5-Year Review of the Smoothback Angelshark (*Squatina oculata*)

April 2025

National Marine Fisheries Service
Office of Protected Resources
Silver Spring, Maryland

National Marine Fisheries Service
5-Year Review of the

Endangered Smoothback Angelshark (*Squatina oculata*)

Recommendation Resulting from the 5-Year Review:

- ☐ Downlist to Threatened
- ☐ Uplist to Endangered
- ☐ Delist
- ☒ No change is needed

Review Conducted By:

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Jennifer Schultz, Office of Protected Resources

HEADQUARTERS APPROVAL:

☒ Concur ☐ Do Not Concur

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Acting Assistant Administrator, NOAA Fisheries

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5-Year Review
of the
Smoothback Angelshark (*Squatina oculata*)

The National Marine Fisheries Service (NMFS) of the National Oceanic and Atmospheric Administration (NOAA) conducted this review in accordance with the Endangered Species Act of 1973, as amended (ESA; 16 U.S.C. 1533 *et seq*.).

1 GENERAL INFORMATION

1.1 Reviewers

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1.2 Introduction

Section 4(c)(2) of the ESA requires us to conduct a review of listed species at least once every 5 years (16 U.S.C. 1533(c)(2)). It requires us to determine whether a species should be

- removed from the list (*i.e.*, delisted),
- reclassified from an endangered species to a threatened species (*i.e.*, downlisted), or
- reclassified from a threatened species to an endangered species (*i.e.*, uplisted).

Section 4(b)(1)(A) of the ESA requires us to make the determination based solely on the best scientific and commercial data available at the time of the review and after taking into account efforts to protect the species (16 U.S.C. 1533(b)(1)(A)). Any recommendation to delist or reclassify the species would require a separate rulemaking process.

Throughout this review, we use terms as defined or described by the ESA (16 U.S.C. 1532) as follows.

- The term “species” includes any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate fish or wildlife which interbreeds when mature.
- The term “endangered species” means any species which is in danger of extinction throughout all or a significant portion of its range.

- The term “threatened species” means any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

1.3 Methods

As required under 50 CFR 424.21, we announced the initiation of the 5-year review in the Federal Register (FR) and solicited relevant information (89 FR 90266; November 15, 2024). We specifically requested data available since the publication of the status review (Miller 2016). We received comments from the Angel Shark Conservation Network (E. Meyers, I. Giovos, and C. Bousquet) and incorporated that information into this review. We also received one comment supporting the continued listing of the smoothback angelshark.

We used scientific publication search tools to identify relevant information available since the publication of the previous status review in 2016. This information included peer-reviewed publications and government and technical reports. We reviewed, synthesized, and applied the best available scientific and commercial data to make our determination.

1.4 ESA Section 4 History

Section 4 of the ESA requires us to promulgate regulations to list threatened and endangered species (16 U.S.C. 1533 *et seq*.), which are listed at 50 CFR 17.11. For this species, we have completed the following actions under section 4 of the ESA.

1.4.1 Initiation of this 5-Year Review

FR notice: 89 FR 90266
Date published: November 15, 2024

1.4.2 Listing History

Original Listing
FR notice: 81 FR 50394
Date listed: August 1, 2016
Entity listed: Species
Status: Endangered

1.4.3 Review History

Miller, M.H. 2016. Status Review Report of 3 Species of Angelsharks: *Squatina aculeata*, *S. oculata*, and *S. squatin*a. Report to National Marine Fisheries Service, Office of Protected Resources. June 2016. 74 pp.
Conclusion: All species were at a high risk of extinction

2 DESCRIPTION OF LISTED ENTITY

2.1 Species Description

Angel sharks (written as one word when referring to the species) have a flattened body (batoid) with large diamond-shaped pectoral and pelvic fins. The smoothback angelshark has “thorns” (sharp, tooth-like structures) on its snout and above its eyes, but these are absent from its dorsal surface, which gives it the descriptive name of smoothback. It also has barbels (fleshy filaments) underneath its mouth. Its first dorsal fin is situated farther back on its tail than other angel sharks, and it has symmetrical white spots on its body and pectoral fins. It is a medium-sized shark, growing to 160 cm in total length (Lawson *et al*. 2020).

2.2 Taxonomy and Nomenclature

Since the status review, the taxonomy and nomenclature of the smoothback angelshark have not changed. The genus is monophyletic (*i.e.*, all species in the genus have a common ancestor). The species clusters phylogenetically with the sawback (*S. aculeata*) and common (*S. squatina*) angelsharks that also occur in the Mediterranean Sea and eastern Atlantic Ocean (Figure 1; Weigmann *et al*. 2023). In addition to external morphological differences that allow for identification, these species are genetically distinguishable through mitochondrial DNA (mtDNA) sequencing (Faure *et al*. 2023). The genetic divergence between the smoothback and sawback angelsharks at two mtDNA genes is 9.63% (Vella *et al*. 2017).

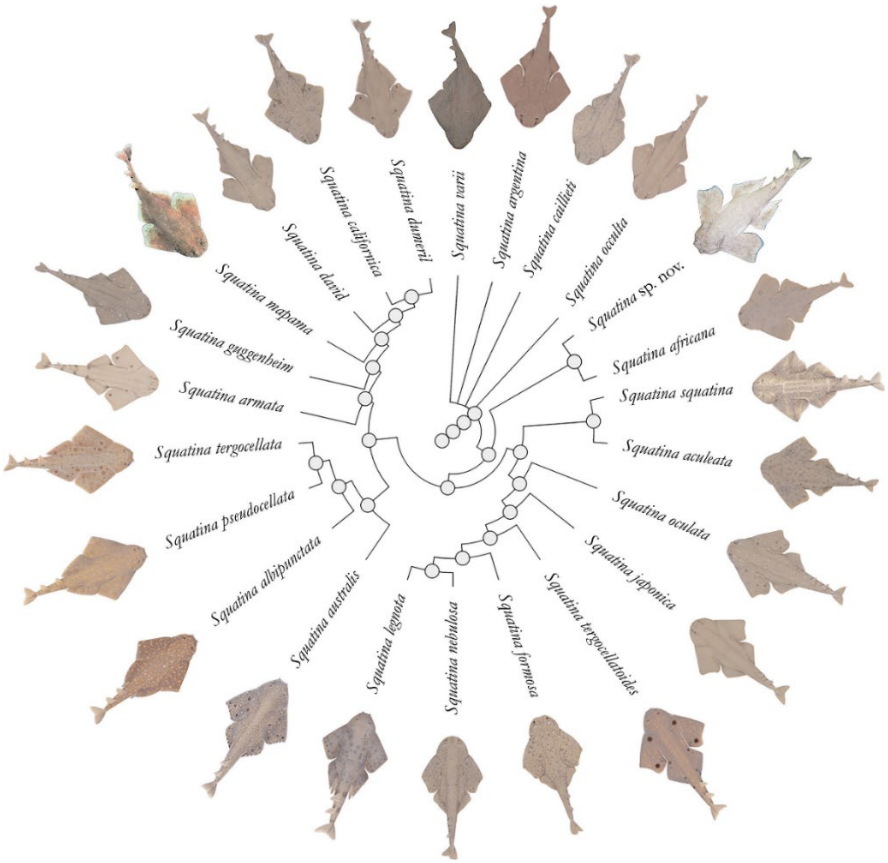

FIGURE 1. *SQUATINA* CLADOGRAM
(Weigmann *et al.* 2023). Reproduced with the permission of Dr. Simon Weigmann.

3 BIOLOGY, LIFE HISTORY, AND RANGE

The smoothback angelshark is a demersal (*i.e.*, bottom-dwelling) species that occurs in depths of 10-560 m (mostly commonly at 50-200 m), along continental shelves (Ellis *et al*. 2020; Lawson *et al*. 2020). Angel sharks are ovoviviparous (*i.e.*, eggs hatch within the female's body), and females move to shallower waters (10-40 m) to give birth (Ellis *et al*. 2020). Angel sharks are lie-and-wait ambush predators that forage on demersal fish, cephalopods, and crustaceans (Ellis *et al*. 2020; Lawson *et al*. 2020). The smoothback angelshark occurs in warm temperate waters of the eastern Mediterranean Sea and the eastern Atlantic Ocean from Mauritania to Angola (Lawson *et al*. 2020). Its current, fragmented range is shown in Figure 2.

FIGURE 2. RANGE OF THE SPECIES
Shading reflects the species' range. Map modified with permission from the International Union for the Conservation of Nature (IUCN) Red List (Morey *et al.* 2019) with updates from data available through March 2025.

4 DEMOGRAPHIC FACTORS

The demographic factors of abundance, productivity, spatial distribution, and diversity are reliable indicators of a species' persistence and reflect the manifestation of past

threats (McElhany *et al.* 2000). Information on these demographic factors is limited for this species.

4.1 Abundance

No estimates of abundance were available for the smoothback angelshark at the time of the status review, and no estimates of abundance are currently available. In the most recent review by the IUCN Red List, Morey *et al*. (2019) concluded that the species' abundance has declined dramatically in the past 50 years (at least 80%) and is currently declining. Species with such low abundance are at greater risk of extinction due to deterministic density or Allee effects (*i.e.*, reduced individual fitness due to small population size; Stephens *et al*. 1999), environmental variation, genetic processes, demographic stochasticity (*i.e.*, random changes), ecological feedback, and catastrophes (McElhany *et al.* 2000).

4.2 Productivity and Population Trends

Productivity data on the species are limited. As summarized by Lawson *et al*. (2020), the species has a 15-year generation time, with a 2-year reproductive periodicity and low fecundity (3 to 8 pups/litter). Females reach maturity at 89 to 100 cm, and males reach maturity at 71 to 82 cm (Lawson *et al*. 2020). Population growth rates are unknown, but the species' generation time is longer and its fecundity is lower than other elasmobranchs (Lawson *et al*. 2020), which include sharks, rays, skates, and sawfish. We conclude that productivity is likely low.

4.3 Spatial Distribution

Historically, the smoothback angelshark's range included the entire Mediterranean Sea and the eastern Atlantic Ocean, from Namibia to Portugal (Figure 3; Lawson *et al*. 2020). It has been extirpated from parts of the northwestern Mediterranean Sea, much of the Adriatic Sea, and waters off northwestern Africa (Holcer and Lazar 2017; Morey *et al*. 2019; Lawson *et al*. 2020; Soldo and Lipej 2022). Where it remains extant, it is extremely uncommon (Morey *et al*. 2019). Reviewing all sightings, landings, and bycatch records from 1987 to 2019, Lawson *et al*. (2020) estimated a 48% reduction in spatial distribution. We reviewed data available through 2025 (Appendix) and updated the spatial distribution of the species (Figure 3), using the classifications as defined by Lawson *et al*. (2020):

- Extant: areas with at least one record
- Presence uncertain: areas with no records, but sharing a coastline with an extant area

- Possibly extinct: areas without records.

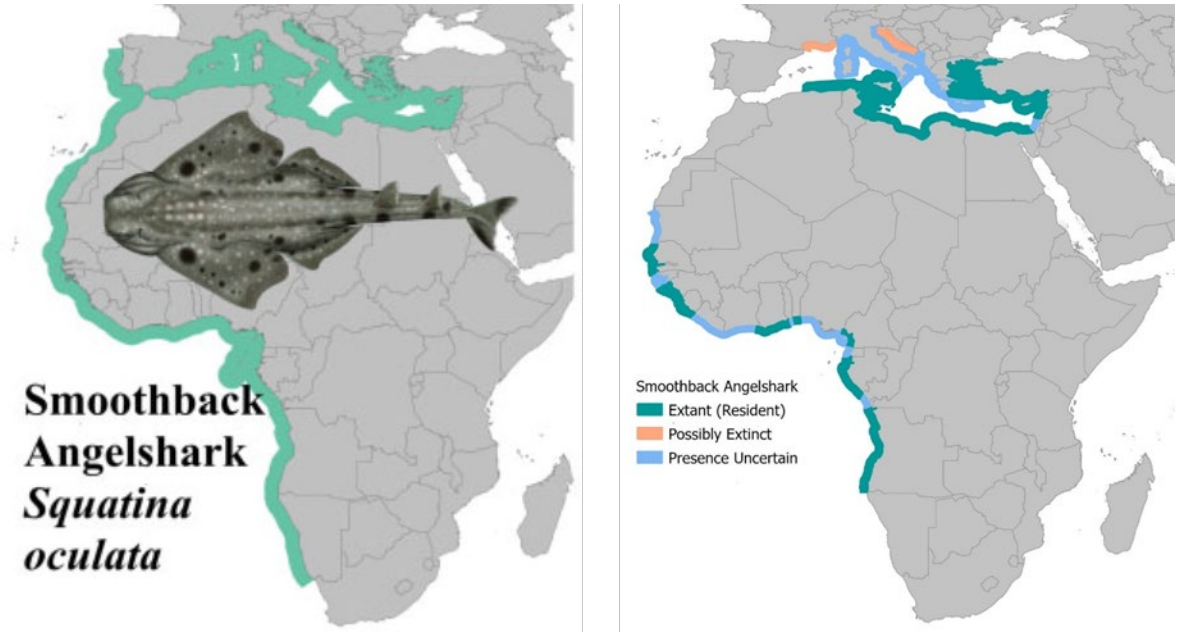

Figure 3. Historical and Present Range of the Species
Historical range shown in green (left; Lawson *et al*. 2020). Present range (right), based on data available since the publication of Lawson *et al*. (2020), see Appendix. Shading reflects where the species is extant (green), presence uncertain (blue), and possibly extinct (orange). Present range map modified with permission from the International Union for the Conservation of Nature (IUCN) Red List (Morey *et al.* 2019) with updates using data available through March 2025.

Because of the rarity of the species, the only records of recent occurrence (*i.e.*, since the 2016 status review) are bycatch and landings data, which are discussed in section 5.2. Satellite telemetry, genetic, or other data are not available to evaluate connectivity across the fragmented range of the species. As described in the 2016 status review, such fragmentation makes the species vulnerable to stochastic and demographic fluctuations (Miller 2016).

4.4 Diversity

Seven smoothback angelsharks collected from Maltese fish markets between 2005 and 2009 shared the same mtDNA haplotype (Vella *et al*. 2017). Although the sample size is small, the lack of variation suggests reduced genetic diversity and thus reduced resilience of the species (Vella *et al*. 2017).

5 ESA SECTION 4(A)(1) FACTORS OR THREATS

Section 4(a)(1) of the ESA requires us to determine whether any species is an endangered species or a threatened species because of any of the following factors (16 U.S.C. 1533(a)(1)):

(A) the present or threatened destruction, modification, or curtailment of its habitat or range;
(B) overutilization for commercial, recreational, scientific, or educational purposes;
(C) disease or predation;
(D) the inadequacy of existing regulatory mechanisms; or
(E) other natural or manmade factors affecting its continued existence.

In the sections below, we review the 4(a)(1) factors or threats. For each threat, we identify the magnitude (*e.g.*, high, moderate, low, or unknown), trend of the impact (*e.g.*, increasing, decreasing, stable, or unknown), and impact to relevant demographic factors (*e.g.*, reducing the abundance, recruitment, distribution, or diversity). For this species, we are not aware of any other natural or manmade factors affecting its continued existence.

5.1 Present or Threatened Destruction, Modification, or Curtailment of its Habitat or Range

Since the publication of the 2016 status review, data have become available on the present or threatened modification of habitat. Emerging threats to the species' habitat include changing environmental conditions, towed-bottom fisheries, and pollution.

Relative to other elasmobranch species, Pereira Santos *et al*. (2024) found that increasing temperatures pose a medium-low threat to the smoothback angelshark by altering the distribution of the species and its prey. Rummer *et al*. (2022) suggested that ocean acidification was likely to have the most dramatic direct effects on epibenthic invertebrates and strong indirect effects on their predators, which include demersal sharks. We conclude that these environmental changes are an emerging threats to the species.

As a demersal species, the smoothback angelshark is vulnerable to benthic habitat perturbation (Zara *et al*. 2022). Trawls, nets, and dredges pulled along the seafloor may damage habitat used by the species and its prey. For example, towed-bottom fishing gear kills 20-50% of benthic invertebrates (Collie *et al*. 2017), and recovery times for benthic communities after trawling range from 1.9 to 6.4 years (Hiddink *et al*. 2017).

However, there are no data available on how such habitat modifications impact the smoothback angelshark or its prey.

Pollutants may also degrade the habitat of the species and its prey. Along the Turkish coast of the Aegean Sea, fish exhibited elevated levels of cadmium, lead, and mercury (Pazi *et al*. 2017). Seabed sediments in Egyptian waters contained elevated levels of organochlorine contaminants (Hassaan *et al*. 2024). Plastic ingestion and entanglement are also a concern, especially in the Mediterranean Sea, which is a global hotspot for plastic debris (Marcuso *et al.* 2023). However, there are no data available regarding the impacts of pollution on the smoothback angelshark, its habitat, or its prey.

5.2 Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

Historical overutilization for commercial purposes depleted the abundance, productivity, and diversity of the smoothback angelshark throughout its range and reduced its spatial distribution (Holcer and Lazar 2017; Morey *et al*. 2019; Leonetti *et al*. 2020). In the 19th and early 20th centuries, commercial fisheries targeted angel sharks for their meat, liver, and skin (Lawson *et al*. 2020). In Turkey, there is also a traditional belief that angel shark meat reduces cancer (Giovos *et al*. 2019). Specialized gear was developed to catch angel sharks, and areas of high concentration were named after them, including the Baie des Anges (Bay of Angels) in France (Lawson *et al*. 2020). Overfishing depleted the smoothback angelshark to such low levels that targeted fisheries were abandoned decades ago. For example, Portuguese landings off Morocco and Mauritania declined by 95% from 1990 to 1998 (Morey *et al*. 2019).

Now, the greatest threat to the smoothback angelshark is bycatch in fisheries targeting other species (Morey *et al*. 2019). Table 1 summarizes reported bycatch of the species available since publication of the 2016 status review. The small numbers likely reflect the scarcity of the species (Giovos *et al*. 2019). It is also likely that reported bycatch represents a fraction of the total bycatch due to lack of or erroneous reporting (Giovos *et al*. 2019; Lawson *et al*. 2020; Ulman *et al*. 2024). Illegal, unreported, and unregulated IUU) fishing occurs throughout the range of the species (Giovos *et al*. 2019; Lawson *et al*. 2020). Erroneous reporting includes misidentification, aggregated counts including other angel sharks and elasmobranchs, and inadequate training of monitoring staff (Giovos *et al*. 2019; Lawson *et al*. 2020).

TABLE 1. BYCATCH RECORDS AVAILABLE SINCE 2016

Nation	Location	Gear or Market	N or % of catch	Year	Reference
Turkey	All	Trammel net	52*,**	2020-2023	Ulman *et al*. 2024
	Levantine Sea	All	0.02%	1991-2018	Bengil and Basusta 2018
	Aydıncık	Trawl	1	2017	Ergüden *et al.* 2019
	Gökçeada	Bottom trawl	1*	2018	Yığın *et al.* 2019
	Gökçeada	Trammel net	1**	2023	Kabasakal *et al*. 2023
	Marmaris	Purse-seine	1	2022	Akyol *et al.* 2023
	Marmara	Gillnet	1	2018	Kabasakal *et al*. 2024
Cyprus		Benthic nets, longline	9*	2018-2022	O'Keefe *et al.* 2023
Syria	All	All	0.31%	2014-2016	Alkusairy and Saad 2018
Lebanon	Tyre		1	2019	Bariche and Fricke 2020
Greece	Crete	Net	2	2015	Giovos *et al*. 2019
Italy	Sicily	Trammel net, bottom trawl	5**	2016-2017	Zava *et al.* 2022
	Sicily	Trammel net	1	2017	Giovos *et al*. 2019
Malta		Trammel net, bottom trawl	11*	2016-2019	Zava *et al.* 2022
Egypt		Bottom trawl	2	2021	Zava *et al.* 2022
Tunisia			1	2018	Rafrafi-Nouira *et al.* 2019
		Trawl	3	2022	Rafrafi-Nouira *et al.* 2022
		Trammel	2*	2021	Ounifi-Ben Amor *et al*. 2023
Algeria		Market	3*	2023	Capapé *et al.* 2023
The Gambia		Market	1	2017	Moore *et al.* 2019
Guinea			1	2017	Morey *et al.* 2019b
Gabon		Trawl	9	2018	Minko and Bruyne 2024
Democratic Republic of the Congo	Songolo	Landings	17	2019-2021	Doherty *et al.* 2023

*Gravid female and/or young of year
**Some released

Smoothback angelsharks are most often caught in demersal trawls, bottom set gillnets, and trammel nets. In a survey of bycatch data from the eastern and central

Mediterranean Sea from 2005 to 2022, 74% of smoothback angelshark specimens were caught in bottom trawls, and 18% were caught in trammel nets (Zava *et al.* 2022). Citizen science reports from Italy, Libya, Cyprus, and Greece identified only two smoothback angelsharks: one caught in a trammel net in Sicily in 2017 (Table 1) and one caught in a net in Crete in 2015 (Giovos *et al*. 2019). In Gabon, nine smoothback angelsharks were bycaught and recorded by observers on 56 fish and shrimp trawling trips in 2018 (Meyers *et al*. 2024).

Bycatch mortality rates are not available, but angel sharks are able to survive low oxygen environments and often survive for hours while entangled in a net (Ulman *et al*. 2024). While often landed alive, most bycaught angel sharks are consumed or sold at market. The smoothback angelshark has been documented at fish markets in Libya, Greece, Turkey, and Cyprus (Al Mabruk *et al*. 2021; Gordon *et al*. 2020; Bengil *et al*. 2021; Fakıoğlu *et al*. 2021; Giovos *et al*. 2021). Capapé *et al.* (2023) sampled a gravid female from a market in Algeria. The species has also been recently reported in markets in The Gambia, Cameroon, and Gabon (Diop and Sidibeh 2024; Labyedh *et al*. 2024; Minko and Bruyne 2024). Thus, we conclude that most bycaught individuals are consumed or sold in local markets, despite laws against retention and trade (Zava *et al*. 2022).

Turkey is the only country known to report on the discard or release of bycaught angel sharks (Giovos *et al*. 2019). From 2020 to 2023, 90% of smoothback angelsharks were captured alive, and Ulman *et al*. (2024) indicated that small-scale fishers generally release angel sharks, in accordance with Turkish law. However, in a broader study of bycatch records throughout the Mediterranean Sea, only 9% of angel sharks were released (Zava *et al*. 2022). As described above, angel sharks survive being caught; however, captured, gravid females often abort their fetuses (Ellis *et al*. 2020; Ulman *et al*. 2024). These fetuses are not viable, and their deaths reduce the productivity of the species. Such capture-induced parturition has been observed in waters off Turkey, Cyprus, Sicily, Malta, and Tunisia (Zava *et al.* 2016; Yığın *et al.* 2019; O'Keefe *et al*. 2023; Ulman *et al.* 2024).

We conclude that commercial overutilization, including bycatch, is a high-level threat to the species. It reduces the abundance and productivity of the species. We do not have adequate data to determine the trend of this threat.

5.3 Disease or Predation

There were no data available regarding smoothback angelshark diseases or predation at the time of the status review, and no data have become available since then.

5.4 Inadequacy of Existing Regulatory Mechanisms

As described in the sections below, numerous regulations exist to protect and conserve the smoothback angelshark. Despite these regulations, IUU fishing continues throughout the species' range. Therefore, the inadequacy of existing regulatory mechanisms remains a high-level threat to the species.

5.4.1 Mediterranean

The Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean (*i.e.*, the Barcelona Convention) is the principal regional regulatory mechanism in the Mediterranean Sea. It is a legally binding multilateral environmental agreement that has been adopted by the United Nations Environment Programme Mediterranean Action Plan. Since 2012, angel sharks have been listed under Annex II of the List of Endangered and Threatened Species" of the Special Protected Areas and Biological Diversity Protocol. While contracting parties have agreed to protect, preserve, and manage the species, bycatch retention, consumption, and trade continue throughout the Mediterranean Sea (Table 1).

The General Fisheries Commission for the Mediterranean (GFCM) is a regional fisheries management organization and its objective is to ensure the conservation and sustainable use of living marine resources. In 2018, it updated its recommendations that prohibit retention, landing, and sale of all angel sharks throughout the Mediterranean Sea (GFCM/42/2018/2). Despite such recommendations, angel sharks continue to be sold in local markets (Giovos *et al*. 2022).

In 2023, the European Union (EU) updated regulations and codified the GFCM recommendations (EU Regulation 2023/2124). We are unable to evaluate the effectiveness of this update due to lack of data since its enactment. However, as described above, previous international regulations, agreements, and recommendations have not adequately reduced bycatch, retention, and trade in the Mediterranean Sea.

National regulations also appear to be inadequate. For example, the lack of reported angel shark landings in Greece is likely due to its aggregating reporting of elasmobranchs, rather than protections put into place in 2018 (Giovos *et al*. 2019). After the 2021 Turkish Fisheries Law prohibited retention and trade, fishers were reluctant to report their bycatch, despite fines only for transporting or selling angel sharks (Ulman *et al*. 2024).

Marine protected areas (MPAs) exist in the Mediterranean Sea but are inadequate in size. Fisheries restricted areas cover only 20% of the species' range (Giovos *et al*. 2022).

5.4.2 Eastern Atlantic

In the waters off Western Africa, industrial trawlers catch large quantities of elasmobranchs without monitoring and reporting requirements (de Bruyne and Labyedh 2024). In many nations, there are no elasmobranch-specific laws and limited capacity to enforce fishing regulations or collect data (Issah and Brobbey 2024, Jabado *et al.* 2024; Konan and Diaha 2024; Labyedh *et al*. 2024; Mangue Ebana and Barrientos 2024; Midinoudewa 2024; Porriños *et al.* 2024; Sinclair 2024a, 2024b; Soares 2024). In Gabon and The Gambia, laws protect elasmobranchs from retention and trade; however, enforcement is inadequate due to limited budgets (Minko and Bruyne 2024; Diop and Sidibeh 2024). In Gabon, MPAs prohibit industrial, artisanal, and scientific fishing, but enforcement and awareness are lacking (Minko and Bruyne 2024). Since 2023, efforts are underway to update regulations to protect elasmobranchs and to expand MPAs in Gabon to 26% of its waters; however, these efforts are currently in the information-gathering stage (Minko and Bruyne 2024).

6 EFFORTS TO PROTECT THE SPECIES

Section 4(b)(1)(A) of the ESA requires us to make determinations based solely on the best scientific and commercial data available, after conducting a review of the status of the species, and after taking into account efforts, if any, being made by any State or foreign nation, or any political subdivision of a State or foreign nation, to protect such species, whether by predator control, protection of habitat and food supply, or other conservation practices within any area under its jurisdiction, or on the high seas.

Section 4(f)(1) of the ESA requires us to

- develop and implement recovery plans for listed species, unless such a plan will not promote the conservation of the species, and
- prioritize the development and implementation of plans for species that are most likely to benefit from such plans (16 U.S.C. 1533(f)(1)).

We determined that a recovery plan will not promote the conservation of the smoothback angelshark because it exists solely in foreign waters, and the United States does not contribute to the threat of the species. However, others entities have developed strategies and action plans to protect the species.

The 2017 Eastern Atlantic and Mediterranean Angel Shark Conservation Strategy (Gordon *et al*. 2017) provided three goals to guide cooperative efforts to protect angel sharks:

- Minimize fisheries mortality
- Identify, investigate, and protect Critical Angel Shark Areas
- Minimize other manmade impacts on angel sharks

Several regional and subregional action plans built on the above strategy to minimize fisheries mortality, identify and protect habitat, and establish, implement, and enforce national regulations. These include:

- The 2019 Mediterranean Angel Sharks: Regional Action Plan (Gordon *et al*. 2019)
- Mediterranean Angel Sharks: SubRegional Action Plans
    - Southern Ionian Sea (Al Mabruk *et al*. 2021)
    - Aegean Sea and Crete (Gordon *et al*. 2020)
    - Northern Levant Sea (Fakıoğlu *et al*. 2021)
    - Northern Cyprus (Bengil *et al*. 2021)
    - Republic of Cyprus (Giovos *et al*. 2021)

The efforts listed above provide strategies and goals to protect the species. However, these strategies and plans have not yet been sufficiently implemented to reduce threats to the smoothback angelshark.

7 SYNTHESIS

Historically, the smoothback angelshark was harvested for its meat, oil, and skin. Targeted fisheries were abandoned decades ago due to depletion of the species. Bycatch in fisheries targeting other species is now the greatest threat to the smoothback angelshark. As a demersal species, it is captured in trawls, nets, and other benthic fishing gear and is often retained for consumption or sale in local markets. While regulatory mechanisms exist throughout the Mediterranean Sea and in some Western African nations, monitoring, reporting, and enforcement are inadequate to reduce retention and trade. Emerging threats to the species' benthic habitat and prey base include towed-bottom fishing, pollution, and changing environmental conditions. Protective efforts are at the strategic planning or information-gathering stages and have not yet been effective at reducing threats to the species.

In 2016, we listed the smoothback angelshark as an endangered species under the ESA. At that time, abundance estimates were not available, and such estimates have not become available since then. The IUCN Red List concludes that, where extant, the smoothback angelshark is extremely uncommon and continues to decline in abundance (Morey *et al*. 2019). The species' productivity and genetic diversity are also low. The species has been extirpated from many areas of its historical range, and its spatial distribution is now reduced and fragmented. Data are insufficient to estimate population trends.

Thus, the best scientific and commercial data available since the 2016 status review demonstrate that the species continues to be in danger of extinction throughout its range because of commercial overutilization and inadequate regulatory mechanisms to reduce bycatch, retention, and trade. We therefore do not recommend delisting or reclassification at this time.

8 RESULTS

Based on the best scientific and commercial data available, we provide the following recommendation. The species continues to be endangered because of commercial overutilization (especially fisheries bycatch) and inadequate regulatory mechanisms to reduce this threat (Table 2).

TABLE 2. SUMMARY OF 4(A)(1) FACTORS (THREATS)
Magnitude and trend of each threat and how it impacts the species.

Threat	Magnitude of Threat	Trend of Threat	Impact to Species
Habitat Modification or Loss	Emerging	↑ Increasing	Spatial distribution
Overutilization	High	? Unknown	Abundance, productivity, spatial distribution, diversity
Disease/Predation	Unknown	? Unknown	Unknown
Regulatory Inadequacy	High	? Unknown	Abundance, productivity, spatial distribution, diversity

8.1 Recommended Classification

_____**Downlist to Threatened**
_____**Uplist to Endangered**
_____**Delist** *(Indicate reason for delisting per 50 CFR 424.11):*

_____*Extinction*
_____*Recovery*
_____*Original data for classification in error*

_X___**No change is needed**

9 RECOMMENDED FUTURE ACTIONS

We recommend the following future actions to protect and conserve the species. Completion of these recommendations is not required, and the results of subsequent reviews are not dependent on the completion of these recommendations.

- List the smoothback angelshark under Appendix I of the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention) to protect the species, its habitat, and its movement across national jurisdictions (Gordon *et al.* 2017).
- Implement goals and objectives included in the Eastern Atlantic and Mediterranean Angel Shark Conservation Strategy (Gordon *et al*. 2017), Mediterranean Angel Sharks: Regional Action Plan (Gordon *et al*. 2019), and sub-regional plans (Gordon *et al*. 2020; Al Mabruk *et al*. 2021; Bengil *et al*. 2021; Fakıoğlu *et al*. 2021; Giovos *et al*. 2021).
- Protect Critical Angel Shark Areas and Important Shark and Ray Areas (Giovos *et al*. 2022; Ulman *et al*. 2024).
- Establish or update and enforce regulations to protect the smoothback angelshark from overutilization.
- Continue to work in regional partnerships to gather information on the species' abundance, productivity, spatial structure, and diversity.
- Validate and apply eDNA analyses to detect the presence or absence of the smoothback angelshark throughout its range (Faure *et al*. 2023).

10 REFERENCES

Akyol O, Çoker T, Betül Toprak H, Capapé C (2023) Capture of a rare smoothback angelshark *Squatina oculata* (Squatinidae) in Turkish waters, with updated records from the eastern Mediterranean Sea. Natural and Engineering Sciences 8(1): 38-45.

Alkusairy H, Saad A (2018) Species composition, diversity and length frequency of by-catch sharks from the Syrian coast. International Journal of Research Studies in Zoology 4: 11-21.

Al Mabruk SAA, Barker J, Gillham RL, Giovos I, Hood AR, Jiménez-Alvarado D, Meyers EKM (2021) Mediterranean Angel Sharks: SubRegional Action Plans (SubRAP) GSA 21 (Southern Ionian Sea). The Shark Trust, Plymouth, UK. [Available from: https://angelsharknetwork.com/wp-content/uploads/sites/16/2021/09/SubRAP-GSA-21-summary-Eng-final.pdf].

Bakiu R, Peculaj A, Krstinic P (2023) Using Local Ecological Knowledge of fishers to identify the presence ad habitats of angelsharks in Albanian waters. Croatian Journal of Fisheries 81: 139-146.

Balàka PF, Ugarkovíc P, Türtscher J, Kriwet J, Niedermüller S, Krstiníc P, Jambura PL (2023) Updated checklist of chondrichthyan species in Croatia (Central Mediterranean Sea). Biology 12: 952.

Bariche M, Fricke R (2020) The marine ichthyofauna of Lebanon: An annotated checklist, history, biogeography, and conservation status. Zootaxa 4775(1): 1–157.

Bengil EGT, Başusta N (2018) Chondrichthyan species as by-catch: A review on species inhabiting Turkish waters. Journal of the Black Sea/Mediterranean Environment 24(3): 288–305.

Bengil EGT, Godley BJ, Gillham RL, Hood AR , Snape RTE (2021) Mediterranean Angel Sharks: SubRegional Action Plans (SubRAP) GSA 25* (Northern Cyprus). The Shark Trust, Plymouth, UK. [Available from: https://angelsharknetwork.com/wp-content/uploads/sites/16/2021/07/SubRAP-GSA-25N-summary-Eng_final.pdf].

Blamo E (2022) Liberia's struggle to protect endangered sharks and rays. Dialogue Earth December 8, 2022: https://dialogue.earth/en/nature/liberias-struggle-to-protect-endangered-sharks-and-rays/.

Bradaï MN (ed.) (2020) Action Plan for the conservation of cartilaginous fishes (chondrichtyans) in the Mediterranean Sea. Specially Protected Areas Regional Activity Center (SPA/RAC), Tunis, Tunisia. [Available from: https://www.rac-spa.org/sites/default/files/action_plans/elasmo.pdf].

Capapé C, Reynaud C, Hemida F (2023) The first substantiated records of smoothback angelshark *Squatina oculata* (Squatinidae) from the Algerian coast (southwestern Mediterranean Sea). Annales, Series Historia Naturalis 33(2): 143-147.

Collie JS, Hiddink JG, van Kooten T, Rijnsdorp AD, Kaiser MJ, Jennings S, Hilborn R (2017) Indirect effects of bottom fishing on the productivity of marine fish. Fish and Fisheries 18: 619–637.

De Bruyne G, Labyedh G (2024) West Africa. Pages 997-999 in Jabado RW, Morata AZA, Bennett RH, Finucci B, Ellis JR, Fowler SL, Grant MI, Barbosa Martins AP, Sinclair SL (eds.) Global status of sharks, rays, and chimaeras. IUCN, Gland, Switzerland. [Available from: https://portals.iucn.org/library/node/52102].

De Bruyne G, Dissondet Moundzoho B, Doherty P, M*etc*alfe K (2024) Congo. Pages 1069-1078 in Jabado RW, Morata AZA, Bennett RH, Finucci B, Ellis JR, Fowler SL, Grant MI, Barbosa Martins AP, Sinclair SL (eds.) Global status of sharks, rays, and chimaeras. IUCN, Gland, Switzerland. [Available from: https://portals.iucn.org/library/node/52102].

Diop MS, Morata AZA (2024) Sierra Leone. Pages 1321-1326 in Jabado RW, Morata AZA, Bennett RH, Finucci B, Ellis JR, Fowler SL, Grant MI, Barbosa Martins AP, Sinclair SL (eds.) Global status of sharks, rays, and chimaeras. IUCN, Gland, Switzerland. [Available from: https://portals.iucn.org/library/node/52102].

Diop MS, Sidibeh M (2024). Gambia (Republic of the). Pages 1135-1142 in Jabado RW, Morata AZA, Bennett RH, Finucci B, Ellis JR, Fowler SL, Grant MI, Barbosa Martins AP, Sinclair SL (eds.) Global status of sharks, rays, and chimaeras. IUCN, Gland, Switzerland. [Available from: https://portals.iucn.org/library/node/52102].

Diop MS, Dia M, de la Hoz Schilling C (2024b) Mauritania. Pages 1217-1222 in Jabado RW, Morata AZA, Bennett RH, Finucci B, Ellis JR, Fowler SL, Grant MI, Barbosa Martins AP, Sinclair SL (eds.) Global status of sharks, rays, and chimaeras. IUCN, Gland, Switzerland. [Available from: https://portals.iucn.org/library/node/52102].

Diop MS, Sylla I, Doumbouya F (2024) Guinea. Pages 1157-1164 in Jabado RW, Morata AZA, Bennett RH, Finucci B, Ellis JR, Fowler SL, Grant MI, Barbosa Martins AP, Sinclair SL (eds.) Global status of sharks, rays, and chimaeras. IUCN, Gland, Switzerland. [Available from: https://portals.iucn.org/library/node/52102].

Doherty PD, de Bruyne G, Dissondet Moundzoho B, Dilambaka E, Okondza GN, Atsango BC, Ngouembe A, Akendze TR, Parnell RJ, Cournarie M, Malonga R, Missamou A, Godley BJ, M*etc*alfe K (2023) Artisanal fisheries catch highlights hotspot for threatened sharks and rays in the Republic of the Congo. Conservation Science and Practice 5: e13017. 1-13.

Ellis JR, Barker J, McCully Phillips SR, Meyers EK, Heupel M (2021) Angel sharks (Squatinidae): a review of biological knowledge and exploitation. Journal of Fish Biology 98(3): 592–621.

Ergüden D, Ayas D, Gürlek M, Karan S, Turan C (2019) First documented smoothback angelshark *Squatina oculata* Bonaparte, 1840 from the north-eastern Mediterranean Sea, Turkey. Cahiers de Biologie Marine 60: 189–194.

Fakıoğlu E, Gillham RL, Hood AR, Kabasakal H, Oruc A, Ozturk AA, Ulman A (2021) Mediterranean Angel Sharks: SubRegional Action Plans (SubRAP) GSA 24 (Northern Levant Sea). The Shark Trust, Plymouth, UK. [Available from: https://angelsharknetwork.com/wp-content/uploads/sites/16/2021/11/SubRAP-GSA-24-summary-Eng-FINAL.pdf].

Faure N, Manel S, Macé B, Arnal V, Guellati N, Holon F, Barroil A, Pichot F, Riutort JJ, Insacco G, Zava B, Mouillot D, Deter J (2023) An environmental DNA assay for the detection of Critically Endangered angel sharks (*Squatina* spp.). Aquatic Conservation: Marine and Freshwater Ecosystems 33: 1088–1097.

García-Monteiro S, Sobrino JA, Julien Y, Sòria G, Skokovi D (2022) Surface Temperature trends in the Mediterranean Sea from MODIS data during years 2003–2019. Regional Studies in Marine Science 49: 102086.

Giovos I, Gillham R, Hadjioannou L, Hood A, Kleitou P, Aga – Spyridopoulou RN, Papageorgiou M (2021) Mediterranean Angel Sharks: SubRegional Action Plans (SubRAP) GSA 25* (Republic of Cyprus). The Shark Trust, Plymouth, UK. [Available from: https://angelsharknetwork.com/wp-content/uploads/sites/16/2021/08/SubRAP-GSA-25Rep-summary_FINAL_new-iSea-logo.pdf].

Giovos I, Katsada D, Spyridopoulou RNA, Poursanidis D, Doxa A, Katsanevakis S, Kleitou P, Oikonomou V, Minasidis V, Ozturk AA, Petza D, Sini M, Yigin CC, Meyers EKM, Barker J, Jiménez-Alvarado D, Hood AR (2022) Strengthening angel shark conservation in the northeastern Mediterranean Sea. Journal of Marine Science and Engineering 10(2): 296.

Giovos I, Stoilas, VO, Al-Mabruk SAA, Doumpas N, Marakis P, Maximiadi M, Moutopoulos D (2019) Integrating local ecological knowledge, citizen science and long-term historical data for endangered species conservation: additional records of angel sharks (Chondrichthyes: Squatinidae) in the Mediterranean Sea. Aquatic Conservation: Marine and Freshwater Ecosystems 29: 881–890.

Gordon CA, Hood AR, Barker J, Bartolí À, Dulvy NK, Jiménez Alvarado D, Lawson JM, Meyers EKM (2017) Eastern Atlantic and Mediterranean Angel Shark Conservation Strategy. The Shark Trust, Plymouth, UK. [Available from: https://www.cms.int/sites/default/files/document/cms_cop12_inf.22_eastern-atlantic-mediterranean-angle-shark-conservation-strategy_e.pdf].

Gordon CA, Hood AR, Al Mabruk SAA, Barker J, Bartolí A, Ben Abdelhamid S, Bradai MN, Dulvy NK, Fortibuoni T, Giovos I, Jimenez Alvarado D, Meyers EKM, Morey G, Niedermuller S, Pauly A, Serena F, Vacchi M (2019) Mediterranean angel sharks: regional action plan. The Shark Trust, Plymouth, UK and Brussels, Belgium. [Available from: https://www.cms.int/sites/default/files/Med-Angel-Sharks-Regional-Action-Plan_2019_EN_web.pdf].

Gordon CA, Hood AR, Giovos I, Naasan Aga-Spyridopoulou R, Ozturk AA, Yigin CC, Fakiŏ glu E, Ibrahim D, Oruc A, Niedermüller S (2020) Mediterranean angel sharks: subregional action plan (SubRAP) GSAs 22/23 (Aegean Sea and Crete). The Shark Trust, Plymouth, UK. [Available from: https://angelsharknetwork.com/wp-content/uploads/sites/16/2020/10/SubRAP-GSA-22-23-summary-proof06-ENG.pdf].

Hassaan MA, Ragab S, Elkatory MR, El Nemr A (2024) Organochlorine pesticides (OCPs) and polychlorinated biphenyls (PCBs) distribution, origins, and risk evaluation in the Egyptian Mediterranean coast sediments. Water Environment Research 96(8): e11093.

Hiddink JG, Jennings S, Sciberras M, Szostek CL, Hughes KM, Ellis N, Rijnsdorp AD, McConnaughey RA, Mazor T, Hilborn R, Collie JS, Pitcher CR, Amoroso RO, Parma AM, Suuronen P, Kaiser MJ (2017) Global analysis of depletion and recovery of seabed biota after bottom trawling disturbance. Proceedings of the National Academy of Sciences 144(31): 8301-8306.

Holcer D, Lazar B (2017) New data on the occurrence of the critically endangered common angelshark, *Squatina squatina*, in the Croatian Adriatic Sea. Natura Croatica 26: 313–320.

Issah S, Brobbey LK (2024). Ghana. Pages 1145-1154 in Jabado RW, Morata AZA, Bennett RH, Finucci B, Ellis JR, Fowler SL, Grant MI, Barbosa Martins AP, Sinclair SL (eds.) Global status of sharks, rays, and chimaeras. IUCN, Gland, Switzerland. [Available from: https://portals.iucn.org/library/node/52102].

Jabado RW, Diop MS, Mbengue M (2024) Senegal. Pages 1291-1304 in Jabado RW, Morata AZA, Bennett RH, Finucci B, Ellis JR, Fowler SL, Grant MI, Barbosa Martins AP, Sinclair SL (eds.) Global status of sharks, rays, and chimaeras. IUCN, Gland, Switzerland. [Available from: https://portals.iucn.org/library/node/52102].

Kabasakal H (2023) A preliminary social media-based survey of sharks and batoids captured in commercial fisheries in the Northern Aegean Sea. Annales, Series Historia Naturalis 33(2): 165-186.

Kabasakal H, Uzer U, Karakulak FS (2024) Where have you been hiding? Re-emergence of *Squatina oculata* in the Sea of Marmara, with a review of captures in Turkish Seas. Aquatic Sciences and Engineering 39(3): 200-205.

Konan KJ,Diaha N'GC (2024) Côte d'Ivoire. Pages 1081-1086 in Jabado RW, Morata AZA, Bennett RH, Finucci B, Ellis JR, Fowler SL, Grant MI, Barbosa Martins AP, Sinclair SL (eds.) Global status of sharks, rays, and chimaeras. IUCN, Gland, Switzerland. [Available from: https://portals.iucn.org/library/node/52102].

Labyedh G, Fogwan C, Biankeu CI, Nigon M, Mbotiji N, Kamla AT, Ndounteng Ndjamo RX, Tchinda W (2024) Cameroon. Pages 1045-1052 in Jabado RW, Morata AZA, Bennett RH, Finucci B, Ellis JR, Fowler SL, Grant MI, Barbosa Martins AP, Sinclair

SL (eds.) Global status of sharks, rays, and chimaeras. IUCN, Gland, Switzerland. [Available from: https://portals.iucn.org/library/node/52102].
Lawson JM, Pollom RA, Gordon CA, Barker J, Meyers EKM, Zidowitz H, Ellis JR, Bartolí A, Morey G, Fowler SL, Jiménez Alvarado D, Fordham SV, Sharp R, Hood AR, Dulvy NK (2020) Extinction risk and conservation of critically endangered angel sharks in the Eastern Atlantic and Mediterranean Sea. ICES (International Council for the Exploration of the Sea) Journal of Marine Science 77: 12–29.
Leonetti FL, Sperone E, Travaglini A, Mojetta AR, Signore M, Psomadakis PN, Dinkel TM, Bottaro M (2020) Filling the gap and improving conservation: how IUCN red lists and historical scientific data can shed more light on threatened sharks in the Italian seas. Diversity 12: 389.
Leurs G, Barry I, Regalla A (2024) Guinea-Bissau. Pages 1167-1176 in Jabado RW, Morata AZA, Bennett RH, Finucci B, Ellis JR, Fowler SL, Grant MI, Barbosa Martins AP, Sinclair SL (eds.) Global status of sharks, rays, and chimaeras. IUCN, Gland, Switzerland. [Available from: https://portals.iucn.org/library/node/52102].
Mangue Ebana GL, Barrientos C (2024) Equatorial Guinea. Pages 1095-1098 in Jabado RW, Morata AZA, Bennett RH, Finucci B, Ellis JR, Fowler SL, Grant MI, Barbosa Martins AP, Sinclair SL (eds.) Global status of sharks, rays, and chimaeras. IUCN, Gland, Switzerland. [Available from: https://portals.iucn.org/library/node/52102].
Marcuso M, Porcino N, Blasco J, Romeo T, Savoca S, Spano N, Bottari T (2023) Microplastics in the Mediterranean Sea. Impacts on marine environment. Springer Briefs in Environmental Science. [Available from https://doi.org/10.1007/978-031-30481-1].
McElhany P, Rucklelshaus MH, Ford MJ, Wainwright TC, Bjorkstedt EP (2000) Viable salmonid populations and the recovery of evolutionary significant units. NOAA Technical Memorandum NMFS-NWFSC-42. Northwest Fisheries Science Center, Seattle, Washington.
Meyers E, Ellis JR, Chiaramonte GE, Furtado Soares AL, Barker J, Jiménez Alvarado D, Giovos I (2024) Angel sharks. Pages 1939-1944 in Jabado RW, Morata AZA, Bennett RH, Finucci B, Ellis JR, Fowler SL, Grant MI, Barbosa Martins AP, Sinclair SL (eds.) Global status of sharks, rays, and chimaeras. IUCN, Gland, Switzerland. [Available from: https://portals.iucn.org/library/node/52102].
Midinoudewa HEC (2024) Benin. Pages 1025-1030 in Jabado RW, Morata AZA, Bennett RH, Finucci B, Ellis JR, Fowler SL, Grant MI, Barbosa Martins AP, Sinclair SL (eds.) Global status of sharks, rays, and chimaeras. IUCN, Gland, Switzerland. [Available from: https://portals.iucn.org/library/node/52102].
Miller MH (2016) Status review report of 3 species of angelsharks: *Squatina aculeata*, S. *oculata*, and S. *Squatina*. Report to National Marine Fisheries Service, Office of

Protected Resources. June 2016. National Marine Fisheries Service, Silver Spring, Maryland, USA. [Available from: https://repository.library.noaa.gov/view/noaa/16283/].
Minko YIM, De Bruyne G (2024) Gabon. Pages 1117-1132 in Jabado RW, Morata AZA, Bennett RH, Finucci B, Ellis JR, Fowler SL, Grant MI, Barbosa Martins AP, Sinclair SL (eds.) Global status of sharks, rays, and chimaeras. IUCN, Gland, Switzerland. [Available from: https://portals.iucn.org/library/node/52102].
Moore ABM, Séret B, Armstrong R (2019) Risks to biodiversity and coastal livelihoods from artisanal elasmobranch fisheries in a Least Developed Country: the Gambia (West Africa). Biodiversity and Conservation 28: 1431.
Morey G, Barker, J, Bartolí A, Gordon C, Hood A, Meyers EKM, Pollom R (2019). *Squatina oculata*. The IUCN Red List of Threatened Species 2019: e.T61418A116782036. [Available from: https://dx.doi.org/10.2305/IUCN.UK.2019-1.RLTS.T61418A116782036.en].
O'Keefe M, Bengil EGT, Palmer JL, Beton D, Çağlar Ç, Godley BJ, Özkan M, Snape RTE and Broderick AC (2023) Diversity and distribution of elasmobranchs in the coastal waters of Cyprus: using bycatch data to inform management and conservation. Frontiers in Marine Science 10: 1181437.
Ounifi-Ben Amor, Ben Amor MM, Bdioui M, Capapé C (2023) Additional captures of smoothback angel shark *Squatina oculata* (Squatinidae) from the Tunisian coast (central Mediterranean Sea). Annales, Series Historia Naturalis 33(1): 37-40.
Öztürk B (2018) National action plan for the conservation of cartilaginous fishes in the Turkish water of the eastern Mediterranean Sea. Journal of the Black Sea/Mediterranean Environment 24(1): 91-96.
Pazi I, Gonul LG, Kucuksezgin F, Avaz G, Tolun L, Unluoglu A, Karaaslan Y, Gucver SM, Orhon AK, Siltu E, Olmuz G (2017) Potential risk assessment of metals in edible fish species for human consumption from the Eastern Aegean Sea. Marine Pollution Bulletin 120: 409-413.
Porriños G, Nuno A, Mulligan B, Murray K, da Graça M, Santos F, Guedes M, Madruga L, Maia HA, Nazaré L, Rosa R, Santos A, Walker K, Pissarra V (2024) Nigeria. Pages 1267-1274 in Jabado RW, Morata AZA, Bennett RH, Finucci B, Ellis JR, Fowler SL, Grant MI, Barbosa Martins AP, Sinclair SL (eds.) Global status of sharks, rays, and chimaeras. IUCN, Gland, Switzerland. [Available from: https://portals.iucn.org/library/node/52102].
Rafrafi-Nouira S, Chérif M, Reynaud C, Capapé C (2022) Captures of the rare smoothback angel shark *Squatina oculata* (Squatinidae) from the Tunisian coast (central Mediterranean Sea). Thalassia Salentina 44: 9–16.

Rafrafi-Nouira S, Diatta Y, Diaby A, Capapé C (2019) Additional records of rare sharks from northern Tunisia (central Mediterranean Sea). Annales, Series Historia Naturalis 29(1): 25–34.

Sinclair SL (2024a) Democratic Republic of Congo. Pages 1089-1092 in Jabado RW, Morata AZA, Bennett RH, Finucci B, Ellis JR, Fowler SL, Grant MI, Barbosa Martins AP, Sinclair SL (eds.) Global status of sharks, rays, and chimaeras. IUCN, Gland, Switzerland. [Available from: https://portals.iucn.org/library/node/52102].

Sinclair SL (2024b) Togo. Pages 1359-1368 in Jabado RW, Morata AZA, Bennett RH, Finucci B, Ellis JR, Fowler SL, Grant MI, Barbosa Martins AP, Sinclair SL (eds.) Global status of sharks, rays, and chimaeras. IUCN, Gland, Switzerland. [Available from: https://portals.iucn.org/library/node/52102].

Sinclair S, Morata AZA (2024) Liberia. Pages 1191-1198 in Jabado RW, Morata AZA, Bennett RH, Finucci B, Ellis JR, Fowler SL, Grant MI, Barbosa Martins AP, Sinclair SL (eds.) Global status of sharks, rays, and chimaeras. IUCN, Gland, Switzerland. [Available from: https://portals.iucn.org/library/node/52102].

Soares ALF (2024) Angola. Pages 1011-1022 in Jabado RW, Morata AZA, Bennett RH, Finucci B, Ellis JR, Fowler SL, Grant MI, Barbosa Martins AP, Sinclair SL (eds.) Global status of sharks, rays, and chimaeras. IUCN, Gland, Switzerland. [Available from: https://portals.iucn.org/library/node/52102].

Sohou Z, Okpeitcha OV, Sankare Y (2018) Biological diversity on the Beninese continental shelf during the demersal fish stock assessment survey. Vestnik of Astrakhan State Technical University. Series: Fishing Industry 3: 48-59.

Soldo A, Lipej L (2022) An annotated checklist and the conservation status of chondrichthyans in the Adriatic. Fishes 7: 245, 1-20.

Stephens PA, Sutherland WJ, Freckleton RP (1999) What is the Allee effect? Oikos 87(1): 185-190.

Ulman A, Gordon CA, Hood AR, Warren M, Pauly D (2024) Identifying potential critical angel shark areas in Türkiye, eastern Mediterranean based on new records of *Squatina* spp. identified through fisher engagement. Fishes 9(7): 270.

Vella A, Vella N, Schembri S (2017) A molecular approach towards taxonomic identification of elasmobranch species from Maltese fisheries landings. Marine Genomics 36: 17–23.

Weigmann S, Vaz DFB, Akhilesh KV, Leeney RH, Naylor GJP (2023) (2023) Revision of the western Indian Ocean angel sharks, Genus *Squatina* (Squatiniformes, Squatinidae), with description of a new species and redescription of the African angel shark *Squatina africana* Regan, 1908. Biology 12(7): 975.

Yığın CÇ, İşmen A, Daban B, Cabbar K, Önal U (2019) Recent findings of rare sharks, *Squatina oculata* Bonaparte, 1840 and *Squatina squatina* (Linnaeus, 1758) from

Gökçeada Island, northern Aegean Sea, Turkey. Journal of the Black Sea/Mediterranean Environment 25(3): 305–314.

Zava B, Fiorentino F, Serena F (2016) Occurrence of juveniles *Squatina oculata* Bonaparte, 1840 (Elasmobranchii: Squatinidae) in the Strait of Sicily (Central Mediterranean). Cybium 40(4): 341-343.

Zava B, Insacco G, Deidun A, Said A, Ben Souissi J, Nour OM, Kondylatos G, Scannella D, Corsini-Foka M (2022) Records of the critically endangered *Squatina* aculeata and *Squatina oculata* (Elasmobranchii: Squatiniformes: Squatinidae) from the Mediterranean Sea. Acta Ichthyologica et Piscatoria 52(4): 285–297.

11 APPENDIX

TABLE 3. DISTRIBUTION OF THE SMOOTHBACK ANGELSHARK

Using the best scientific and commercial data available through 2025, we updated the table provided by Lawson *et al*. (2020) with changes in bold.

Region	Sub-region	Nation	Status	Status in Lawson *et al*. 2020 (if changed)	Reference or Reasoning (per Lawson *et al*. 2020)
Atlantic Ocean					
	Northwest Africa				
		Benin	**Extant**	**Presence Uncertain**	**Sohou *et al*. 2018**
		Cote d'Ivoire	Presence Uncertain		Proximity to Ghana (Lawson *et al*. 2020)
		Ghana	Extant		FAO, pers. comm., reviewed by C. Gordon, 2016 (Lawson *et al*. 2020)
		Guinea	Extant		Morey *et al.* 2019
		Guinea-Bissau	Presence Uncertain		Proximity to Guinea and Senegal (Lawson *et al*. 2020)
		Liberia	Presence Uncertain		Proximity to Guinea and Sierra Leone (Lawson *et al*. 2020)
		Mauritania	Presence Uncertain		Proximity to Senegal (Lawson *et al*. 2020)
		Nigeria	Presence Uncertain		Proximity to Ghana (Lawson *et al*. 2020)
		Senegal	Extant		Capapé *et al*. 2002 (Lawson *et al*. 2020)
		Sierra Leone	Extant		M. Schaber, pers. comm., reviewed by E. Meyers, 2017 (Lawson *et al*. 2020)
		The Gambia	Extant		Diop and Sidibeh 2024
		Togo	Presence Uncertain		Proximity to Ghana (Lawson *et al*. 2020)
	Southwest Africa				

Region	Sub-region	Nation	Status	Status in Lawson *et al*. 2020 (if changed)	Reference or Reasoning (per Lawson *et al*. 2020)
		Angola	**Extant**	**Possibly Extinct**	**Soares 2024**
		Angola (Cabinda)	**Presence Uncertain**	**Possibly Extinct**	**Zidowitz unpublished data, 2017 (record from 1964) (Lawson *et al*. 2020)**
		Cameroon	**Extant**	**Presence Uncertain**	**Labyedh *et al*. 2024**
		Democratic Republic of the Congo	**Extant**	**Possibly Extinct**	**Doherty *et al*. 2023**
		Equatorial Guinea	Presence Uncertain		Proximity to Ghana (Lawson *et al*. 2020)
		Gabon	**Extant**	**Presence Uncertain**	**Minko and De Bruyne 2024**
		Republic of the Congo	Presence Uncertain		Proximity to Ghana (Lawson *et al*. 2020)
Mediterranean Sea					
	Western Basin/Tyrrhenian Sea				
		Algeria	Extant*	(Not included)	Capapé *et al*. 2023
		France	Possibly Extinct		Gag and Arnulf (1985; reported as Extant in the mid-1900s) (Lawson *et al*. 2020)
		Monaco	Possibly Extinct		Proximity to France (Lawson *et al*. 2020)
		Corsica (France)	Presence Uncertain		Proximity to Sicily (Lawson *et al*. 2020)
		Italy	Presence Uncertain		Proximity to Sicily (Lawson *et al*. 2020)
		Sardinia (Italy)	Presence Uncertain		Proximity to Sicily (Lawson *et al*. 2020)
	Central Basin				
		Libya	Extant		Al Mabruk *et al*. 2021
		Malta	**Extant**	**Presence Uncertain**	**Zava *et al.* 2022**
		Tunisia	Extant		Ounifi-Ben Amor *et al.* 2023

Region	Sub-region	Nation	Status	Status in Lawson *et al*. 2020 (if changed)	Reference or Reasoning (per Lawson *et al*. 2020)
		Greece	Presence Uncertain		Proximity to Greece (Aegean) (Lawson *et al*. 2020)
		Sicily (Italy)	Extant		Zava *et al.* 2022
Adriatic Sea					
		Albania	Presence Uncertain		Bakiu *et al.* (2023)
		Bosnia and Herzegovina	Presence Uncertain		Unknown, error regarding Croatia (Lawson *et al*. 2020)
		Croatia	**Possibly Extinct**	**Extant (Error)**	**Holcer and Lazar 2017; Balàka *et al*. 2023**
		Italy	Presence Uncertain		Unknown, error regarding Croatia (Lawson *et al*. 2020)
		Montenegro	Presence Uncertain		Unknown, error regarding Croatia (Lawson *et al*. 2020)
		Slovenia	Presence Uncertain		Unknown, error regarding Croatia (Lawson *et al*. 2020)
	Eastern Basin				
		Cyprus	**Extant**	**Presence Uncertain**	**Giovos *et al*. 2019; O'Keefe *et al.* 2023**
		Egypt	**Extant**	**Presence Uncertain**	**Zava *et al.* 2022**
		Israel	Presence Uncertain		Proximity to Turkey and Cyprus (Lawson *et al*. 2020)
		Lebanon	**Extant**	**Presence Uncertain**	**Bariche and Fricke 2020**
		Palestine	Presence Uncertain		Proximity to Turkey and Cyprus (Lawson *et al*. 2020)
		Syria	**Extant**	**Presence Uncertain**	**Alkusairy and Saad 2018**
		Turkey	Extant		Bengil and Basusta 2018
	Aegean Sea				
		Crete (Greece)	Extant		Giovos *et al*. 2019

Region	Sub-region	Nation	Status	Status in Lawson *et al*. 2020 (if changed)	Reference or Reasoning (per Lawson *et al*. 2020)
		Greece	Extant		Giovos *et al*. 2019
		Turkey	Extant		Ulman *et al*. 2024