Mediterranean Angel Sharks: SubRegional Action Plan (SubRAP)

GSAs 22/23 (Aegean Sea and Crete)

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INTRODUCTION

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

- *Squatina aculeata* **Sawback Angelshark** (EN), **Ακανθορίνα** (GR), **Keler** (TR)
- *Squatina oculata* **Smoothback Angelshark** (EN), **Ματορίνα** (GR), **Keler** (TR)
- *Squatina squatina* **Angelshark** (EN), **Αγγελοκαρχαρίας** (GR), **Ρίνα** (GR), **Keler** (TR)

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.

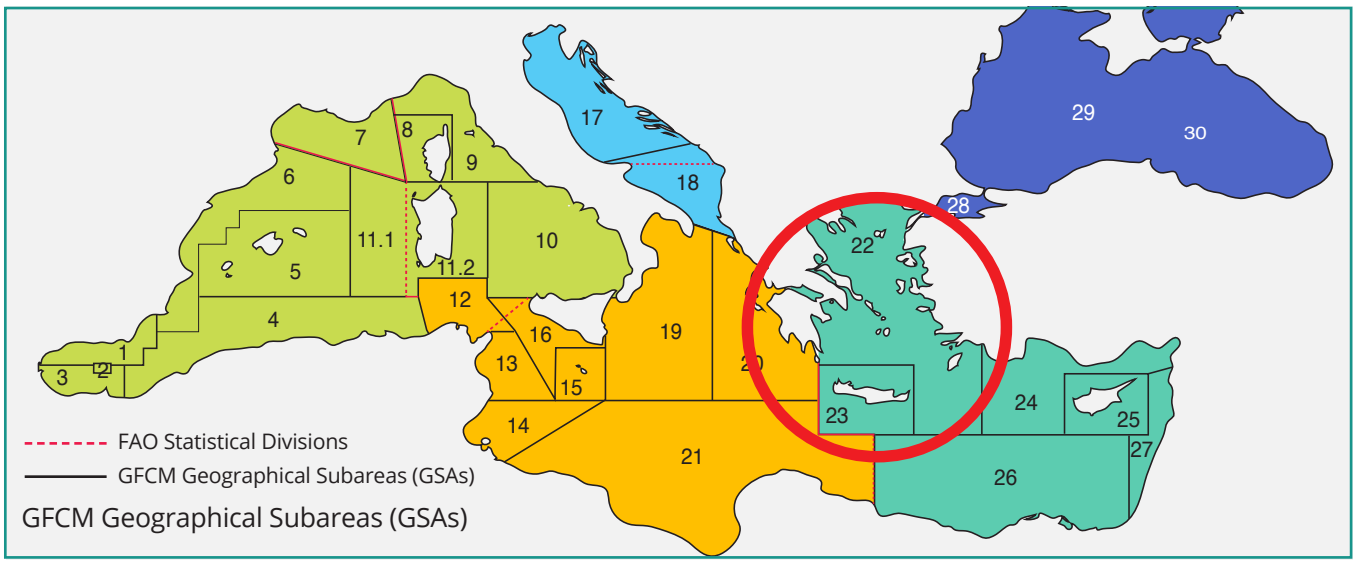
With over 20 coastal states and territories, the complex nature of the Mediterranean creates further need for highly collaborative action to build capacity for angel shark conservation. To allow a tailored approach in priority regions, SubRegional Action Plans (SubRAPs), such as this, are designed to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

The ***Mediterranean Angel Sharks: Regional Action Plan*** should be referred to for more detail.

IMPORTANCE OF SUBAREA

General Fisheries Commission for the Mediterranean (GFCM) ***Geographical Subareas*** (GSAs) 22 and 23 have been identified as priority regions for angel sharks, given the contemporary occurrence of all three species of *Squatina* known in the Mediterranean. There have been recent captures (and subsequent sale) of all three species, despite regulations in place to prohibit this.

Lead partners involved in this SubRAP are the ***Shark Trust***, ***iSea***, ***Turkish Marine Research Foundation*** (TUDAV), ***WWF Greece*** and ***WWF Turkey***.



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

EXISTING REGIONAL PROJECTS AND INITIATIVES

There are several key projects already established in GSAs 22 and 23 which will be engaged during this process. These include:

By ElasmoCatch (iSea) – assesses the impact of fisheries on elasmobranchs in the North Aegean and collects information on species biology and ecology. Observations, measurements, and samples are gathered during monthly visits to fishing vessels (two purse seines, two bottom trawlers, two longliners) following protocols produced by FAO.

Elasmobranch fisheries and trade in the North Aegean (iSea) – collects information on elasmobranch landings in the North Aegean by working with fishers, collecting species-specific landings data, and collating fisher's local ecological knowledge.

Sharks and rays in Greece and Cyprus (Mediterranean Elasmobranchs Citizen Observations, M.E.C.O.) – as part of the wider Mediterranean initiative, sightings data are collected through a network of organisations to better understand occurrence, seasonality, and distribution of elasmobranchs.

Understanding Mediterranean multi-taxa 'bycatch' of vulnerable species and testing mitigation – a collaborative approach (SPA/RAC) – this bycatch project aims to identify and test measures to reduce impact of fisheries on marine mammals, birds, turtles, and elasmobranchs.

Determination growth and reproduction characteristics of some cartilaginous fishes in the North Aegean Sea (TUBİTAK Projects) – this project collects biological data (e.g. growth, sexual maturity, reproduction of species) to determine population parameters of elasmobranchs in the North Aegean.

Support mechanism for filling key knowledge gaps for vulnerable species (marine mammals, sea birds, sea turtles and elasmobranchs) impacted by fisheries in priority areas of the Mediterranean (WWF Turkey, supported by SPA/RAC) – this project aims to understand distribution, movement patterns, and bycatch levels within two selected fishing grounds in Turkish Mediterranean waters.

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 24 Parties to the GFCM. This Recommendation prohibits the retention and sale of 24 elasmobranchs listed on Annex II of the Barcelona Convention.

Greece – While there is no national legislation in place for Greece, the European Union (EU) transposed the GFCM Recommendation into EU Regulation (EU 2015/2102), thereby as an EU Member State, this regulation is applicable. In addition, *S. squatina* is a Prohibited species under the Technical Measure, Regulation (EU) 2019/1241, which applies to the EU fleet in the Mediterranean and third country vessels fishing in Union waters.

Turkey – Fisheries Law (No: 1380) is the main legislative instrument governing fisheries in Turkey. In 2018, Communique 2018/19 updated Article 5 of the Turkish Prohibited Species lists (Communique 2016/35), prohibiting targeting and retention of all three *Squatina* species.

RECENT SIGHTINGS AND NON-COMPLIANCE

Contemporary sightings have been documented in the Aegean Sea for all three Mediterranean species (Başusta, 2002; Filiz *et al*., 2005; Corsini and Zava, 2007; Kabaskal and Kabaskal, 2014; Başusta, 2015; Giovos *et al*., 2019; Ergüden *et al*., 2019; Yığın *et al*., 2019; Ergenler *et al*., 2020), with sightings as recently as May 2020 for *S. aculeata* (Athens), February 2020 for *S. oculata* (Fethiye), and February 2020 for *S. squatina* (Rhodos Island).

Many of these sightings have been documented during fish market surveys in both Greece and Turkey, demonstrating incidents of non-compliance with existing regulations.

Sightings can be reported through the Angel Shark Sightings Map at **www.angelsharknetwork.com/#map**

▲ *Squatina aculeata* - Alexandroupoli, Greece © iSea

▲ *Squatina aculeata* - Athens, Greece © iSea

▲ *Squatina aculeata* – Samandag, Hatay, Turkey © Emre Fakioglu

THREATS

Priority threats in the Aegean and Cretan Seas remain largely the same as across the Mediterranean. These include lack of species-specific landings and identification issues in Small-Scale Fisheries (SSF) and Large-Scale Fisheries (LSF); Illegal, Unreported and Unregulated (IUU) fishing; impact of differing gear types in SSF and LSF; and potentially recreational fishing (although more needs to be established on the latter).

With so little known about habitat preference of angel sharks and the effect of human activities (beyond fishing), additional priority threats are perceived to be degradation of habitat and altered seafloor morphology.

No other regionally specific threats were identified by lead-partners at this time.

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

The extended coastline around the Aegean Sea, together with the large number of boats and the lack of auction markets (especially in the areas of interest for angel sharks) are major obstacles, as they make monitoring and enforcement challenging. In Greece, landings and sales are often not made in authorised places, and so have no sales notices or surveillance. Despite intense fishing activity around the North Aegean islands, auction markets are on the mainland (Alexandroupoli, Kavala, Thessaloniki) and the island of Chios, which is further south. Islands such as Lesbos, Samothrace, Thassos and Lemnos have no auction markets and therefore no monitoring.

Further constraints include the weak implementation of existing regulations, lack of resources and low capacity of authorities and fishers as well as scientists, widespread landing sites and a large fleet challenging Monitoring, Control and Surveillance, challenging communication, lack of knowledge of legislation, lack of national legislation or transposition of international regulation, aggregated landing categories hinder any good intentions.

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).

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 22 and 23 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.

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 threats for Aegean and Cretan Seas are highlighted, however these will vary between Greece and Turkey.

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

FISHERIES

GOAL 1: FISHERIES BASED ANGEL SHARK MORTALITY IS MINIMISED IN THE AEGEAN AND CRETAN SEAS

Greece: The Greek fleet is compiled of 8150 vessels, which use both static and towed gear: ~95% SSF (set gill nets, set longlines, trammel nets) and ~5% LSF (bottom otter trawlers, purse seines). Bottom otter trawls from Italy and Egypt also operate in international Mediterranean waters (more in GSA 23 than GSA 22).

The Greek coastline is extensive. Bottom otter trawlers and purse-seiners are obliged to land in the 11 auction markets of the country (including Kavala, Chios, Alexandroupoli, Kalymnos) while SSFs land in small ports where no monitoring exists, and data collection is exclusively based on self-reporting in the regional Fisheries Offices. In addition, monitoring is lacking in the auction markets where illegal trade and mislabelling is quite common, largely due to aggregated landing categories. The widespread nature of SSFs makes monitoring extremely challenging.

Turkey: As of 2018, the Turkish fleet consists of 18,008 vessels (both marine and inland waters), including bottom trawl, longline, and polyvalent vessels.

In Turkish waters of the northern Aegean Sea, sharks and rays are captured as bycatch by otter trawls, purse-seines, bottom longlines and gillnets. Shark and ray meat consumption is limited in Turkey and it is mainly processed for export. Effective initiatives on the conservation and fishery management of elasmobranchs is lacking in the Aegean Sea, despite ongoing efforts. Overfishing and IUU fisheries are prevalent, with landings appearing in aggregated categories such as “sharks” and “rays” which do not reflect the true diversity.

GOAL 1 **Fisheries based angel shark mortality is minimised in the Aegean and Cretan Seas.**	
Objective 1.1	Reporting and monitoring in all segments of coastline in the areas of interest, including recreational, 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 information, training, and education for fishers.
Objective 1.4	The extent of interaction between marine recreational fishing activities and angel sharks is ascertained and minimised.

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) so species-specific reporting is improved.	NGOs
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, GFCM, Governments, Fishing Industry
1.1.3	ASCN Angel Shark Sightings Map widely advertised through social media to encourage submissions from recreational anglers.	ASCN, NGOs
1.1.4	Engage with regional observer programmes to ensure collation of angel shark records.	RAC/SPA, NGOs, ASCN
1.1.5	Comply with existing GFCM and national reporting procedures.	Fishing Industry, Governments
1.2.1	Collate data on incidental catch to inform management measures (liaise with programmes such as the Med Bycatch Project).	GFCM, NGOs
1.2.2	Ascertain the level of bycatch and incidental catch by gear type in order to inform further necessary action.	Governments, Fishing Industry, NGOs
1.2.3	Map hotspots for bycatch of angel sharks (spatially and temporally).	NGOs, ASCN, Researchers
1.2.4	Secure spatial/temporal management and gear restrictions based on collated data.	Governments, ASCN, NGOs, GFCM
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
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, GFCM, Governments
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
1.3.4	Ascertain other drivers to angel shark retention to inform actions.	NGOs, ASCN
1.3.5*	Quantify the impact of SSF vessels through monitoring bycatch levels in gillnets and trammel nets.	Governments, Fishing Industry, NGOs
1.4.1	Quantify the level of recreational fishing activity in the Mediterranean, guided by GFCM recreational fisheries handbook.	GFCM, Governments
1.4.2	Collate information on whether licence systems are in force in each subregion and what requirements are stipulated.	NGOs, ASCN
1.4.3	Determine how often recreational fishers encounter angel sharks (contemporary and historic records).	GFCM, NGOs, ASCN
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
1.4.5	Identify angling clubs/shops in each region where guidelines can be distributed.	NGOs, ASCN
1.4.6	Encourage participation of recreational fishers in data collection.	NGOs, ASCN

**New action for this SubRAP*

HABITATS & NON-FISHING HUMAN IMPACT

GOAL 2: ANGEL SHARK HABITAT IS IDENTIFIED AND PROTECTED

The sea floor habitat in the Aegean Sea is widely unknown, with maps mostly derived by models and very little cross validation by in situ surveys.

There are 521 Fisheries Restricted Areas (FRAs) identified in GSAs 22 and 23, towed or mobile gears are restricted in 88.5% of these, and static gears are restricted in just 10.2% (Petza *et al*., 2017).

Under EU and GFCM regulations, 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, providing valuable protection for coastal species.

Greece: In Greek waters of GSAs 22 and 23, seasonal closures to otter bottom trawl fishing are effective between 24th May and 1st October and between 24th December and 1st of January in national waters (>6 nm from shore and >50 m depth). Purse-seine fishing is prohibited from 15th December until the end of February, and must be deeper than >30 m. In addition, it's prohibited to fish using purse seines on Saturdays, and if it is a full moon it is also prohibited on Sundays from dawn of that day until dawn of the next day (p.D. 23/3/53 replaced by N.4691/2020, ΦΕΚ 108A). The minimum mesh size is 14 mm (vertically) for the purse seine vessels operating at night (EC 1967/2006) and 40 mm (vertically) for purse seines operating during daytime (p.D*. 445/1963) parliament decree). Additional spatial prohibitions are in place at various sites (e.g. Thermaic Gulf), from aquaculture settlings etc. No data are available on the number of licences issued for otter bottom trawlers in international waters.

Turkey: In Turkish waters, harvesting of fisheries by purse-seining is prohibited between 15th April and 31st August. In territorial waters purse seining is prohibited in waters shallower than 10 fathom (18 m). Seining with ığrıp, trata, tarlakoz, manyat and other beach seines are prohibited in all territorial waters.

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.

Action No.	Actions (adapted from MedRAP)	By who
2.1.1	Increase the profile of three species to encourage public reporting to ASCN Angel Shark Sightings Map, complementing fisheries data.	ASCN, NGOs
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
2.1.3	Use fisheries data and other reporting methods to improve spatial data on distribution.	ASCN, GFCM, Governments, Fishing Industry
2.2.1	Engage dive clubs across the Mediterranean to look out for signs of presence (e.g. angel shark 'beds').	NGOs, ASCN
2.2.2	Identify and map popular beaches and dive sites and compare with sightings data.	Researchers, NGOs, ASCN
2.2.3	Investigate the impact of tourism near CASAs	Researchers, NGOs, ASCN
2.2.4	Confirm if noise impacts angel sharks and if there are ways this can be mitigated.	Researchers, ASCN
2.2.5	Identify if areas with high levels of pollution (plastics, agriculture etc.) overlap with important areas for angel sharks.	Researchers
2.3.1	Determine general features of potential CASAs based on those habitats in which angel sharks have been sighted on previously.	Researchers
2.3.2	Based on Action 2.3.1, examine models to predict potential CASAs.	Researchers
2.3.3	Increase engagement with SPA/RAC habitat mapping programmes to identify potential CASAs.	NGOs, RAC/SPA, Governments
2.3.4	Evaluate spatial distribution of threats and existing conservation measures (e.g. MPAs, Natura 2000).	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).	Researchers
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
2.4.1	Engage with Environmental Impact Assessment process prior to coastal developments near CASAs.	Governments, Wider industry, NGOs
2.4.2	Monitor coastal developments near CASAs and mitigate impacts where possible.	Governments, Wider industry, NGOs
2.4.3	Identify what spatial/temporal management measures would be most appropriate according to each subarea.	GFCM, Governments, Input from NGOs
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
2.4.5*	Promote a citizen science observatory for angel sharks.	NGOs

**New action for this SubRAP*

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.

LEGISLATION AND REGULATIONS

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

There is no transposition into Greek legislation of the GFCM Recommendation 42/2018/2, however, as an EU Member State, EU 2015/2102 (for all three species) and Regulation (EU) 2019/1241 (for *S. squatina*) both apply - yet there is evidence of non-compliance with these EU Regulations. There is no action plan for the conservation of elasmobranchs in Greece, however the EU Community Plan of Action for Sharks (2009) is relevant to Greece.

While the GFCM regulation has not been fully transposed, Turkey has established a legal tool (under Fisheries Law No. 1380) which includes *Squatina* spp., however compliance can be further enforced.

UNDERLYING GOAL **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).

Action No.	Actions (adapted from MedRAP)	By who
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
3.1.2	Transpose GFCM/42/2018/2 into national legislation where lacking.	Governments
3.1.3	Fulfil obligations under CMS App I & II listing and CMS Sharks MoU Annex I.	Governments, CMS*
3.1.4	Engage with governments/CMS Range States and industry to aid compliance with existing legislation/policies/regulations.	NGOs, ASCN
3.1.5	Where absent, seek adoption of full protective measures to cover recreational activities and disturbance.	NGOs, Governments
3.2.1	Implement and enforce GFCM/42/2018/2 & national legislations.	Governments, Fishing Industry, NGOs
3.2.2	Implement CMS Appendix I listing in all Mediterranean and Black Sea Range States.	Governments, NGOs
3.2.3	Reinforce compliance reporting processes at regional fora, requiring more detailed documentation.	Governments, GFCM, NGOs
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
3.2.5	Engage with CMS Focal Points to seek comment on the RAP.	CMS*
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 subregional constraints.	NGOs, Governments
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.	Governments, NGOs, CMS*
2.4.1	Engage with Environmental Impact Assessment process prior to coastal developments near CASAs.	Governments, Wider industry, NGOs
2.4.2	Monitor coastal developments near CASAs and mitigate impacts where possible.	Governments, Wider industry, NGOs
2.4.3	Identify what spatial/temporal management measures would be most appropriate according to each subarea.	GFCM, Governments, Input from NGOs
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
2.4.5*	Promote a citizen science observatory for angel sharks.	NGOs

** Turkey is not a party to CMS (See: **www.cms.int**)*

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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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Shark Conservation Fund

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