

**Common Angelshark
(*Squatina squatina*)**

**5-Year Review:
Summary and Evaluation**

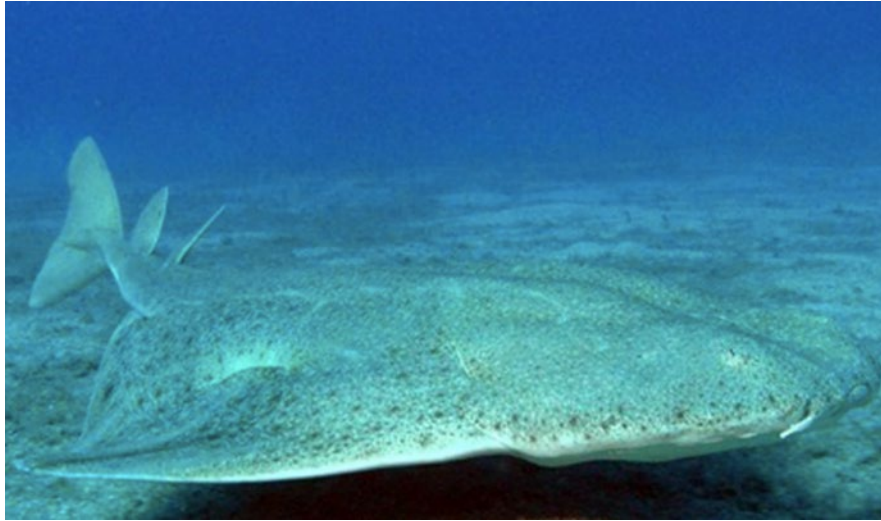


Figure 1: Photo credit: NOAA

**National Marine Fisheries Service
Office of Protected Resources
Silver Spring, MD**

5-YEAR REVIEW
Species reviewed: common angelshark (*Squatina squatina*)

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5-YEAR REVIEW

common angelshark / *Squatina squatina*

1.0 GENERAL INFORMATION

1.1 Reviewers

Headquarters Office:

George Kalantzopoulos, Office of Protected Resources, Intern
Celeste Stout, Office of Protected Resources, 301-427- 8436

1.2 Methodology used to complete review

The purpose of the Endangered Species Act of 1973, citation as amended (ESA; 16 U.S.C. 1531 et seq.) is to provide a means to conserve the ecosystems upon which endangered and threatened species depend, to provide a program for the conservation of endangered and threatened species, and to take appropriate steps to recover endangered and threatened species. One of our responsibilities under the ESA is to conduct a review of each listed species at least every 5 years to determine whether its endangered or threatened status should be changed or removed (i.e., 5-year review, 16 U.S.C. 1533(c)(2)). The ESA requires us to make these determinations solely on the basis of the best scientific and commercial data available (16 U.S.C. 1533(b)(1)(A)). In 2016, the National Marine Fisheries Service (NMFS) listed the common angelshark (*Squatina squatina*) as endangered after reviewing its status (the Status Review; Miller 2016) (81 FR 50394; August 1, 2016; listing effective August 31, 2016). On November 15, 2021, we initiated this 5-year review (86 FR 62996).

To compile the best available scientific and commercial data on this species, we first reviewed the Status Review (Miller 2016), which was based on the best available scientific and commercial data available at that time. We then searched for relevant new information on the species, its biology and habitat, and threats to their existence. Specifically, we searched for published literature using scientific search engines (including Clarivate's Web of Science, ScienceDirect, BioOne Complete, ProQuest's Aquatic Sciences and Fisheries Abstracts, JSTOR, EBSCO Academic Search and Environment Complete, and Google Scholar) and NMFS' scientific literature database. We solicited relevant information from other Federal agencies, States, Territories, Tribes, foreign governments, academia, nonprofit organizations, industry groups, and individuals by publishing a request in the Federal Register (86 FR 62996; November 15, 2021). We received one non-substantive comment. We compiled, reviewed, and evaluated available data. We did not conduct new empirical studies because the ESA requires the use of the best available scientific and commercial information.

After compiling the data, we considered the biology and habitat of the species. We identified information that has become available since the publication of the Status Review in 2016. We also reviewed the best available information on abundance and trends, genetics, and spatial distribution. We also assessed threats to the species by identifying and evaluating the ESA section 4(a)(1) factors (i.e., the five factor analysis; 16 U.S.C. 1533(a)(1)):

1. Present or threatened destruction, modification, or curtailment of habitat or range
2. Overutilization for commercial, recreational, scientific, or educational purposes

3. Disease or predation
4. Inadequacy of existing regulatory mechanisms
5. Other natural or manmade factors affecting its continued existence

1.3 Background

1.3.1 FRN Notice citation announcing initiation of this review

FR notice: 86 FR 62996

Date published: November 15, 2021

Purpose: NMFS gave notice of our initiation of a 5-year review of the common angelshark (*Squatina squatina*); we requested relevant information from the public.

1.3.2 Listing History

Original Listing

FR notice: 81 FR 50394

Date listed: August 1, 2016

Entity listed: common angelshark (*Squatina squatina*); wherever found

Classification: Endangered

1.3.3 Associated rulemakings

Not Applicable

1.3.4 Review History

On July 15, 2013, NMFS received a petition from WildEarth Guardians to list 81 marine species or subpopulations as threatened or endangered under the Endangered Species Act (ESA). This petition included species from many different taxonomic groups, including the foreign marine common angelshark (*Squatina squatina*). On November 19, 2013, NMFS found that the petition presented substantial scientific information indicating that listing the common angelshark may be warranted (78 FR 69376) and subsequently conducted a Status Review (Miller 2016). The final rule listing the common angelshark as endangered was published on August 1, 2016 (81 FR 50394).

1.3.5 Species' Recovery Priority Number at start of 5-year review

No Recovery Priority Number has been issued for the common angelshark

1.3.6 Recovery Plan or Outline

Not Applicable: A recovery plan has not been prepared for the common angelshark.

This is in accordance with NMFS' June 19, 2019 finding that a recovery plan would not promote its conservation as this species occurs entirely in foreign waters and therefore the threats to this subspecies occur under foreign jurisdiction.

2.0 REVIEW ANALYSIS

2.1 Application of the 1996 Distinct Population Segment (DPS) policy

2.1.1 Is the species under review a vertebrate?

Yes
 No

2.1.2 Is the species under review listed as a DPS?

Yes
 No

2.1.3 Is there relevant new information for this species regarding the application of the DPS policy?

Yes
 No

2.2 Updated Information and Current Species Status

2.2.1 Biology and Habitat

2.2.1.1 New information on the species' biology and life history: In this section, we present new information since the initial status review on the common angelshark (Miller 2016), was completed in 2016.

Squatina squatina is found in coastal and outer continental shelf sediment habitats in the Mediterranean Sea and eastern Atlantic (**Figure 2**, below). They are bottom dwellers and prefer to spend most of their time buried in the sand or mud (Compagno 1984).

S.squatina, is distinguished from other angelsharks by its simple and conical nasal barbels, high and wide pectoral fins, small spines that are present on snout and above eyes and may also be present down middle of back, and lateral trunk denticles that are very narrow with sharp-cusped crowns (Compagno 1984). Litter sizes typically range from 7 to 18 pups, with litter sizes being known to reach 25. Size at birth ranges from 24 cm-30 cm TL (Osaer 2009; Tonachella 2010). Males mature between 80 cm and 132 cm TL, with maximum sizes attained at 183 cm TL, and females mature between 126 cm and 169 cm TL and attain maximum sizes of up to 244 cm TL (Compagno 1984; Capapé *et al.* 1990; Quigley 2006; Tonachella 2010).

Gestation for common angelsharks is 8–10 months, and in the Mediterranean Sea birth occurs between December and February, while it occurs in July in British

waters (Ebert et al. 2021). This is consistent with previous reports of common angelshark fecundity.

The reproductive biology of *S. squatina* has been studied by Osaer *et al.* (2015), which reinforces previous studies by Lo Bianco (1899) and Capapé *et al.* (1990), and all studies suggest immature males ranged from 24.8 to 105.2 cm LT and mature males from 99.9 to 112.2 cm LT, whilst females were immature at 25.8–111.2 cm LT and mature at 102.8–120.8 cm LT. (Ellis *et al.* Nov. 2020)

2.2.1.2 Abundance, population trends (e.g. increasing, decreasing, stable), demographic features (e.g., age structure, sex ratio, family size, birth rate, age at mortality, mortality rate, etc.), or demographic trends:

Population estimates for *S. squatina* include an over 80 percent depletion of its historical abundance over the last 45 years (Ferretti *et al.* 2015). Since the status review population estimates have not changed for the better and very few *S. squatina* have been recorded in recent years (Shephard, *et al.* 2019). Quantifying the decline of this data-limited species and identifying accurate population data is challenging due to *S. squatina* population decline occurring before independent scientific monitoring (Giovos *et al.*, 2019; Hiddink *et al.*, 2019; Shephard *et al.*, 2019).

Observed declines in *S. squatina* are assumed to reflect fishing mortality predominately as commercial bycatch. *S. squatina* is encountered rarely in fishery-independent trawl surveys (Martin *et al.* 2010), and there is low spatial overlap between offshore research survey locations and coastal populations and habitats.

Population declines of *S. squatina* have been observed from many parts of the biogeographical range. This includes Ireland (Shephard *et al.*, 2019), the Irish Sea and the Bristol Channel (Ellis *et al.*, 2002; Hiddink *et al.*, 2019), the English Channel (McHugh *et al.*, 2011; Rogers & Ellis, 2000), the western Mediterranean (Coll *et al.*, 2014), the Gulf of Naples (Psomadakis *et al.*, 2009), Sicilian waters (Colloca *et al.*, 2020) and the Adriatic Sea (Fortibuoni *et al.*, 2016).

Additionally, *S. squatina* is now considered to be locally extinct in the North Sea (Figure 2) and is no longer encountered in areas of the northern Mediterranean (Morey *et al.* 2017). Additional reductions in angelshark distribution in other parts of north-west Europe (Lawson *et al.* 2020, Rogers and Ellis, 2000) and the southern North Sea have been reported (Bom *et al.* 2020).

S. squatina is currently extremely uncommon throughout a majority of its range with the exception of the Canary Islands. While an exact abundance is still unavailable, Noviello *et al.* (2021) gave a better idea of Canary Island common angelshark abundance with a study taking place between March 2014 and August

2018 using citizen science to document the average common angelshark occurrence per month combined with dive effort (Figure 3). The Canary Islands population is cited as having regular sightings by divers and fishermen (Lawson *et al.*, 2020, Meyers *et al.* 2017); however, this area only constitutes an extremely small portion of the species' range. Based on the historical and current catches and survey data, the information suggests that *S. squatina* has undergone significant declines and is likely still in decline throughout most of its range, with evidence of local extirpations and a significant curtailment of its historical range.

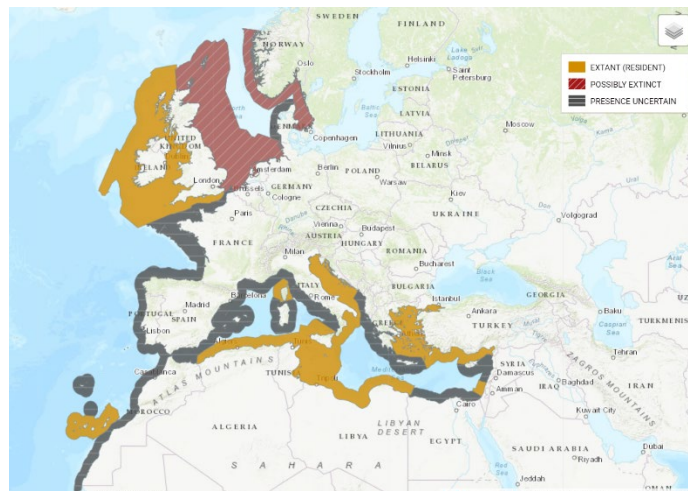


Figure 2: Distribution map of *S. squatina*. Red highlights areas where they are possibly extinct, yellow highlights areas where they are extant, and grey highlights unknown areas (Source: Morey *et al.* 2017).

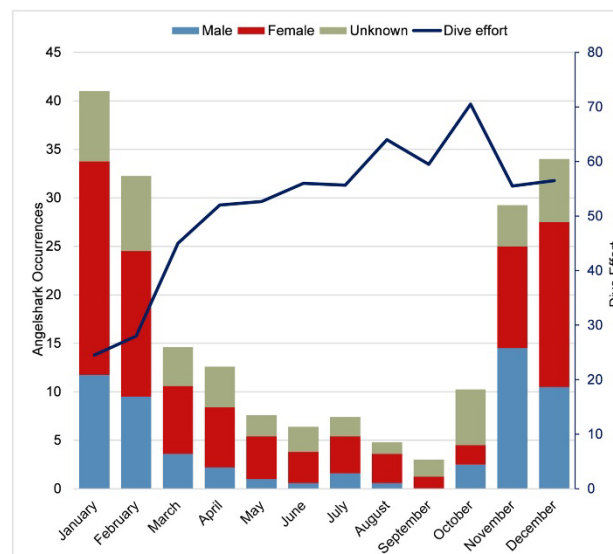


Figure 3: Angelshark occurrences with diver effort. Average sex-differentiated occurrences of angelshark (*Squatina squatina*) in the Canary Islands between March 2014 and August 2018, separated by month. The monthly average dive effort (dives per month) is also included (2016-2018). (Source: Noviello *et al.* 2021).

2.2.1.3 Genetics, genetic variation, or trends in genetic variation (e.g., loss of genetic variation, genetic drift, inbreeding, etc.):

For *S. squatina*, only preliminary information is available from the Canary Islands portion of its range. Between 2009 and 2016, Fitzpatrick *et al.* (2017) collected 509 tissue samples from *S. squatina* individuals off the Gran Canaria, Tenerife, and Lanzarote islands within the Canary Islands archipelago. Analysis of the deoxyribonucleic acid (DNA) sequences from four mitochondrial loci showed almost no genetic variation, with identical haplotypes found in almost all of the sampled individuals (Fitzpatrick *et al.* 2016).

2.2.1.4 Taxonomic classification or changes in nomenclature:

The Bayesian tree below (Figure 4) shows *S. squatina* as a sister species to the three angelsharks. This first *S. squatina* mitogenome provides a genomic resource to aid conservation and management efforts for this highly depleted species (Fitzpatrick *et al.* 2016). The tree was confirmed by Kousteni *et. al.*, in Nov 2021. Within Squatiniformes, *Squatina squatina* was grouped with *Squatina japonica* and sequentially by *Squatina nebulosa* which was placed as sister species to *Squatina formosa*. Pristiophoridae was placed as a sister taxon to Squatinidae, and pristiophoridae in the tree was represented by *Pristiophorus japonicus*.

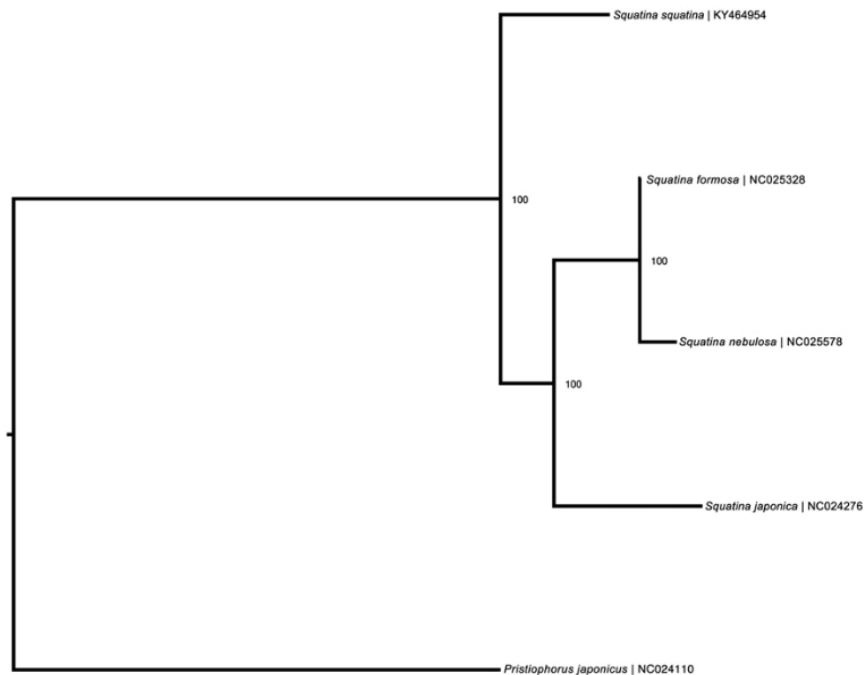


Figure 2: Bayesian tree depicting currently available Squatinidae mitogenomes with closely related outgroup. Labels include species name and GenBank RefSeq accession numbers.

2.2.1.5 Spatial distribution, trends in spatial distribution (e.g. increasingly fragmented, increased numbers of corridors, etc.), or historic range (e.g. corrections to the historical range, change in distribution of the species' within its historic range, etc.):

According to Lawson *et al.* (2020) updated distribution information of *S. squatina* revealed that the geographic extent of the species may have decreased by more than half from its historical range (Figure 5 (below), Figure 2 (above)), with a potential decline of up to 58 percent of its historical range (Lawson *et al.* 2020).

S. squatina is considered to be locally extinct in the North Sea and is no longer encountered in areas of the northern Mediterranean (Morey *et al.* 2017). Additional reductions in distribution have been reported in other parts of north-west Europe (Lawson *et al.* 2020, Rogers and Ellis, 2000) and the southern North Sea (Bom *et al.* 2020). *S. squatina* were formerly found throughout Welsh waters, however their distribution now appears to be constricted to Cardigan Bay (Hiddink *et. al.* 2019). Additionally, current occurrence along the Atlantic coasts of Western Europe is still uncertain (Lawson *et al.*, 2020, Ellis *et al.* Nov 2020, Barker *et al.* 2020). *S. squatina* is currently extremely uncommon throughout a majority of its range with the exception of the Canary Islands. In the 2016 status review it was assumed that *S. squatina* likely had a patchy distribution due to continued local extirpations and population declines. Updated abundance and distribution data, while limited, indicates the historic range and spatial distribution of the species appears to be increasingly fragmented as a result of severe population depletion resulting in range contraction and localized extinctions. Thus, we again assume that connectivity of *S. squatina* populations is likely very low. As mentioned in the status review, the limited inter-population exchange would reduce the recovery potential for the depleted and small local populations and may increase the risk of extirpations.



Figure 3: Historical range of *Squatina squatina* from the last status review (Source: Morey et al. 2006)

2.2.1.6 Habitat or ecosystem conditions (e.g., amount, distribution, and suitability of the habitat or ecosystem):

Since the 2016 status review, the importance of more complex habitats has been observed for *S. squatina*, with Lapinski & Giovos (2019) reporting on several captures of *S. squatina* close to a lagoon and seagrass *Posidonia* meadow of the Réserve Naturelle de l'Etang de Biguglia (Corsica). While most observations of *S. squatina* around the Canary Islands were in their typical sandy substrates there were also records associated with seagrass and reef habitats.

In the Canary Islands, the high abundance is attributed to the isolated oceanographic conditions, combined with a productive marine environment and a ban on trawl fishing in 1986 aimed at reducing harm to the seafloor, which provides the optimal conditions for angelshark populations in this region (Noviello et al. 2021).

2.2.2 Five-Factor Analysis (threats, conservation measures, and regulatory mechanisms)

2.2.2.1 Present or threatened destruction, modification or curtailment of its habitat or range:

The status review (Miller 2016) discusses the decline and local extirpations of *S. squatina* within its historical range, citing evidence from various seas like the North Sea, Baltic Sea, English Channel, Tyrrhenian Sea, Black Sea, Catalan Sea,

and parts of the Adriatic Sea. These declines coincide with significant demersal trawling, though a direct correlation between habitat alteration due to trawling and the species' decline remains unproven.

However, *S. squatina* still likely exist in potentially isolated populations in a highly fragmented landscape and re-colonization of extirpated areas may not be possible.

2.2.2.2 Overutilization for commercial, recreational, scientific, or educational purposes:

Overfishing, the use of nonselective fishing practices, and habitat degradation has led to dramatic declines of *S. squatina* (Bradai 2018). The main driver of *S. squatina* population decline is thought to be bycatch by large and small scale fisheries, through discard mortality, landing, and illegal fishing practices (Dulvy *et al.* 2016).

Out of all the fishing techniques, trawlers, pelagic longlines, and purse seines constitute the largest threat to elasmobranch species, including *S. Squatina* (Bradai *et al.* 2018). However, artisanal fisheries across the Mediterranean, Turkey, North Africa, and Ireland have utilized gillnets and other gear, that have also contributed to angelshark bycatch and mortality. Depletion of *S. squatina* began many decades ago, driven by target fisheries and compounded by bycatch. As stated earlier, currently the biggest anthropogenic threat to the species is bycatch; and historically from bottom trawls. Trawlers represent about 10 percent of the Mediterranean fleet, but they contribute approximately 50 percent of the landed catch, which highlights their significance. In the Mediterranean, discards make up over 40 percent of the catch (Bradai 2018).

In addition to discard mortality, there is also evidence that these species are still being landed in certain parts of their ranges illegally. For example in March 2018, a bottom trawler from Le Guilvinec, France caught a common angelshark. The shark was killed by fishermen for personal consumption (Iglesias *et al.*, 2020). Another incident occurred in Rhodos Island, Greece in February 2020 where *S. squatina* was documented during fish market surveys in both Greece and Turkey, demonstrating incidents of noncompliance with existing regulations (Gordon *et al.*, 2019).

Furthermore, these specimens were retained by fishermen in spite of the European Union (EU) regulation prohibiting fishing and retention of the species, and despite the presence of fishery observers. The examples provided above are indicative of situations observed throughout *S. squatina*'s range, where fishermen keep them for their own consumption. These recent examples suggest that the current regulations are insufficient to prevent the extirpation of *S. squatina* from continental European waters (Iglesias *et al.*, 2020).

Moreover, it is thought that *S. squatina* declines have been masked due to misreporting in fisheries or being marketed under alternative common names. In some regions, angelsharks have historically been confused with or substituted for Monkfish/Anglerfish (*Lophius* spp.) and continue to be misreported as rays (Gordon *et al.* 2019). As a result, assessing *S. squatina* declines continues to be difficult. While recof renaming and market substitution are limited, these have anecdotally been described as key factors that have contributed to the decline and near extinction of the *S. squatina* throughout its range (Lawson *et al.* 2020).

The main cause of population decline of *S. squatina* is unchanged from the 2016 status review, and fisheries that historically contributed to the decline in *S. squatina* are still active throughout the species' range. Although the species is protected in EU waters, the available information suggests that continued exploitation of demersal resources by fisheries operating throughout the Mediterranean and eastern Atlantic are likely still resulting in high levels of discards and associated mortality. The species is still being landed, both legally and illegally, in some parts of its range, at levels that may have led to continued population declines.

2.2.2.3 Disease or predation:

Disease and predation affecting *S. squatina* have remained relatively consistent with prior observations. No significant changes have been identified. Previously, Bulguroğlu *et al.* (2014) reported the first occurrence of a parasitic marine leech (*Stibarobdella moorei*) on *S. squatina* captured from Antalya Bay, Turkey. Narváez and Osaer (2016) also identified a parasitic marine leech (*Stibarobdella macrothela*) on *S. squatina* in the Canary Islands, and Osaer and Narváez (2015) found *Aegapheles deshaysiana* to be a common micropredator on *S. squatina*, also in the Canary Islands. However, none of the previous information on rates of parasitism in the *Squatina* species suggested the abundance of *S. squatina* was affected.

In addition, between June 2007 and June 2016, *B. torpedinis* were observed while attached to the dorsum of *S. squatina* (Narvaez 2016). As with previous observations, this was not thought to negatively affect *S. squatina* populations.

2.2.2.4 Inadequacy of existing regulatory mechanisms:

As stated in the 2016 status review, there are certain regulatory mechanisms in place that are designed to protect *S. squatina*.

The regulations surrounding *S. squatina*, vary across different regions and international agreements. In 2009, the Specially Protected Areas Protocol and Biodiversity Protocol to the Barcelona Convention listed all three *Squatina* species on Annex II, mandating cooperative efforts among Mediterranean countries to protect and recover these species. Despite being listed in this

protective protocol, *S. squatina* in the Eastern Central Atlantic and in the Mediterranean continue to be exposed to significant incidental fishing pressure. A situation exacerbated by limited monitoring and, particularly in the Mediterranean, inadequate implementation of protective measures (Lawson *et al.* 2020).

Further regulations include the General Fisheries Commission for the Mediterranean's (GFCM) adoption of a recommendation in 2012, which prohibited *S. squatina* from being retained on board, shipped, landed, transferred, stored, sold or displayed, or offered for sale by Contracting Parties and Cooperating non-contracting Parties (CPCs) of the GFCM. It also requires CPCs to release the species unharmed and alive. In 2012, Spain published an order which announced the inclusion of the Mediterranean populations of *S. squatina* on Spain's List of Wild Species under Special Protection, safeguarding them from capture, trade, and injury. Despite these protective measures, the impact on reducing *Squatina* species' extinction risks remains uncertain due to their incidental capture in fisheries and the lack of data on survival rates upon bycatch.

In the EU it is prohibited for fishing vessels to fish for, retain, transship, or land *S. squatina* in EU waters (EU 2016/72). Species prohibited under the EU Common Fisheries Policy may not be targeted, retained or landed, and there have been no recorded commercial landings of *S. squatina* in northern Europe since 2011 (ICES 2017). However, as noted in section **2.2.2.2. Overutilization for commercial, recreational, scientific, or educational purposes**, there have been incidents that demonstrate noncompliance with existing regulations.

In the Mediterranean, the Common Fisheries Policy (CFP) aims to balance fishing effort and opportunities, but critiques highlight its inability to control fleet overcapacity, posing risks to fish stocks and *Squatina* species populations (European Commission, 2023). Additionally, some non-EU countries lack specific management measures, leading to overexploitation despite some seasonal bans and gear restrictions (Miller 2016).

Since the 2016 status review, new legislation has been put in place to protect *S. squatina*. In April 2019, Spain's Ministerio para la Transición Ecológica updated the List of Wild Species under Special Protection Regime and the Spanish Catalogue of Threatened Species to include *S. squatina* as a species being in danger of extinction, the highest extinction risk category within this legislation (Ellis *et al.* Nov 2020). This legislation allows the government to increase the level of legal protection for *S. squatina* under the Natural Heritage and Biodiversity Act, which makes it subject to special attention and requires active conservation measures. An additional benefit of this legislation is that the inclusion of *S. squatina* on this list and catalogue "obliges the public authorities to monitor its state of conservation and the threats affecting them. The species included in the catalogue must also be the object of specific conservation or recovery action plans." However, this measure is specific to the Canary Islands.

A coalition of individuals that included government representatives, fishing industry representatives, conservationists, policy experts, and historical ecologists who have knowledge on the common angel shark as well as other European angel shark species in the Northeast Atlantic and Mediterranean Sea regions, participated in a workshop in 2016 focused specifically on developing an Eastern Atlantic and Mediterranean Angel Shark Conservation Strategy. The strategy's main goals included the minimization of fisheries induced angelshark mortality, identifying and protecting critical angel shark areas, and minimizing harmful interactions with angelsharks. While these goals and strategies have the potential to be effective, many of them have not yet been realized.

In conclusion, the current regulatory mechanisms exhibit deficiencies in addressing the complex multijurisdictional nature of the Mediterranean with over 20 bordering countries, threats such as bycatch, illegal fishing, and habitat protection in different regions. Further constraints include the weak implementation of existing regulations and protection measures and a lack of resources and capacity, including that of governments to implement these measures. Widespread landing sites make it challenging to perform enforcement and monitoring of these regulations. Finally, many coastal communities rely on subsistence fishing, and use non-selective gear like gillnets (Gordon *et al.*, 2019).

2.2.2.5 Other natural or manmade factors affecting its continued existence:

As stated in the 2016 status review, Meyers (pers. comm. 2015) notes that divers have recently observed female angelsharks straying from their usual birthing areas (in areas frequented by divers) to more remote coastal areas to give birth. However, since that status report, there is still not enough information to determine if diver disturbance is a threat negatively affecting the abundance of the *S. squatina* population in the Canary Islands.

2.3 Synthesis

Since the initial status review and listing of the species as Endangered under the ESA, there have been several studies published that attempt to evaluate the status of *S. squatina*. However, accurate abundance data before the 2016 status review was unavailable, and that fact remains. Studies since the status review have continued to note a declining population trend at several sites but have also shown a consistent population at the Canary Islands. Also since the status review, there has been a confirmation of *S. squatina*'s extirpation from the Black Sea, as well as possible extinctions in the North Sea, Spanish coastal waters, the western coastal waters of Africa and parts of the Mediterranean Sea. However, while the *S. squatina* population off the Canary Islands may be fairly stable, the situation since the 2016 status review has not changed in that this area only constitutes an extremely small portion of the species' range and its present abundance in this portion is uncertain. The threats to *S. squatina* remain unchanged from the status review. Current threats to the common angel shark mainly include bottom trawling, fishing mortality from methods like

gillnets and longline, and habitat loss. Further, there is no new evidence to suggest that populations are not still likely small and fragmented, making them particularly sensitive to demographic changes.

In summary, the 2016 status review stated that vulnerabilities of the common angelshark species (small population sizes, declining trends, and potential isolation) are further exacerbated by “the present threats of curtailment of range, overutilization, and inadequacy of existing regulatory measures that will either contribute or continue to contribute to the decline of the existing populations.” The demersal fisheries that historically contributed to the decline in *S. squatina* are still active throughout the species' range. This review has highlighted that the threats to *S. squatina* have remained the same since the status review. Based on these factors, the conclusion remains that *S. squatina* is presently at a high risk of extinction throughout its range, and the species should remain listed as endangered.

3.0 RESULTS

3.1 Recommended Classification

Given your responses to previous sections, particularly section 2.4. Synthesis, make a recommendation with regard to the listing classification of the species

Downlist to Threatened

Uplist to Endangered

Delist (*Indicate reason for delisting per 50 CFR 424.11*):

(1) The species is extinct;

(2) The species has recovered to the point at which it no longer meets the definition of an endangered species or a threatened species;

(3) New information that has become available since the original listing decision shows the listed entity does not meet the definition of an endangered species or a threatened species; or

(4) New information that has become available since the original listing decision shows the listed entity does not meet the definition of a species.

No change is needed

4.0 RECOMMENDATIONS FOR FUTURE ACTIONS

Current threats to the common angelshark primarily include bottom trawling, fishing mortality from methods like gillnets and longline, and habitat loss. Restoring angel sharks to robust populations and protecting them throughout their range will require effective international and national conservation and fisheries regulations that eliminate or reduce the mortality of angel sharks due to harmful fishing gear (Fernandes *et al.*, 2017).

While regulation has been effective at preventing the intentional capture of *S. squatina*, further regulation could be enacted to prevent the unintentional take of *S. squatina*. Such regulations could be to require circular hooks. Circle hooks are much safer for catch and release compared to the typical J hooks and barbed hooks. Additionally, different line requirements, such as the use of monofilament snoods, which sharks can more easily cut, could be required as it is preferable to any other type of braided synthetic fiber or steel (Lawson and Fordham, 2018).

One of the major takeaways from the different action plans and strategies again highlighted in the Single Species Action Plan for the Angelshark (*Squatina squatina*) in the Mediterranean Sea (2024) is the need to initiate educational and awareness programs throughout the region, with relevant stakeholder groups in both the fisheries sector (e.g. enforcement officials, fishing industry, fish markets) and recreational sector as to the prohibited and/or protected status of *S. squatina*. With a particular focus on species identification for classification purposes as Angel sharks are often misreported as rays and not sharks. Share resources for best practice to safely release *S. squatina* if accidentally caught etc.

Further adopting practices to minimize anthropogenic effects can be adopted from the Canary Islands. Partially because of the Canary Island's ban on bottom trawling, the *S. squatina* population surrounding the Canary Islands is the most successful population in the world. Using this as a guide, the expansion of Marine Protected Areas (MPA) which effectively minimize anthropogenic effects on the local *S. squatina* population can help populations slowly rebuild.

Along with this five-year review, other summaries contain centralized recommendations for angelsharks. These summaries include the Wales Angelshark Action Plan, the Eastern Atlantic and Mediterranean Angel Shark Conservation Strategy, and the Mediterranean Sharks: Regional Action Plan. Each of these plans address similar priority threats. Those threats include biological resource use including commercial and recreational fisheries, natural system modifications like habitat degradation and low genetic diversity. An example of an action item from these plans is to engage with regional observer programs to ensure collation of angel shark records.

Wales Angelshark Action Plan -

<https://angelsharknetwork.com/wales/wales-angelshark-action-plan-2020/>

Eastern Atlantic and Mediterranean Angel Shark Conservation Strategy -

<https://www.sharktrust.org/faqs/angel-sharks-eastern-atlantic-mediterranean-conservation-strategy>

The Mediterranean Sharks: Regional Action Plan -

<https://www.sharktrust.org/news/action-plan-for-mediterranean-angel-sharks>

Single Species Action Plan for the Angelshark (*Squatina squatina*) in the Mediterranean Sea -

https://www.cms.int/sites/default/files/document/cms_cop14_res.14.12_annex_ssap-angelshark_e_0.pdf

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**NATIONAL MARINE FISHERIES SERVICE
5-YEAR REVIEW**

Current Classification:

Recommendation resulting from the 5-Year Review

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

Review Conducted By:

LEAD OFFICE APPROVAL:

Office of Protected Resources, NOAA Fisheries

Approve _____ Date: _____

Cooperating Regional Administrator, NOAA Fisheries

Concur Do Not Concur N/A

Signature _____ Date: _____

HEADQUARTERS APPROVAL:

Assistant Administrator, NOAA Fisheries

Concur Do Not Concur

Signature _____ Date: _____