

Mediterranean Angel Sharks: SubRegional Action Plan (SubRAP)

GSAs 12/13/14 (Central Mediterranean Sea)

Samira Enajjar¹, Saidi Bechir¹, Prof. Bradai Mohamed Nejemeddine¹, Hettie Brown², Àlex Bartolí², Ali R. Hood²

¹ ASCOB Syrtis ² Shark Trust

INTRODUCTION

Three species of Critically Endangered angel shark are present in the Mediterranean with overlapping ranges:

<i>Squatina aculeata</i>	Sawback Angelshark (EN)	Ange de mer épineuse (FR)	سفن/وقاس (TN)
<i>Squatina oculata</i>	Smoothback Angelshark (EN)	Ange de mer ocellé (FR)	سفن/وقاس (TN)
<i>Squatina squatina</i>	Common Angelshark (EN)	Ange de mer commun (FR)	سفن/وقاس (TN)

The *Mediterranean Angel Sharks: Regional Action Plan* (Gordon *et al.*, 2019) sets out a roadmap to help restore these enigmatic species to robust populations in the region. It acts as a call to action for stakeholders to work together to address the challenges faced by these three imperilled species.

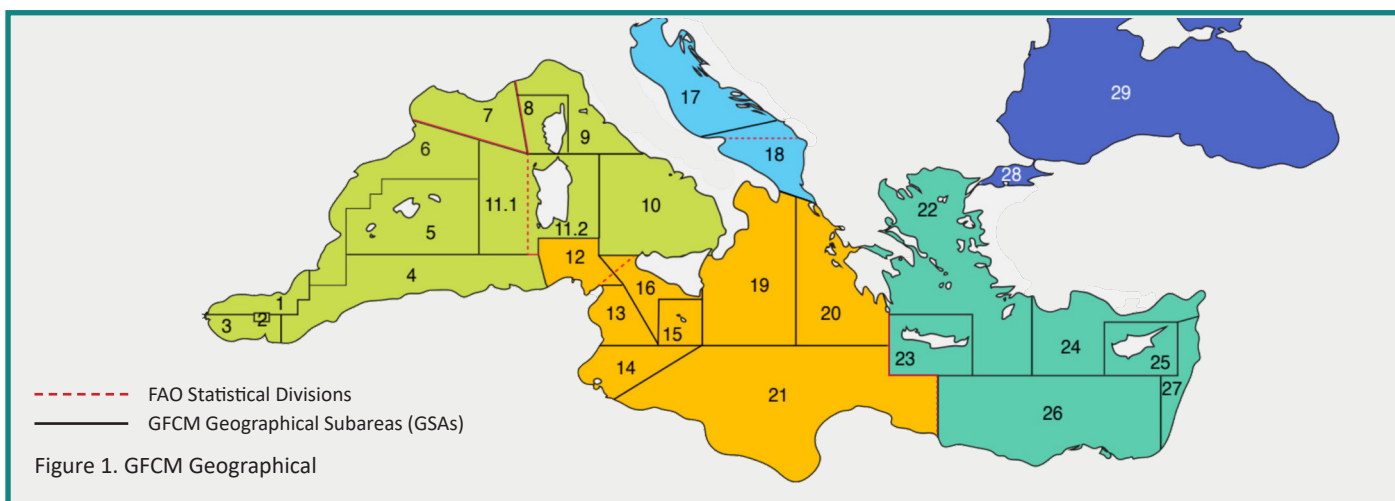
With over 20 coastal states and territories, the complex nature of the Mediterranean creates further need for highly collaborative action to build capacity for angel shark conservation. To allow a tailored approach in priority regions, SubRegional Action Plans (SubRAPs) are designed to facilitate further coordinated actions by engaging regional stakeholders, including governments and industry.

The *Mediterranean Angel Sharks: Regional Action Plan* should be referred to for more detail (available in Arabic, English, French and Spanish).

IMPORTANCE OF SUBAREA

General Fisheries Commission for the Mediterranean (GFCM) *Geographical Subareas* (GSAs) 12, 13 and 14 have been identified as a priority regions for angel sharks, given the contemporary distribution of all three species of *Squatina* known in the Mediterranean (Fig. 1). Recent incidental captures of all three species were reported (Saidi *et al.*, 2016; Zava *et al.*, 2022, Ouinifi *et al.*, 2023; Rafrafi Noura *et al.*, 2023, 2022 and 2019). Currently there are no national regulations concerning these species.

Lead partners involved in this SubRAP are *ASCOB-Syrtis* (Association pour la Conservation de la Biodiversité dans le Golfe de Gabès) and *Shark Trust*.



FAO (2018). The State of Mediterranean and Black Sea Fisheries. General Fisheries Commission for the Mediterranean.

EXISTING REGIONAL PROJECTS AND INITIATIVES

The following projects were implemented in collaboration with GFCM, ACCOBAMS, SPA/RAC, and Bird Life and were financed mainly by the MAVA foundation. These include:

Bottom and surface longline fisheries in the Gulf of Gabès (2015-2017).

Med Bycatch Project - "A collaborative approach for understanding multi-taxa 'bycatch' of vulnerable species in Mediterranean fisheries and testing mitigation" (2019-2022).

Support Mechanism for Filling Key Knowledge Gaps for Vulnerable Species (Marine Mammals, Seabirds, Sea Turtles and Elasmobranchs) Impacted by Fisheries in Priority Areas of the Mediterranean: In GSA 13 and GSA 14 (2020 - 2021).

Key projects already established in GSA 14 which will be engaged during this process include:

Preserving endangered sharks in their ultimate Mediterranean hotspot by promoting sustainable human/shark interactions (Stazione Zoologica ANTON DOHRN (SZN), ASCOB Syrtis, Blue Marine Foundation) (April 2023- December 2024)

This project aims to provide scientific data on the diversity, distribution and abundance of threatened sharks and rays to improve their conservation in one of the most threatened hotspots for endangered sharks and rays in the Mediterranean Sea.

Turning the tide for sharks in Tunisia's Gulf of Gabès (INSTM, funded by SOSF) (March 2023- March 2024)

This project aims to:

- describe the specific elasmobranch fisheries in Tunisia (Technical characteristics and impact on vulnerable species).
- test measures to mitigate the catch of sharks at fragile maturity stages.
- develop of management approaches of these fisheries.
- raise awareness among fishermen about the need to conserve elasmobranchs

SCF Mediterranean Angel Sharks: Regional Action Plan Phase 2: Implementation (Shark Trust, ASCOB Syrtis) (January 2023 - December 2025)

SPECIES MANAGEMENT

All three Mediterranean *Squatina* species are listed under binding Recommendation GFCM/42/2018/2 (amending GFCM/36/2012/3) which was adopted by the 23 Parties to the GFCM. This Recommendation prohibits the removal of shark fins at sea, prohibits trawling within 3 nautical miles from the coast (or within the 50 metre isobath where that depth is reached at a shorter distance from the coast) and prohibits the retention and sale of 30* elasmobranch species listed on Annex II of the Barcelona Convention. This regulation is operational and requires transposition into national legislation.

There is no national legislation in place in Tunisia specifically for angel shark species. The protection of some species is ensured on a **national** level by the promulgation of Law No. 94-13 of July 1994, and the *Order of the Minister of Agriculture of September 28, 1995*, regulating the practice of fishing activities. The 1995 decree is being amended to mainly consider the conventions ratified by Tunisia and the recommendations of the GFCM. Whilst angel sharks are not directly mentioned, there are some tangential benefits from some of the restrictions. The only existing rule concerning elasmobranchs is the prohibition of landing rays (*Raja spp.*) below 40 cm length, measured from the tip of the snout to the end of the tail.

In addition, while Tunisia has agreed to the GFCM regulation, ratification, at a national level, is still required. Noting the communiqué in November 2020, from the Director General of Marine Fisheries and Aquaculture to the Head of Aquaculture Bureaus of Coastal Prefectures requesting avoidance of the killing, fishing, landing and trading of protected species (including three species of angel shark *Squatina squatina*, *S. aculeata* and *S. oculata*). It is currently understood that final ratification of legislation formalising this communiqué is anticipated in 2025.

To protect the diversity of elasmobranchs, Tunisia has undertaken several conservation measures through the ratification of international conventions and the implementation of resulting measures, however, is yet to transpose GFCM/42/2018/2 into national law. The main international conventions ratified by Tunisia are listed in Table 1.

Conventions	Adoption	Ratification	Law no.
CITES	1973	1974	74 - 12 of 11/05/74
Barcelona	1976	1977	77 - 29 of 25/05/77
CMS**	1979	1986	86 - 63 of 16/07/86
Bern	1979	1995	95 - 75 of 07/08/95
CBD	1992	1993	93 – 45 of 29 /12/94

Table 1. International conventions adopted by Tunisia

Tunisia also adopted the following regional and international tools:

- The Action Plan for the Conservation of Cartilaginous Fishes in the Mediterranean Sea, adopted by the Contracting Parties to the Barcelona Convention
- The FAO International Shark Action Plan

Tunisia recently adopted the *Law No. 2024-17* of February 22, 2024, on the organisation of international trade in species of wild fauna and flora threatened with extinction.

*During the 23rd Meeting of the Contracting Parties to the Barcelona Convention (COP23), in December 2023, 6 additional species were added to the list, increasing the original 24 elasmobranchs listed on Annex II to 30.

**Whilst a Range State and a Party to CMS, Tunisia is not a signatory to CMS Sharks MoU.

RECENT SIGHTINGS AND NON-COMPLIANCE

Records of angel shark have been documented in Tunisia since 1971 (Quignard et Capapé, 1971) in the three GSAs (12, 13 and 14). When records of *Squatina* species from the last thirty years are compiled, various sources concur that angel shark occurrence is infrequent. These sources include bibliographic citations, unpublished records collected by authors from direct landing surveys from 2000 onwards, and citizen science through social media including photographs of captured specimens.

A total of 36 *Squatina squatina*, 38 *S. aculeata* and 28 *S. oculata* were recorded during this period (Saidi *et al.*, 2016; Zava *et al.*, 2022, Ouinifi *et al.*, 2023; Rafrafi Nouira *et al.*, 2022, 2023; Enajjar *et al.*, 2025). The bycatch occurred predominantly in trawl fisheries in the Gulf of Gabès. Bycatch occurs mainly in June (Fig. 2). The Tunisian northern coast (GSA 12) seems to be also an important area for *Squatina squatina*.

The published papers related to Squatinidae record indicate clearly that there is a confusion between the three species among the scientific community in Tunisia (See Ouinifi ben Amor *et al.*, 2023; Rafrafi Nouira *et al.*, 2022).



Figure 2. Squatinidae bycaught and at market in Tunisia; Top left: *Squatina squatina*, bottom left and middle: *Squatina aculeata*, far right: *Squatina oculata*

THREATS

Main (priority) threats along the Tunisian coasts (GSA 12, 13, 14) remain largely the same as across the rest of the Mediterranean (Table 2). These threats are exacerbated by a lack of species-specific landings and identification issues in Small-Scale Fisheries (SSF) and Large-Scale Fisheries (LSF); Illegal, Unreported and Unregulated (IUU) fishing; the impact of differing gear types in SSF, LSF and degradation of habitat (due to the trawling effect on the seabed) mainly in GSA 14.

Whilst still gaining knowledge about the habitat preference of angel sharks and the effect of other anthropogenic pressures (beyond fishing), additional priority threats have been identified. These are: altered seafloor morphology, pollution caused by sewage, coastal building and infrastructure development, changing water temperature, anchor damage to habitats, impact of beach users/activities on coastal nursery areas, and micro/macro plastics. More research needs to be carried out to determine the extent of these threats.

CONSTRAINTS

The wide-spread nature of landing sites represents a constraint to efficient monitoring, control and surveillance. In addition, the absence of national fisheries regulations or the transposition of international conventions for all three angel shark species in Tunisia is an obstacle to enforcement.

Other constraints include the increasing scarcity of other fish resources, making it challenging to prioritise actions for angel sharks; limited capacity for conservation efforts; and limited funding for conservation.

ACTIONS

A working version of this SubRAP is retained by the lead partners outlined in this document. In the working version, actions have been adapted and attributed to relevant bodies working in GSAs 12,13 and 14 and they have been assigned approximate timescales (short, medium, long term) and costs (€, €, €, €€€). Where existing projects and initiatives are in place, it is the intention of the authors that necessary actions will be approached in a collaborative manner.

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.

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 overexploitation).

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

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

Headline threat categories are identified with second-level threats outlined below each category. Priority and secondary threats for Tunisia are highlighted.

Table adjusted from Figure 6 in the *Mediterranean Angel Sharks: Regional Action Plan*.

THREAT CATEGORIES							
1 Agriculture & Aquaculture	2 Biological Resource Use	3 Climate Change & Severe Weather	4 Human Intrusion & Disturbance	5 Invasive & Other Problematic Species, Genes & Diseases	6 Pollution	7 Residential & Commercial Development	8 Transportation & Service Corridors
1.1 Aquaculture cages (hormones, food etc.)	2.1 Illegal, Unreported & Unregulated (IUU) fishing	3.1 Changing water temperature	4.1 Degradation of habitat	5.1 Pathogens	6.1 Water pollution/runoff	7.1 Coastal building and infrastructure development	8.1 Pipelines and electrical cables
	2.2 Small-scale & Large-scale fisheries: lack of species-specific landings and identification issues		4.2 Altered seafloor morphology	5.2 Low genetic diversity (genetic bottlenecks/ population fragmentation)	6.2 Micro/ macro plastics	7.2 Renewable energy (e.g. wind farms, underwater turbines, lagoons)	8.2 Shipping disturbance (e.g. physical disturbance, noise pollution)
	2.3 Small-scale & Large-scale fisheries: impact of different gear types		4.3 Anchor damage of habitats	5.3 Invasive species	6.3 Sewage	7.3 Extractive Industries (e.g. aggregate, mining, dredging)	
	2.4 Subsistence/ food security		4.4 Recreational watersports		6.4 Oil spills		
	2.5 Recreational and sports fishing (e.g. rod & line, surfcasting, spearfishing)		4.5 Increasing number of tourists		6.5 Eutrophication		
	2.6 Ghost fishing		4.6 Physical disturbance				
	2.7 Alteration of the food web (overfishing of prey species)		4.7 Diver disturbance				
			4.8 Impact of beach users/ activities on coastal nursery areas				

 **Priority Threat**
 **Secondary Threat**
 **Not a current threat**

FISHERIES

GOAL 1: FISHERIES BASED ANGEL SHARK MORTALITY IS MINIMISED IN TUNISIA

Tunisia, with 2,290 km of coastline, has ten fishing ports where industrial vessels can be based, 23 coastal ports and eight landing points for artisanal fishing boats. In 2020, the number of active fishing vessels was 13,216 including 12,385 small scale vessels with or without engines (93.71%), 408 benthic trawlers and 423 purse seiners (Direction Générale de la Production Agricole (DGPA), 2020). A variety of static and towed gear are used including trammel nets, gillnets, longlines, bottom trawls and purse seine (Enajjar *et al.*, 2024). Angel sharks are caught accidentally by all fleet segments.

Information on fishing activities, catch data, or incidental catches that should be recorded by the ship owner in the logbook are generally overlooked for angel sharks or placed in the miscellaneous categories. In addition, Arabic angel shark name “Sfen” is used also for other cartilaginous species such as guitarfish and rays increasing then the unreliability of statistics registered in the landing ports.

It seems that recreational fisheries constitute a significant fishing activity in Tunisia but this is yet to be quantified as little data on this sector is currently available.

GOAL 1 Fisheries based angel shark mortality is minimised in Tunisia	
Objective 1.1	Reporting and monitoring along the Tunisian coast in all fleet segments is improved for the three species of angel shark.
Objective 1.2	Incidental catch of angel sharks by all fisheries is minimised.
Objective 1.3	Retention is reduced and post-release survival enhanced, through awareness, training, and education for fishers.
Objective 1.4	The impact of interaction between marine recreational fishing activities and angel sharks is ascertained and minimised.

-  **Priority Action**
-  **Secondary Action**
-  **Not a current priority**

Action No.	Actions (adapted from MedRAP)	By who
1.1.1	Translate identification materials featuring the three species of angel sharks and lookalike/similar species (e.g. guitarfishes) into Arabic to improve species-specific reporting.	NGOs, INSTM, AVFA
1.1.2	Translate guidance documents for reporting procedure in line with GFCM recommendations for data recording and ensure the document is accessible to industry.	NGOs, INSTM, AVFA, DGPA
1.1.3	Angel Shark Sightings Map widely advertised through social media to encourage the capture and sighting submissions from commercial fishers.	NGOs, INSTM, AVFA, fishers
1.1.4	Engage with national and regional observer programs to ensure collation of angel shark records.	RAC/SPA, NGOs, ASCN, INSTM
1.1.5	Comply with existing GFCM and national reporting procedures.	DGPA, Fishing Industry
1.1.6	Develop capacity training for researchers, fishers, enforcement bodies, NGOs, members of the fishing authority etc. on elasmobranch identification, focusing on angel sharks (see 1.3.4)	SPA/RAC, DGPA, AVFA, INSTM
1.2.1	Collate data on incidental catch to inform management measures.	DGPA, NGOs, INSTM,
1.2.2	Develop a map of hotspots for angel shark catch (spatially and temporally) associated with recently established ISRAs.	NGOs, ASCN, Researchers, INSTM
1.2.3	Develop mitigation measures (spatial/temporal, gear restriction etc) based on collated data. Work with fishers to identify and adopt bycatch mitigation measures.	DGPA, NGOs, ASCN, Fishing Industry
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).	NGOs, ASCN, AVFA, Researchers
1.3.2	Develop awareness campaigns for consumers about the threatened and legal status of angel sharks, as well as the risks of consuming shark meat.	DGPA, AVFA, NGOs, Researchers
1.3.3	Identification (see Action 1.1.1) and handling guides (see Action 1.3.3) to be disseminated among fishing industry, recreational anglers, enforcement bodies, fish markets, governments etc.	DGPA, AVFA, NGOs Fishing Industry, Researchers
1.3.4	Develop awareness and training programs to educate fishers about the sensitivity of angel sharks to fisheries and their conservation and prohibited status, as well as best practice handling techniques.	DGPA, AVFA, NGOs, Researchers
1.3.5	Ascertain other drivers of angel shark retention to inform actions.	NGOs, ASCN
1.4.1	Quantify the level of recreational fishing activity in GSAs 12, 13, 14 guided by GFCM recreational fisheries handbook.	DGPA, NGOs, Researchers
1.4.2	Collate information on license enforcement systems in GSA 12, 13, 14 and what requirements are stipulated.	Government, NGOs, ASCN
1.4.3	Determine how often recreational fishers encounter angel sharks (contemporary and historic records).	NGOs, ASCN, Fishing Industry
1.4.4	Create recreational fishing best practice guidelines specific to the three <i>Squatina</i> species in the Mediterranean drawing on existing recreational guidelines such as the GFCM recreational fisheries handbook.	NGOs, ASCN
1.4.5	Encourage participation of recreational fishers in data collection and in using safe handling and release techniques for angel sharks.	NGOs, ASCN

HABITATS & NON-FISHING HUMAN IMPACT

GOAL 2: ANGEL SHARK HABITAT IS IDENTIFIED AND PROTECTED

Due to their demersal nature, habitat degradation poses a significant threat to angel sharks. Baseline data on the spatial distribution patterns, habitat use and population structure of angel sharks within these GSAs, as well as on substrate and bathymetry is required. Further investigation of non-fishing activities (e.g., Coastal building and infrastructure development) that could impact angel shark populations is also essential.

GOAL 2 Angel shark habitat is identified and protected.

Objective 2.1	Angel shark distribution is better understood.
Objective 2.2	The impact of non-fishing activities on angel sharks in the area is better understood.
Objective 2.3	Angel shark habitat is identified, specifically Critical Angel Shark Areas (CASAs)
Objective 2.4	Angel shark habitat is reflected in marine spatial planning and coastal development.

 **Priority Action**

 **Secondary Action**

 **Not a current priority**

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.

Action No.	Actions (adapted from MedRAP)	By who
2.1.1	Increase the profile of the three species to encourage public reporting to Angel Shark Sightings Map, complementing fisheries data.	NGOs, INSTM, Research institutes
2.1.2	Liaise with scientific surveys operating in the region and encourage engagement with this SubRAP (e.g. through data provision, assessments etc.)	ASCN, NGOs, Research institutes
2.1.3	Use fisheries data and other reporting methods to improve spatial data on distribution.	DGPA, RFMOs, Research institutes, ASCN
2.2.1	Engage divers in the region to look out for signs of presence (e.g. angel shark 'beds').	NGOs, ASCN, diving club
2.2.2	Identify and map popular dive sites and compare with sightings data.	Researchers, NGOs, ASCN
2.2.3	Investigate impact of tourism (e.g. diving) near CASAs.	Researchers, NGOs, ASCN
2.2.4	Identify if areas with high levels of pollution (plastics, agriculture etc.) overlap with important areas for angel sharks.	Researchers
2.2.5	Confirm if noise impacts angel sharks and if there are ways this can be mitigated.	Researchers, NGOs
2.3.1	Determine general features of potential CASAs based on those habitats in which angel sharks have been sighted on previously, liaising with work already conducted by regional partners.	Researchers, INSTM
2.3.2	Based on Action 2.3.1, Examine models to identify potential CASAs.	Researchers, INSTM
2.3.3	Increase engagement with habitat mapping programs to identify potential CASAs.	Ministry of Environment, RAC/SPA, NGOs, Researchers
2.3.4	Evaluate spatial distribution of threats and existing conservation measures (e.g. MPAs).	Ministry of Environment, Researchers
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).	Ministry of Environment, Researchers
2.3.6	Identify activities and develop action plans aiming to conserve and restore CASAs in CMS Range States, in line with CMS Appendix I obligations.	CMS Parties
2.4.1	Engage with Environmental Impact Assessment process prior to coastal developments near CASAs.	Ministry of Environment, Wider industry, Researchers, NGOs
2.4.2	Monitor coastal developments near CASAs.	Ministry of Environment, NGOs, Researchers
2.4.3	Identify what spatial/temporal management measures would be most appropriate in GSAs 12, 13 and 14.	Ministry of Environment, NGOs, Researchers
2.4.4	Include CASAs in MPA processes 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.	Government, NGOs, Researchers

LEGISLATION AND REGULATIONS

GOAL 3: NATIONAL LEGISLATION FOR ANGEL SHARKS IS ESTABLISHED, IMPLEMENTED AND ENFORCED

GFCM Recommendation 42/2018/2 has not yet been transposed into national legislation.

Priority actions identified to support the enforcement of legislation concerning angel sharks include engaging with government agencies and industry to identify gaps in the implementation of legislation and aid compliance with existing policies.

GOAL 3 National legislation for angel sharks is established, implemented and enforced.

Objective 3.1	Angel sharks are protected by regional and national management measures.
Objective 3.2	Management measures are implemented and enforced.
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).

-  **Priority Action**
-  **Secondary Action**
-  **Not a current priority**

Action No.	Actions (adapted from MedRAP)	By who
3.1.1	Transpose GFCM/42/2018/2 into national legislation.	Government
3.1.2	Fulfil obligations under CMS App I & II listing and CMS Sharks MoU Annex I.	Government
3.1.3	Engage with governments/CMS Range States and industry to aid compliance with existing legislation/policies/regulation.	NGOs, ASCN
3.1.4	Seek adoption of full protective measures to cover recreational activities and disturbance.	Government, NGOs
3.2.1	Implement and enforce GFCM/42/2018/2 and national legislations.	DGPA, Fishing Industry, NGOs
3.2.2	Implement CMS Appendix I listing in Tunisian waters.	Government, NGOs
3.2.3	Reinforce compliance reporting processes at regional fora, requiring more detailed documentation.	Government, GFCM, NGOs
3.2.4	Work with government to deal with cases of non-compliance with existing legislation/policies/regulations to key regional and international fora (e.g. GFCM, SPA/RAC, CMS).	NGOs, ASCN
3.2.5	Engage with CMS Focal Point to seek comment on the RAP.	CMS Secretariat
3.2.6	Promote RAP at relevant fora (e.g. CMS, GFCM, SPA/RAC).	ASCN
3.2.7	Ensure regulatory obligations are reflected in training for fishers, accommodating sub-regional constraints.	Government, NGOs
3.3.1	Advocate for adoption of spatial/temporal management in appropriate fora (e.g. GFCM, SPA/RAC) and at country level.	NGOs
3.3.2	Ensure CMS obligations are reflected in marine spatial planning (e.g. MPAs, FRAs, SPAs) and coastal development processes.	Government, NGOs, CMS Parties

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GLOSSARY/ACRONYMS

ASCN - Angel Shark Conservation Network

ACCOBAMS - Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area

CASA – Critical Angel Shark Area

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

FRA – Fisheries Restricted Area

GFCM – General Fisheries Commission for the Mediterranean

GSA – GFCM Geographical Subarea

LSF – Large-Scale Fisheries

MPA – Marine Protected Area

NGO – Non-governmental Organisation

RAC/SPA – Specially Protected Areas Regional Activity Centre

SPA – Special Protection Area

SSF – Small-Scale Fisheries

If you would like to be further involved in this work, please email angels@sharktrust.org with details about the work you are undertaking and we would be pleased to discuss engagement.



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