management measures in place (listed in Table 1). Recent reports of juveniles are also highlighted as they confirm the presence of breeding stock and could help direct conservation action. The presence of these juveniles provides encouraging signs for the future of these Critically Endangered species. Reports of adult and juvenile sightings can be viewed by visiting the online sightings map at **www.angelsharknetwork.com**. This Strategy encourages the submission of data and information by regional experts, contributing additional layers to the existing knowledge base.

Domestic protection for *S. squatina* in UK Waters (0-12 nm)[I].

Regional protection for *S. squatina* in EU Union Waters with a Prohibition on retention[II].

Domestic protection for *Squatina* spp. in Spanish Mediterranean Waters[III].

Regular sightings of juvenile (and adult) S. squatina[7] in the Canary Islands[IV].

Minimal knowledge of incidental or targeted landings from the West African coast.

Recent juvenile record of S. oculata.

Territorial protection for *Squatina* spp. in Balearic Islands with protective status in Marine Protected Areas.

Recent juvenile records of S. oculata[9].

In 2015, over 180 tonnes[5] of angel shark were reported as landed from Mediterranean Waters. Additional landings are highly likely under aggregated landings categories.

Recent juvenile records of S. aculeata[8].

The retention of 24 species of elasmobranch (including *Squatina* spp.) are prohibited in the Mediterranean[V].

Despite prohibition in Mediterranean, landings persist.

Recent known distribution since 1987

- S. squatina
- S. aculeata
- S. oculata
- S. squatina & S. oculata
- S. aculeata & S. oculata
- Squatina spp.

☐ Former range of *Squatina* spp.
● Legislative measures
● Recent juvenile sightings
● Landings information

Squatina *spp. is used to refer to the three species of angel shark found in these regions, rather than the entire family.*

Figure 1. Current and former distribution of *S. squatina*, *S. aculeata,* and *S. oculata*, key legislative measures, and recent juvenile sightings.

Table 1. Details of map annotations for legislative and conservation measures

	Area	Species	Legislative/conservation measure
I	UK	*S. squatina*	Wildlife and Countryside Act (1981); Northern Ireland Wildlife Order (1985); Scottish Elasmobranch Protection Order (2012).
II	EU Union Waters	*S. squatina*	Prohibited species under the EU Common Fisheries Policy Council Regulation (EC) 43/2009.
III	Spanish Mediterranean	*Squatina* spp.	Domestic legislation in Spanish waters for *Squatina* spp. through the Spanish List of Species Under Special Protection in the Mediterranean (LESPRE) Orden AAA/75/2012.
IV	Canary Islands	*S. squatina*	Angelshark Action Plan for the Canary Islands.
V	Mediterranean	*Squatina* spp.	Elasmobranch species on Barcelona Convention Annex II of the Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean (SPA/BD Protocol) for which GFCM (GFCM/36/2012/3) Parties agreed to ban retention, landing, transhipment, storage, display, and sale.

Key Threats

Within this Conservation Strategy, the Eastern Atlantic and Mediterranean has been broken down into four sub-regions: Northeast Atlantic, Canary Islands, West Africa, and the Mediterranean Sea. The potential threats faced by angel shark populations are detailed in Table 2 using the headings outlined in the standardised IUCN Red List threat classification criteria[10]. The most significant direct threats are highlighted within the table and should be given highest priority. Specialist input was sought through an online questionnaire and associated workshops, however additional contributions would help identify specific regional threats and subsequent actions.

Table 2. Potential threats to angel sharks in the Eastern Atlantic and Mediterranean.

THREAT CATEGORIES								
Agriculture & Aquaculture	**Biological Resource Use**	Climate Change & Severe Weather	**Human Intrusion & Disturbance**	**Invasive & Other Problematic Species, Genes & Diseases**	Natural System Modification	Pollution	**Residential & Commercial Development**	Transportation & Service Corridors
Aquaculture cages (hormones, food etc.)	Illegal, Unreported & Unregulated (IUU) fishing	Changing weather temperature	Degradation of habitat	Pathogens	In-water developments affecting sediment transport (e.g. dykes)	Water pollution/ runoff	Coastal building and infrastructure development	Pipelines & electrical cables
Intensive shellfish management	Commercial fishing (lack of species specific landings & identification issues)	Storms destroying habitat	Altered seafloor morphology	Low genetic diversity (genetic bottlenecks/ population fragmentation)		Micro/macro plastics	Renewable energy (e.g. wind farms, underwater turbines, aggregate extraction, lagoons)	Shipping disturbance (e.g. physical disturbance, noise pollution)
	Commercial fishing (impact of differing gear types)	Water runoff destroying habitat	Anchor damage of habitats	Invasive species		Desalination plant pollution		
	Small scale/ artisanal fishing	Severe winters	Recreational watersports	Predation on juveniles		Sewage		
	Subsistence/ food security					Oil spills		
	Recreational Fishing					Antibiotics/ hormones in water course		
	Ghost fishing					Eutrophication		
	Alteration of food chain (overfishing of prey species)							

Example threats for each geographic region:

Northeast Atlantic: commercial fishing

The morphology of angel sharks twinned with their demersal habitat makes them highly vulnerable to targeted or incidental capture in a number of coastal fisheries. Despite some fisheries restrictions, the actual level of threat is masked by the lack of incidental catch reporting or reporting under aggregated categories.

Canary Islands: recreational fishing

Angel sharks are caught by recreational fishers throughout their range. In addition to the 50 registered recreational charter vessels in the Canary Islands, there are a substantial number of shore anglers, spearfishers and privately registered vessels catching *S. squatina*. With no official catch reporting mechanisms, the impact of this sector remains unquantified.

Mediterranean: poor implementation

Regulations or measures exist for the management and protection of angel sharks in the Mediterranean, however not all are implemented e.g. the General Fisheries Commission for the Mediterranean (GFCM/36/2012/3). The outward projection of management infers that unregulated fisheries no longer pose a threat.

West Africa: small-scale fishing

References to the consumption of angel shark are fairly common throughout their range. Sharks are an important source of protein to many coastal communities, however the importance specifically of angel sharks to food security is unquantified. Market surveys and data collection at a national level should assist in ascertaining to what extent small-scale fishing poses a threat.
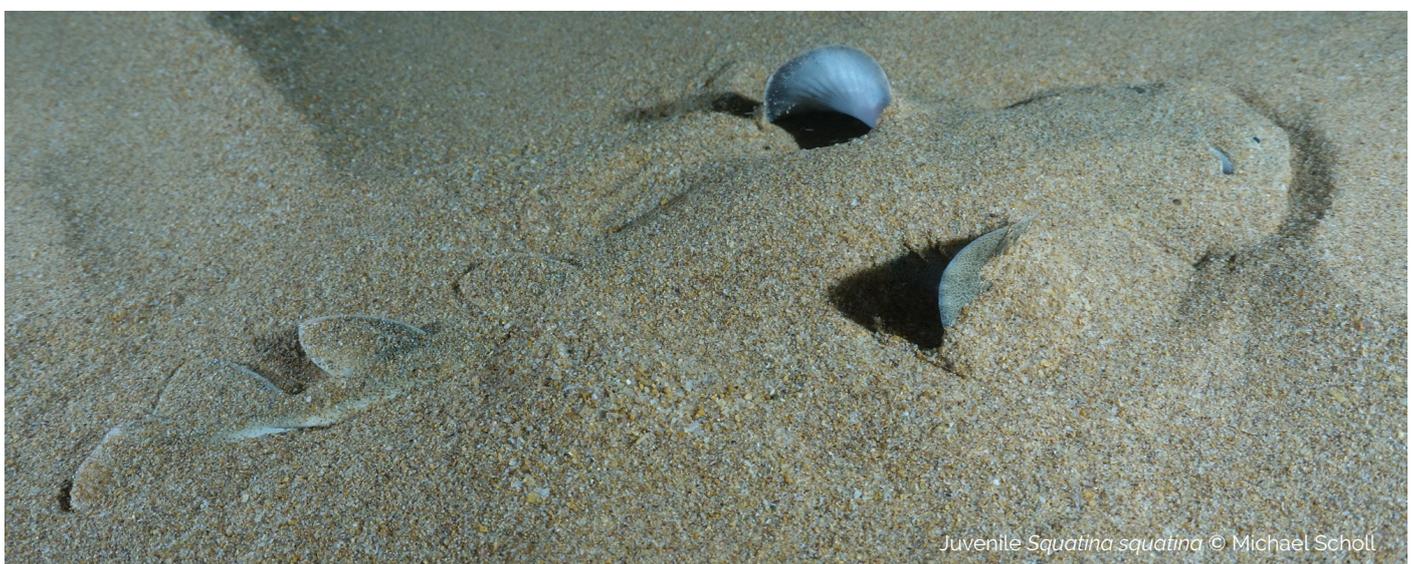
Vision, Goals and Objectives

Three priority goals are key to delivering the vision that: *Angel sharks in the Eastern Atlantic and Mediterranean are restored to robust populations and safeguarded throughout their range*. The associated headline objectives identify broad themes under which subsequent actions can be grouped (Table 3). Actions undertaken to help realise these goals and objectives will be varied according to threat, geographic region and policy measures currently in place.

Table 3. Vision, goals and objectives of the Eastern Atlantic and Mediterranean Angel Shark Conservation Strategy.

VISION		
Angel sharks in the Eastern Atlantic and Mediterranean are restored to robust populations and safeguarded throughout their range		
GOAL 1 **Fisheries based angel shark mortality is minimised**	**GOAL 2** **Critical Angel Shark Areas** are identified, investigated and protected where appropriate**	**GOAL 3** **Human interactions are identified and any negative impacts on angel sharks are minimised**
OBJECTIVE 1 — Reporting and monitoring in commercial fisheries is improved	Distribution and presence of angel shark is confirmed and areas of importance are identified and mapped	The extent of human interaction in each region is understood
OBJECTIVE 2 — Existing legislative measures to protect angel sharks are implemented through enforcement and monitoring	Human impact in Critical Angel Shark Areas is quantified and evaluated	The impact of renewable and extractive industries on angel shark populations is understood
OBJECTIVE 3 — Gaps in protective measures are identified and appropriate legislation to fill these gaps is developed and implemented	Critical Angel Shark Areas are protected through spatial management	Critical Angel Shark Areas are considered prior to nearby coastal development so impacts are mitigated
OBJECTIVE 4 — Improved fisher knowledge of angel sharks' threat status reduces retention and encourages better handling to improve post release survival	Angel sharks are protected by regional and domestic management measures	The extent of angel shark related tourism in each region is assessed and any interactions with angel sharks is understood
OBJECTIVE 5 — Incidental catch of angel sharks is quantified and minimised		
OBJECTIVE 6 — The extent of interaction between recreational fishing activities and angel sharks is ascertained		

**A *Critical Angel Shark Area* is defined as:

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.

Juvenile *Squatina squatina* © Michael Scholl

Geographic Priorities

More specific priorities for each geographic region include:

Northeast Atlantic

Whilst *S. squatina* benefits from Prohibited status in much of the Northeast Atlantic, the next steps should include:

- secure management for additional *Squatina* spp. under the EU Common Fisheries Policy;
- quantify incidental catch in commercial and recreational fisheries.

Canary Islands

The Angelshark Action Plan for the Canary Islands provides a clear framework for the delivery of specific goals, objectives and actions in this unique stronghold for *S. squatina*. This Action Plan could be considered as a model for regional engagement.

Download the Action Plan in English or Spanish from: **www.angelsharknetwork.com**.

Mediterranean

Recent publications have reported the presence of adult and juvenile angel sharks (both *S. aculeata*[7] and *S. oculata*[8]) in the Mediterranean, potentially indicating the presence of breeding stock. Next steps include:

- enhance understanding of species distribution;
- quantify incidental catch;
- enforce existing management measures.

West Africa

West Africa is a priority region which perhaps poses some of the greatest challenges, with little published information currently available. Next steps include:

- further engage with regional experts;
- quantify landings and distribution;
- understand secondary uses;
- identify management opportunities.

Policy Priorities

Effective legislative protection twinned with a reduction in incidental catch mortality are key to delivering the vision of this Conservation Strategy. Key policy objectives have been identified, and additional domestic regulation opportunities sought.

Table 4. Key policy actions with associated priorities and costs.

Key Policy Actions	Priority	Cost
Listing on Spanish Domestic Regulations (based on priorities within the Angelshark Action Plan for the Canary Islands).	H	$
Implementation of General Fisheries Commission for the Mediterranean (GFCM) measures.	H	$
Expansion of Common Fisheries Policy (CFP) to include additional *Squatina* spp.	H	$
Listing on Convention of Migratory Species (CMS) (if data available on migratory behaviour).	M	$$
Other national management measures as identified.	M	$$

Priorities - **H**: High **M**: Medium
Costs - **$**: Low cost (likely with existing budget) **$$**: Medium cost (additional funding may be required)

How to engage with this Strategy

Further details and supporting materials to this summary document can be found at **www.angelsharknetwork.com**. Here you can:

- Submit angel shark sightings
- Join the Angel Shark Conservation Network (ASCN)
- Download additional resources
- Access the latest angel shark news and research

Angel shark questionnaire: if you have supplementary information about angel sharks in the Eastern Atlantic and Mediterranean, please visit **www.bit.ly/2qeVzDJ** and complete the questionnaire. Additional information provided will help enhance this Conservation Strategy and allow expansion of the angel shark community.

If you would like further information on this document, please contact **angels@sharktrust.org**.

Juvenile *Squatina squatina* © Tom Young

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Summary

This Conservation Strategy provides a summary of available information for the three species of angel shark in the Eastern Atlantic and Mediterranean. Threats, goals and objectives are outlined, however this document acts as an invitation for interested individuals to contribute relevant research for the highlighted regions. It is the intention that this Strategy serves as a catalyst for action, bringing together regional experts and resources, and increasing the community's capacity to deliver effective conservation for these Critically Endangered species.

From clarity of species distribution, understanding of cultural significance, quantification of incidental catch rates, to effective implementation of both existing and new management criteria and beyond – there is a great deal of work to do and opportunity for interested parties to get involved.

The Eastern Atlantic and Mediterranean Angel Shark Conservation Strategy aims to:

· improve the overall profile of angel sharks;
· increase the number of sightings reported;
· generate a better understanding of current distribution;
· contribute to IUCN Red List re-assessments;
· identify new opportunities for collaboration.

This Conservation Strategy was created following workshops held in Las Palmas (Gran Canaria) and Bristol (UK) in 2016 and having reviewed questionnaire responses submitted by additional experts.

June 2017

Squatina squatina © Michael Sealey