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**Agenda Item 5: Specific Matters for Consideration and Action by the Meeting, including Draft Decisions**

# Proposals for Amendment to Annexes II and III to the SPA/BD Protocol

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UNEP/MAP
Athens, 2025

**Note by the Secretariat**

1. With reference to the amendment of the lists of species appearing in Annexes II and III of the Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean (SPA/BD Protocol), the SPA/RAC has received proposals for the inclusion of:

- Three species of cartilaginous fishes in Annex II to the SPA/BD "List of endangered or threatened species":
  - **From Albania**
    - *Centrophorus uyato* (Rafinesque, 1810)
    - *Dalatias licha* (Bonnaterre, 1788)
  - **From Israel**
    - *Echinorhinus brucus* (Bonnaterre, 1788)
- Six species of sponges in Annex II "List of endangered or threatened species":
  - **From Greece**
    - *Neophrissospongia* spp. Pisera & Lévi, 2002
  - **From Spain**
    - *Foraminospongia balearica* Díaz, Ramírez-Amaro & Ordines, 2021
    - *Haliclona poecillastroides* (Vacelet, 1969)
    - *Leiodermatium* spp. Schmidt, 1870
    - *Pheronema carpenteri* (Thomson, 1869)
    - *Poecillastra compressa* (Bowerbank, 1866)

2. SPA/RAC also received a proposal from Israel suggesting the removal of the following four cartilaginous fish species from Annex III to the SPA/BD Protocol "List of species whose exploitation is regulated" and their inclusion in Annex II "List of endangered or threatened species":

- *Alopias vulpinus* (Bonnaterre, 1788)
- *Carcharhinus plumbeus* (Nardo, 1827)
- *Centrophorus* spp. (Müller & Henle, 1837)
- *Prionace glauca* (Linnaeus, 1758)

3. As stated in Decision IG.17/14 "Common Criteria for proposing amendments to Annexes II and III of the Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean" adopted by COP 15 (Almeria, Spain, 2008):

- SPA/RAC has immediately forwarded the proposals, in their original version, to the other Contracting Parties, to the MAP Coordinator and relevant international organisations.

- The proposals presented in this document were submitted to the 17th Meeting of SPA/BD Focal Points (Istanbul, Türkiye, 20-22 May 2025), which has proceed to their evaluation in the light of the common criteria for amending Annexes II and III of the Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean (UNEP/MED WG.548/19). To this end, the original version (English) has been translated into French.

- The possible amendment to the annexes must be conducted in conformity with the provisions of article 16 of the SPA/BD Protocol.

4. The proposals, accompanied by the recommendations from the Seventeenth Meeting of SPA/BD Focal Points (Istanbul, Türkiye, 20-22 May 2025), are submitted as appropriate, within the **Draft Decision 27/7** to the meeting of MAP Focal Points and COP 24 for adoption. The Forms for proposing amendments to Annex II and Annex III of the Protocol are presented here for information.

**Proposals for amendment to Annexes II and III to the SPA/BD Protocol**

**Form for proposing amendments to Annex II and Annex III to the Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean**.

Proposed by: Republic of Albania

Ministry of Environment, Forests

and Water Administration

Species concerned: ***Centrophorus uyato*** (Rafinesque, 1810)

Amendment proposed:

| | |
|---|---|
| × | Inclusion in Annex II |
| | Inclusion in Annex III |
| | Removal from Annex II |
| | Removal from Annex III |

**Taxonomy**

Class: Elasmobranchii Bonaparte, 1838
Order: Squaliformes Goodrich, 1909
Family: Centrophoridae Bleeker, 1859
Genus and Species: Centrophorus uyato (Rafinesque, 1810)
Known Synonym(s):
Squalus uyato Rafinesque, 1810
Acanthias nigrescens Nardo, 1860
Centrophorus armatus barbatus Teng, 1962
Common name (English and French):
ENG: Little gulper shark
FRA: Petit squale-chagrin

Inclusion in other Conventions:

Global: Endangered A2bd (Finucci *et al*., 2020)

Europe: Vulnerable A2b (Guallart & Walls, 2015)

Mediterranean: Critically Endangered A4b Serena *et al*. (2020) and also Guallart *et al*. (2016), sensu Bellodi *et al.* (2022) and White *et al*. (2022)

**Justification for the proposal:**

Recent taxonomic revisions have clarified the presence of *Centrophorus uyato* as the only *Centrophorus* species in the Mediterranean Sea, correcting long-standing misidentifications of *C. granulosus* and necessitating updates to the SPA/BD Protocol annexes. The little gulper shark (*Centrophorus uyato*) is a poorly understood and highly threatened deep-sea species with low to no commercial value, whose habitat significantly overlaps with deep-sea fisheries. Consequently, bycatch in bottom trawls, longlines, and gillnets poses a significant threat, particularly in areas with unregulated fishing. Presumed life-history traits, including slow growth, late maturity, extremely long gestation periods, and low reproductive output, render it highly susceptible to overexploitation. Populations of gulper sharks in the Northeast Atlantic and Mediterranean have declined by 98.36% since 1990. Biomass in the Mediterranean is very low, and the species is already rare in several regions. These factors, combined with increasing anthropogenic pressures and habitat degradation, pose severe risks to the species' survival. Including *C. uyato* in Annex II is critical to enforce zero-catch quotas, improve bycatch handling, enhance monitoring and reporting, and foster international collaboration for sustainable management.

**Biological data**

**Brief description of the species**

Until recently, gulper sharks in the Mediterranean Sea were predominantly identified as *Centrophorus granulosus* (Bloch & Schneider, 1801), a species already listed in Annex III of the SPA/BD Protocol. However, significant doubts regarding the validity of these identifications have been raised (McLaughlin & Morrissey, 2005; Bañón *et al*., 2008; Graham & Daley, 2011). Recent taxonomic revisions (White *et al*., 2013, 2017, 2022; Bellodi *et al*., 2022) have confirmed the absence of *Centrophorus granulosus* in the Mediterranean, identifying *Centrophorus uyato* as the only species in the region (Barone *et al*., 2022; White *et al*., 2022), which has been recently redescribed (White *et al*., 2022).

Given these findings, *C. uyato* should be formally included in Annex II of the SPA/BD Protocol, while *C. granulosus* may remain listed only as a precautionary measure.

The little gulper shark, *Centrophorus uyato* (Rafinesque, 1810), is a poorly understood and highly threatened deep-sea elasmobranch. It inhabits depths of 50 to 1,400 meters, favoring upper slopes (Compagno, 1984; Geraci *et al*., 2017). Biology traits of the species remain poorly documented (Morato *et al*., 2006; García *et al*., 2008). Presumed life-history traits include slow growth, late maturity, and low reproductive output (Stevens *et al*., 2000; García *et al*., 2008). Adults typically measure 80–110 cm in total length (White *et al*., 2013) and weigh up to 7.3 kilograms (IGFA, 2001), with recent records from the Adriatic Sea off Albania reporting an average length of 90 cm (Gajić & Sulikowski, 2024). The species reproduces through lecithotrophic viviparity, where embryos rely solely on yolk sacs, with a proposed gestation period of two to three years (Guallart & Vincent, 2001; Hamlett, 2011).

**Distribution (current and historical):**

Despite the belief that little gulper shark (*Centrophorus uyato*) has a circumglobal distribution, inhabiting specific regions of the Atlantic, Indian, and Pacific Oceans (Last & Stevens, 1994), persistent taxonomic confusion complicates understanding their distribution and population boundaries (Guallart *et al*., 2016). This ambiguity risks creating a misleading perception of the species' true distribution, frequency, and abundance (Gajić, 2023). In the Mediterranean Sea, the species is considered very rare in the Northern Basin, occasional in the Central Basin, and relatively common in the Western Basin (Serena *et al*., 2020).

In the Adriatic Sea, Soldo and Lipej (2022) noted that sightings followed a prolonged absence spanning decades. However, recent systematic deep-sea research revealed significantly higher abundance in the southern Adriatic Sea (Gajić & Sulikowski, 2024), highlighting critical conservation implications. In contrast, the updated checklist of Croatian chondrichthyans indicates the last record in the northern Adriatic dates to 1952 (Balàka *et al*., 2023), while surveys by Ćetković *et al*. (2024) reported its absence in Montenegrin waters. Nevertheless, this rarity might reflect insufficient deep-sea fishing efforts and inadequate fisheries monitoring rather than the species' true scarcity (Gajić & Sulikowski, 2024), emphasizing the need for further investigation.

**Population estimates and trends:**

The unresolved nomenclatural and taxonomic issues on a global scale significantly hinder conservation efforts, making it impossible to accurately assess population boundaries, estimates, and trends, thereby exacerbating the vulnerability of gulper sharks.

However, in the Northeast Atlantic and Mediterranean Sea, gulper sharks have declined by 98.36% from 1990 to 2015, with projections indicating a further reduction of 99.97%–99.99% over three generations (Guallart *et al*., 2016). During the MEDITS survey, their biomass in the Mediterranean was estimated at only 2.9 kg/km² (Guallart *et al*., 2016). Globally, gulper shark biomass is estimated to have declined by 75% since 1982 (Meissa & Gascuel, 2015).

In India for example, *Centrophorus spp*. landings reflect a catastrophic population decline of over 99% within three generations (Guallart *et al.,* 2016), highlighting the urgent need for targeted conservation measures.

**Habitat(s):**

The little gulper shark (*Centrophorus uyato*) is a demersal or benthopelagic deep-sea species inhabiting outer continental and insular shelves and slopes at depths of 100 to 1,500 meters, with most records occurring between 300 and 800 meters (Baino *et al*., 2001; White *et al*., 2022). It shows a preference for submarine canyons (Guallart, 1998; Gajić & Sulikowski, 2024) and may exhibit schooling behavior (Compagno, 1984; Gajić & Sulikowski, 2024).

Habitats in the Mediterranean Sea with mayor importance according to IUCN (Guallart *et al*., 2016) include the following:

10. Marine Oceanic

    10.1. Marine Oceanic - Epipelagic (0-200m)

    10.2. Marine Oceanic - Mesopelagic (200-1000m)

    10.3. Marine Oceanic - Bathypelagic (1000-4000m)

11. Marine Deep Benthic

    11.1. Marine Deep Benthic - Continental Slope/Bathyl Zone (200-4,000m)

        11.1.1. Hard Substrate

        11.1.2. Soft Substrate

**Threats**

**Existing and potential threats:**

Gulper sharks are typically caught as bycatch in bottom longlines, trawls, and gillnets (Fischer *et al*., 1987), as their habitat significantly overlaps with deep-sea fisheries. The lack of proper fisheries monitoring in certain Mediterranean countries and the presence of unregulated target fisheries using longlines and gillnets on the continental slope (Guallart *et al*., 2016) pose additional threats to the species. Their biological traits, including slow growth, late maturity, extremely long gestation periods (among the longest in vertebrates), and low reproductive output (Gajić, 2023), make gulper sharks particularly vulnerable to overexploitation and population depletion, even under moderate fishing pressure (Guallart et al., 2016). Increasing anthropogenic pressures in the deep sea amplify the risks to their survival. Thus, potential threats in future definitely include habitat loss and pollution.

**Exploitation:**

In regions where targeted fishing of gulper sharks has occurred, fishing activity has been intensive (Finucci *et al*., 2024), resulting in rapid and dramatic population declines. Although gulper sharks are typically considered bycatch, fishermen in the northern Mediterranean have reported retaining and selling them during periods of low overall catch, while discarding them during periods of abundance due to their low economic value (Gajić & Sulikowski, 2024). When retained, meat, livers, and tails were marketed (Guallart *et al*., 2016).

Sharks are often released by cutting the line, preventing any assessment of their condition or post-capture survival (Gajić & Sulikowski, 2024). Initial assessments of health and trauma from fisheries in a deep-sea sharks revealed high post-capture mortality rates in sharpnose sevengill sharks (Gajić, 2024). Therefore, conducting comprehensive assessments of post-capture survival in gulper sharks is essential to inform conservation measures and prevent the implementation of ineffective or inappropriate management strategies.

Following threats are ongoing or likely to return (IUCN, 2016, Guallart *et al*., 2016):

5.4. Fishing & harvesting aquatic resources

5.4.2. Intentional use: (large scale) [harvest] - past, likely to return

5.4.3. Unintentional effects: (subsistence/small scale) [harvest] - ongoing

5.4.4. Unintentional effects: (large scale) [harvest] – ongoing

**Proposed protection or regulation measures**

While there are no species-specific measures in place in the Mediterranean Sea (IUCN, 2016), the General Fisheries Commission for the Mediterranean (GFCM) has banned deepwater fishing operations beyond 1,000 m depth in the Mediterranean. Yet, enforcement of this decision is not fully understood. Following points should be considered and improved:

1. **Management of Fishing efforts**

Implement zero-catch quotas to eliminate exploitation, and preventing further population declines. Regulate fishing activities in areas overlapping with the species' preferred depths (300–800 m), focusing on sustainable practices.

Conider area restrictions by vessel size and gear, as well aas gear restrictions (i.e., maximum number of hooks on longline gear; hook size).

2. **Bycatch Mitigation and Handling Protocols**

Develop best practices for handling and releasing live individuals to improve post-capture survival rates.

Conduct extensive fishermen education and training.

3. **Monitoring and Reporting**

Require fisheries to document and report all instances of Centrophorus spp. bycatch, including release condition and mortality rates. Improve monitoring of deep-sea fisheries, particularly in developing countries.

4. **Research and Data Collection**

Prioritize research on the biology, ecology, and population dynamics of deep-sea sharks. Conduct comprehensive assessments of post-capture survival to inform effective management strategies.

5. **International collaboration**

Ensuring reliable and timely data, developing comprehensive monitoring programs, strengthening fisheries management, empowering international collaboration, and implementing targeted measures to reduce bycatch and improve post-capture survival are essential actions for the conservation of deep-sea sharks, including C. uyato, in the Mediterranean Sea.

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**Form for proposing amendments to Annex II and Annex III to the Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean.**

Proposed by: Republic of Albania

Ministry of Environment, Forests and Water Administration

Species concerned: ***Dalatias licha*** **(Bonnaterre, 1788)**

Amendment proposed:

| | |
|---|---|
| × | Inclusion in Annex II |
| | Inclusion in Annex III |
| | Removal from Annex II |
| | Removal from Annex III |

**Taxonomy**

Class: *Elasmobranchii Bonaparte*, 1838

Order: *Squaliformes Goodrich*, 1909

Family: *Dalatiidae Gray*, 1851

Genus and Species: *Dalatias licha* (Bonnaterre, 1788)

Known Synonym(s) :

*Squalus licha* Bonnaterre, 1788

*Squalus nicaeensis* Risso, 1810

*Scymnus vulgaris* Cloquet, 1822

*Squalus scymnus* Voigt, 1832

*Scymnorhinus brevipinnis* Smith, 1936

*Dalatias tachiensis* Shen & Ting, 1972

Common name (English and French):

ENG: Kitefin shark, Seal Shark, Darkie Charlie

FRA: Le Squale liche

Inclusion in other Conventions:

*Not included*

IUCN Global:

Vulnerable A2bd+3d

(Finucci *et al*., 2017)

IUCN Europe (incl. Mediterranean part): Endangered A3d+4d

(Walls & Guallart, 2015)

IUCN Mediterranean:

Vulnerable A3d+4d

(Walls & Guallart, 2016)

**Justification for the proposal:**

The kitefin shark (*Dalatias licha*) is a highly vulnerable deep-sea species facing significant threats from bottom trawling and longline fisheries, which heavily overlap with its habitat. Additional pressures, including habitat degradation and pollution, further exacerbate its risk of decline. Moreover, its life history traits, including slow growth, late maturity, and low reproductive output, make population recovery exceedingly slow. Population declines are well-documented in the Mediterranean, with low biomass and abundance. Although the species has little to no commercial value and is often discarded, preliminary health assessments reveal alarming post-capture mortality. The species is a critical component of deep-sea ecosystems and is among the most important top predators in Mediterranean deep-sea habitats. Current management is inadequate. Thus, inclusion in Annex II would provide strict protection, mitigate threats, and align with global conservation priorities for this ecologically vital species.

**Biological data**

**Brief description of the species:**

The kitefin shark, *Dalatias licha* (Bonnaterre, 1788), is a bathydemersal species with a circumglobal distribution, occurring at depths ranging from 37 to 1.800 meters (Soto & Mincarone, 2001). Remarkably, it is the largest known luminous vertebrate, capable of emitting ventral light to achieve counter-illumination, a likely adaptation for hunting prey (Mallefet *et al*., 2021). Adults reach lengths of 110 to 160 cm, with a maximum recorded total length of 180 cm (Springer, 1990). The size of maturity in Mediterranean Sea is between 70 and 90 cm (Bottaro *et al*., 2023). Reproduction is lecithotrophic viviparity, where embryos rely exclusively on a yolk sac for nourishment (Hamlett, 2005), while typical litter consists of 10 to 20 pups. The species is regarded as the second most important top predator in the deep-sea habitats of the Mediterranean Sea (Serena, 2005), and feeds on a variety of prey including teleost, elasmobranchs (such as etmopterids and skate), cephalopods and crustaceans (Navarro *et al*., 2014; Mallefet *et al*., 2023).

**Distribution (current and historical):**

While it is still common in certain regions of the Mediterranean, such as the Western Basin, it is considered occasional in Central and very rare in Eastern and Norther Basin, including the Adriatic Sea (Serena *et al*., 2020). While Soldo and Lipej (2022) postulated that records in the Adriatic Sea are rather separated by prolonged intervals spanning several decades, recent IUCN assessment excluded Adriatic as extant habitat (Walls & Guallart, 2016). The rarity of the species is further highlighted in recent Croatian checklist, which notes last known record dating back to 1984 (Balàka *et al*., 2023). Moreover, recent official fishery surveys combined with extensive citizen science efforts failed to detect the species in Montenegrin waters (Ćetković *et al*., 2024). Through the systematic deep-sea research in Albania (Gajić, 2024; Gajić *et al*., 2024; Gajić & Sulikowski, 2024) three novel records were obtained at the upper slope of Albania. Besides the Mediterranean Sea, the kitefin shark has a circumglobal distribution, occurring in the Western and Eastern Atlantic, the Western Indian Ocean, the Western Pacific (including Japan, Australia, and New Zealand), and the Central Pacific.

**Population estimates and trends**:

Although no empirical data is available on population size and structure, the biomass of this species appears to be very low (Baino et al., 2001). A reduction of 36% over the period from 1972 to 2059 (three generations) has been estimated (Walls & Guallart, 2015). Moreover, the overall trend in the Mediterranean Sea indicates a general decline in abundance. Compagno and Cook (2005) suggested limited or no exchange between subpopulations. This species was reported in less than 2% of bottom trawl surveys conducted across the Mediterranean Sea (Relini *et al*., 2000). While several authors, including Baino *et al*. (2001) and Walls & Guallart (2015), have hypothesized that the species occurs primarily in the western and central basins, more recent records confirm its presence throughout the Mediterranean, including the Adriatic Sea off the coast of Albania (Gajić, 2025).

**Habitat(s)**:

The kitefin shark is a benthic to mesopelagic deep-sea elasmobranch inhabiting both continental and insular shelves and slopes, typically occurring at depths of 300 to 1,800 meters (Compagno *et al*., 2005).

Habitat type include:

9. Marine Neritic

9.5. Marine Neritic - Subtidal Sandy-Mud

10. Marine Oceanic

10.2 Marine Oceanic - Mesopelagic (200-1000m)

10.3. Marine Oceanic - Bathypelagic (1000-4000m)11. Marine Deep Benthic

11.1. Marine Deep Benthic - Continental Slope/Bathyal Zone (200-4,000m)

11.1.1. Hard Substrate

11.1.2. Soft Substrate

**Threats**

**Existing and potential threats:**

Deep-sea sharks, including the kitefin shark, are among the most vulnerable vertebrates to anthropogenic pressures such as overfishing, habitat degradation, and bycatch (Finucci *et al*., 2024). Despite their ecological importance and sensitivity (Heithaus *et al*., 2022), they remain one of the least studied vertebrate groups. Given the global threats facing deepwater sharks and the urgent need for improved management and fisheries regulations (Finucci *et al*., 2019), this lack of knowledge has also significant conservation implications (Gajić & Sulikowski, 2024).

The kitefin shark is primarily caught as bycatch in deep-sea bottom trawling across the Mediterranean and on deep-sea longlines, with occasional captures in gillnet fisheries. Its habitat and range significantly overlap with numerous deep-sea fisheries, making it particularly vulnerable.

While Walls and Guallart (2015) presumed that individuals are typically discarded alive, their survival rates following release are likely low (Guallart, 1990). Furthermore, the first health assessment and trauma study on deep-sea sharks impacted by trawling (Gajić, 2024) reported alarming post-capture mortality rates for sharpnose sevengill sharks. A similar study is currently being conducted on kitefin sharks. Although the sample size remains limited, the preliminary findings of that study indicate high post-capture mortality among juveniles.

**Exploitation**:

Threats according to the Walls and Guallart (2015) include “5. Biological resource use”, particularly “5.4. Fishing & harvesting aquatic resources” and include following:

5.4.3. Unintentional effects: (subsistence/small scale) [harvest] and corresponding stresses 2. Species Stresses affecting both 2.1. Species mortality and 2.2. Species disturbance

5.4.4. Unintentional effects: (large scale) [harvest] corresponding stresses 2. Species Stresses affecting both 2.1. Species mortality and 2.2. Species disturbance

**Proposed protection or regulation measures**

There are currently no species-specific measures in place in the Mediterranean Sea (IUCN, 2017). Given its vulnerability, decreasing population trends and conservation concerns associated with the kitefin shark (*Dalatias licha*) which holds minor to none commercial value, the following protection and regulation measures are proposed to justify its inclusion in Annex II, which lists species requiring strict protection:

**1. Fisheries Management and Quota Systems**

Introduce zero-catch quotas for kitefin sharks as part of national and regional fisheries management plans. Align regional fisheries policies with global best practices, including recommendations from international bodies.

**2. Post-Capture Handling Protocols**

Introduce standardized best practices for handling and releasing deep-sea sharks to minimize injury and improve survival rates, particularly focusing on juveniles and gravid females. Conduct training workshops for fishers on proper shark release techniques and the ecological importance of the species.

**3. Monitoring and Reporting Requirements**

Mandate regular reporting of kitefin shark bycatch by fisheries operating in deep-sea. Require detailed observer programs to ensure compliance and accurate bycatch data.

**4. Research and Data Collection**

Prioritize funding for research on deep-sea sharks, their population dynamics, and interactions with fisheries. Encourage collaborative regional studies to fill data gaps on distribution, health, and reproductive biology.

**5. Public Awareness and Advocacy**

Develop public awareness campaigns highlighting the ecological importance of deep-sea sharks and the urgent need for their protection. Collaborate with stakeholders, including fishing communities, NGOs, and governments, to foster support for conservation measures.

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**Form for proposing amendments to Annex II and Annex III to the Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean.**

**Proposed by:** Israel

**Species concerned:** ***Alopias vulpinus***

**Amendment proposed:**

| | |
|---|---|
| ✓ | Inclusion in Annex II |
| | Inclusion in Annex III |
| | Removal from Annex II |
| ✓ | Removal from Annex III |

**Taxonomy**

Class: Chondrichthyes

Order: Lamniformes

Family: Alopiidae

Genus and Species:

*Alopias vulpinus* (Bonnaterre, 1788)

Known Synonym(s):

*Squalus vulpes*
*Alopias macrourus*
*Squalus alopecias*
*Alopecias chilensis*

Common name(s) (English and French):

**English**:

Atlantic Thresher, Common Thresher, Common Thresher Shark, Fox Shark, Grayfish, Green Thresher, Sea Fox, Slasher, Swingletail, Swiveltail, Thintail Thresher, Thrasher, Thresher Shark, Whip-Tailed Shark, Zorro Thresher Shark

**French** :

renard, renard de mer, renard de mer commun, requin-renard commun

**Inclusion in other Conventions:**

| | |
|---|---|
| **SPA/BD Protocol** | Annex III |
| **CITES** | Appendix II |
| **CMS** | Appendix II |
| **CMS Sharks MOU** | Annex 1 |
| **Bern Convention** | no |
| **UNCLOS** | Annex 1 |

**IUCN Red List status of species**

Mediterranean (2016) – Endangered (EN)

Europe (2015) – Endangered (EN)

Global (2022) – Vulnerable (VU)

**Justification for the proposal**

The species concerned, *Alopias vulpinus*, is currently listed in Annex III of the Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean (SPA/BD). Its congener, *A. superciliosus*, is currently listed in Annex II.

*A. vulpinus* also qualifies for listing in Annex II, and this in accordance with the "Common Criteria for proposing amendments to Annexes II and III of the Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean" (Decision IG 17/14, UNEP(DEPI)/MED IG.17/10 Annex V).

Although only one of the three common criteria for listing a species in Annex II, would be necessary for listing a species, *A. vulpinus* qualifies under these two of the three criteria:

- the species is in decline with a substantial reduction in its numbers (observed, estimated, inferred or suspected);
- the species or its Mediterranean population figures on the IUCN red list as critically endangered, endangered or vulnerable.

Although there is no specific clause in the common criteria for listing look-alike species (such as there is in CITES), the similarity between the two Mediterranean *Alopias* species and their split-listing into two different Annexes of the Protocol is problematic for various reasons, especially reporting and enforcement, but these can be resolved by adding *A. vulpinus* to Annex II and removing it from Annex III.

**Biological data**

**Brief description of the species:**

The species concerned, A. vulpinus, is a large (to 573 cm total length), circum-global, coastal and pelagic shark that occurs from the surface down to depths of 650 m. It is a large thresher shark with relatively small eyes, curved, narrow-tipped pectoral fins, a narrow-tipped caudal fin, and a conspicuous white patch over the pectoral fin bases. The second dorsal origin is well behind the rear tip of the pelvic fin. The upper lobe of the caudal fin is very long and strap-like, about as long as or longer than length of rest of shark; the lower lobe is short but well developed (Fishbase).

This species is viviparous, giving birth to fully developed young, usually with only two pups per litter. Estimated age at maturity ranges from three to nine years in females and three to seven years in males. The species reaches a maximum age of at least 24 years. The estimated generation time (using a midway point, assuming maturity of seven years and longevity of 24 years) is about 15 years (Ellis *et al*., 2016).

**Distribution (current and historical)**

This oceanic and coastal shark is virtually circum-global in tropical to cold-temperate seas but is most common in temperate waters. In the Mediterranean Sea it occurs throughout the pelagic and continental shelf (Ellis *et al*., 2016).

**Population estimate and trends:**

In the Mediterranean Sea, significant declines in catches have been observed over the last century. A Red List assessment of this shark in Italian waters listed it as Critically Endangered on the basis of past and ongoing declines, because it declined by >80% in the last 50 years (Rondinini *et al*., 2013). Sharp declines have been recorded in many parts of the Mediterranean, such as the Ionian Sea, Spanish waters, the northern Adriatic Sea, the Alboran Sea, and the Gulf of Lions and Italian waters (Ferretti et al., 2008; Rigby *et al*., 2022).

Based on these assessments and the steep declines that have been documented in numerous areas of the Mediterranean Sea, it is suspected that *A. vulpinus* has declined by at least 60% over three generations (45 years) in Mediterranean waters and is categorized as **Endangered** (Ellis *et al*., 2016).

**Habitat(s):**

While found both in coastal and oceanic waters, A. vulpinus is most abundant up to 40–50 miles offshore, where it ranges between surface waters and 366 m depth (Ellis *et al*., 2016).

**Threats**

**Existing and potential threats**

Thresher sharks have a slow life history and low fecundity, which combined with high levels of largely unmanaged and unreported mortality in fisheries, makes them highly susceptible to overexploitation. The largely unregulated shark fin trade also represents a serious threat to the genus.

Thresher sharks are also one of the most important and prized species in recreational fisheries.

In the Mediterranean Sea, adult and juvenile *A, vulpinus* are caught mainly in longline, purse seine, and mid-water fisheries throughout the Mediterranean Sea, including in driftnet fisheries (even though the latter is banned in the Mediterranean Sea).

These sharks are caught as by-catch by industrial and semi-industrial longliners, artisanal gillnet fisheries, and by trawlers operating targeting small pelagic teleosts, mainly in the western Mediterranean Sea. Although referred to as bycatch, this species is normally retained, given its high commercial value (Ellis *et al*., 2016).

**Exploitation:**

The species is used for its meat, fins, liver oil, and skin. The meat and fins of *A. vulpinus* are both of high value.

In the Mediterranean Sea, *A. superciliosus* and *A. vulpinus* are often grouped together in catch data making it difficult to distinguish the status of each population, although *A. superciliosus* is the more common of the two species found in this region.

**Proposed protection or regulation measures**

The species is already listed under numerous treaties and agreements – see the table on Page 1 of this proposal. Currently the species is listed in Annex III of SPA/BD while its congener *A. superciliosus* is listed in Annex II. Since there are known look-alike issues with *Alopias* species, the current split-listing of the genus creates confusion and reduces the effectiveness of conservation measures. In a similar vein, the CITES Convention (2017) listed three species of the genus *Alopias*, including *A. vulpinus* in CITES Appendix II due to look-alike clauses. Similarly, the CMS Convention (2014) listed the genus *Alopias* in CMS Appendix II.

Moving *A. vulpinus* to SPA/BD from Annex III to Annex II will give broad and uniform protection measures in the Mediterranean Sea to both species of *Alopias* that occur in the Mediterranean Sea, including providing uniform protection under two binding GFCM Recommendations, GFCM/42/2018/2 on (sharks and rays) and GFCM/45/2022/12 (on recreational fisheries).In summary, the species of concern *A. vulpinus* is already protected in the Mediterranean Sea under current listings in numerous conventions and agreements (such as CMS, ICAAT and UNCLOS) and therefore it may not be retained by Parties to these agreements. Adding the species to Annex II of SPA/BD protocol will give it greater and more uniform protection in all areas of the Mediterranean Sea.

**Bibliographical references**

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**Form for proposing amendments to Annex II and Annex III to the Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean.**

Proposed by: Israel

**Species concerned: *Carcharhinus plumbeus***

**Amendment proposed:**

| | |
|---|---|
| ✓ | Inclusion in Annex II |
| | Inclusion in Annex III |
| | Removal from Annex II |
| ✓ | Removal from Annex III |

**Taxonomy**

Class: Chondrichthyes

Order: Carcharhiniformes

Family: Carcharhinidae

Genus and Species: *Carcharhinus plumbeus* (Nardo, 1827)

Known Synonym(s):
*Carcharhinus japonicus*
*Carcharhinus milberti*
*Carcharhinus platyodon*
*Carcharias ceruleus*
*Carcharias japonicus*
*Carcharias latistomus*
*Carcharias milberti*
*Carcharias obtusirostris*
*Carcharias stevensi*
*Carcharinus latistomus*
*Carcharinus milberti*
*Carcharinus plumbeus*
*Eulamia milberti*
*Galeolamna dorsalis*
*Galeolamna stevensi*
*Lamna caudata*
*Squalus caecchia*
*Squalus plumbeus*

Common name(s) (English and French):

**English**: Sandbar Shark

**French**: requin gris

**Inclusion in other Conventions:**

| | |
|---|---|
| **SPA/BD Protocol** | Annex III |
| **CITES** | Appendix II |
| **CMS** | No |
| **CMS Sharks MOU** | No |
| **Bern Convention** | No |

**IUCN Red List assessments**

Europe (2014) - Endangered (EN)

Mediterranean (2016) - Endangered (EN)

Global (2021) – Endangered (EN)

**Justification for the proposal**

The species concerned, *Carcharhinus plumbeus*, is currently listed in Annex III of the Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean (SPA/BD).

*C. plumbeus* qualifies for listing in Annex II in accordance with the "Common Criteria for proposing amendments to Annexes II and III of the Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean" (Decision IG 17/14, UNEP(DEPI)/MED IG.17/10 Annex V).

Although only one of the three common criteria for listing a species in Annex II, would be necessary for listing a species, *C. plumbeus* qualifies under these two of the three criteria:

- the species is in decline with a substantial reduction in its numbers (observed, estimated, inferred or suspected);
- the species or its Mediterranean population figures on the IUCN red list as critically endangered, endangered or vulnerable.

**Biological data**

**Brief description of the species:**

A medium to large shark with a moderately long, rounded snout, high, triangular, saw-edged upper teeth, and an interdorsal ridge; 1st dorsal fin very large and erect; grey-brown or bronzy with no prominent markings, white below; fins plain or with slightly dusky tips; maximum length: 300 cm TL male/unsexed; common length: 200 cm TL male/unsexed; max. published weight: 117.9 kg (Fishbase).

In the Mediterranean Sea, *C. plumbeus* generally reach sexual maturity at a total length varying between 154 to 160 cm for males and 166 to 172 cm for females (Saïdi *et al.*, 2005). The female has a mean of 8 – 10 pups every other year or every third year, with a 12-month gestation. They are viviparous and give birth to their pups (range from 55 to 70 cm) in shallow inshore nursery grounds. The estimated generation length is ~23 years, so the Sandbar Shark grows slowly and also matures late. Longevity is 35–41 years (Ferretti *et al.*, 2016).

**Distribution (current and historical)**

The species occurs worldwide in tropical and warm temperate waters (Fishbase).

In the Mediterranean Sea the species occurs throughout continental shelf waters off Algeria, Corsica, Egypt, Greece, Israel, Italy, France, Croatia, Cyprus, Lebanon, Libya, Malta, Slovenia, Spain, Syria, Tunisia, and Turkey (Ferretti *et al.*, 2016).

The Gökova's Boncuk Cove in south-western Turkey and the Gulf of Gabès in south-eastern Tunisia are major nursery areas for the Mediterranean population (Başusta *et al.*, 2021).

**Population estimate and trends:**

In the Mediterranean Sea, the Sandbar Shark was common along all the Levantine coasts until the 1980s, where it was the most dominant species in shark catches (>85%) (Baranes and Ben Tuvia, 1978), however, catches have declined significantly along the Levantine coasts.

Historically *C. plumbeus* was regularly seen in fish markets of southern Sicily and was recorded in most coastal areas of the Mediterranean Sea. However, it has not been observed in these markets in recent years. Although the Gulf of Gabès, Tunisia, and the Gulf of Gökova in Turkey appear to be important nursery grounds for this species (Başusta, *et al*., 2021), recent records in the Mediterranean Sea outside these areas are sporadic and there are none of gravid females.

In the Mediterranean, the species is estimated to have undergone a decline of 62.82% over seven years (1998–2005), inferred to have experienced a decline of 90.95% over 10 years (2005–15). Past and future declines are estimated and projected to be of >70% over the three-generation period (69 years). (Ferretti, *et al*., 2016). Species-specific population trend data reveal population reductions of 50–79% in the Mediterranean and the Arabian Seas region over the past three generation lengths (60–78 years).

**Habitat(s):**

The species is found in demersal and coastal-pelagic environments in tropical and temperate seas on the continental shelf from close inshore to a depth of 280 m; sometimes in oceanic waters. Found inshore and offshore, on continental and insular shelves and adjacent deep water; it occurs in shallow waters associated with bays, estuaries and river mouths and in harbors and offshore on oceanic banks. Avoids sandy beaches and the surf zone, coral reefs and rough bottom, and surface waters. Coastal-pelagic, but usually bottom associated at 1-280 m.

**Threats**

**Existing and potential threats**

The species is captured as target and bycatch in artisanal, industrial, and recreational fisheries and is retained for the high value meat and fins, unless regulations prohibit retention (Rigby *et al*., 2021), and to a lesser extent for its skin and liver oil.

**Exploitation:**

In the Mediterranean region, *C. plumbeus* is estimated to have undergone a decline of 62.82% over seven years (1998–2005), inferred to have experienced a decline of 90.95% over 10 years (2005–15) and projected to have a decline of 99.99% over 51 years (2015–66), therefore experiencing a >70% decline over three generations (69 years). With such sharp declines, largely due to unsustainable fisheries, the species is categorized as **Endangered** (Ferretti *et al*., 2016).

**Proposed protection or regulation measures**

Moving *C. plumbeus* from Annex III to Annex II will of the SPA/BD Protocol is proposed in order to enhance its protection under the Barcelona Convention by the Contracting Parties. Listing *C. plumbeus* in SPA/BD Annex II will also activate protections for the species under two GFCM Recommendations: GFCM/42/2018/2 (on sharks and rays) and GFCM/45/2022/12 (on recreational fisheries), which are legally binding on all GFCM members.

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**Form for proposing amendments to Annex II and Annex III to the Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean.**

Proposed by: **Israel**

**Species concerned: *Centrophorus spp.***

**Amendment proposed:**

| | |
|---|---|
| ✓ | Inclusion in Annex II |
| | Inclusion in Annex III |
| | Removal from Annex II |
| ✓ | Removal from Annex III |

**Taxonomy**

Class: Chondrichthyes

Order: Squaliformes

Family: Centrophoridae

Genus and Species:

*Centrophorus* spp. Müller & Henle, 1837

Known Synonym(s):
*Centrophorus granulosus*
*Centrophorus uyato*
*Centrophorus acus*
*Centrophorus lusitanicus*
*Centrophorus niaukang*
*Centrophorus robustus*
*Centrophorus steindachneri*
*Squalus granulosus*

Common name(s) (English and French):

**English**: Little Gulper Shark

**French**: petit squale-chagrin

**Inclusion in other Conventions:**

| | |
|---|---|
| **SPA/BD Protocol** | Annex III as *C. granulosus* |
| **CITES** | no |
| **CMS** | no |
| **CMS Sharks MOU** | no |
| **Bern Convention** | no |

**IUCN Red List status of *Centrophorus granulosus***

Mediterranean (2016) - Critically Endangered (CR)

Europe (2015) - Critically Endangered (CR)

Global (2024) – Endangered (EN)

**IUCN Red List status of *Centrophorus uyato***

Europe (2015) - Vulnerable (VU)

Global (2024) – Endangered (EN)

**Justification for the proposal**

The use of sharks for their liver oil dates to ancient civilizations, but international liver-oil trade is now a major driver of targeted fisheries and retention of incidental catch for many deepwater sharks around the world. Although both coastal and deepwater sharks are used for their liver oil, deepwater shark livers, especially the gulper sharks (family *Centrophoridae*) are preferred for their high squalene content and this trade has put many of these species at risk of extinction (Finucci, 2024a)

The gulper shark family (*Centrophoridae*) is one of the most taxonomically complex shark families. It is very difficult to visually distinguish species within *Centrophorus* as the overall morphological changes between juvenile and adult gulper sharks is often greater than the differences between species. This, combined with overlapping ranges, has led to confusion and inaccurate species-specific data collection for all the gulper shark species, often leading to this group being reported under a generic category (i.e., *Centrophorus* spp.). This is also true for the main product traded, shark liver oil, and for the meat and fins (Bellodi *et al*., 2022).

It is important to note that there has been an ongoing taxonomic debate about the genus *Centrophorus* and this issue impacts the identification of the gulper sharks in the Mediterranean Sea (Bellodi *et al*., 2022). Most reports have referred to the gulpers in the Mediterranean Sea as *C. granulosus* while others use the name *C. uyato*, while others refer to two separate species in the Mediterranean, morphologically distinguishable mainly by size, most often calling the smaller ones *C. uyato*.

The species *Centrophorus granulosus*, is currently listed in Annex III of the Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean (SPA/BD). No other species of *Centrophorus* is listed in any of the Annexes.

A comprehensive DNA study (Bellodi *et al*., 2022), supported the notion that there is only one species of *Centrophorus* in the Mediterranean, and these authors denoted the species as *C. cf. uyato*, adding the taxonomic term "cf." in order to note the lack of certainty.

Building on this and together with other evidence, a recent taxonomic revision of the genus *Centrophorus* (White *et al*., 2022) shows that there is only one species of gulper shark in the Mediterranean Sea, and that the proper scientific name for it is probably *C. uyato*. The name *C. granulosus* refers definitively to a much larger species of gulper shark, which attains at least 1.7 m length and is absent from the Mediterranean, (White *et al*., 2013). Thus, the taxonomy of the large species has been resolved, but the most suitable scientific name for the smaller species is still not resolved definitively (White *et al*., 2022).

Based on this, the correct common name for the species in the Mediterranean Sea is Little Gulper Shark in English, and petit squale-chagrin in French, while its scientific name is probably *C. uyato*.

Unfortunately, the taxonomic confusion has also led to problems with the names of the species in the IUCN Red List assessments. The smaller species, Little Gulper Shark, was assessed under the name *C. uyato* at the European (Guallart *et al*., 2015) and global (Finucci *et al*.) levels but the assessments for *C. granulosus* at the European level (Guallart *et al*., 2015) global (Finucci *et al*., 2020) and Mediterranean levels (Guallart et. al., 2016) do not refer to the same species. This controversy may have led to confusion in the information provided to managers who must make decisions about the conservation of this species (White *et al*., 2022).

As noted earlier, the scientific name *C. uyato* does not appear in the SPA/BD Annexes, while the species *C. granulosus* is listed in Appendix III. In order to ease the taxonomic uncertainty in the

Annexes, and to provide better protection for the Little Gulper Shark in the Mediterranean Sea, we envisage three possible ways forward:

**Option A (our preferred option).** Change the listings in both Annex II and Annex III so that the entire genus *Centrophorus* is in Annex II (with no species names), and delete *C. granulosus* from Annex III. In this way the listing in Annex II would be *Centrophorus* spp., which refers to all species of this genus. **This is our preferred way to move forward**.

Another similar alternative would be to list in Annex II *Centrophorus sp.* pl., which is a taxonomic abbreviation for "species plurimae", which means "many species" and this abbreviation is already in use elsewhere in the Annexes. We note that this abbreviation is not commonly used in taxonomy and seems appropriate only for cases when there are multiple unspecified or undescribed species. We feel it is not really appropriate here, and we prefer *Centrophorus spp*.

**Option B.** Change the listings in both Annex II and Annex III so that both species, *C. granulosus* and *C. uyato*, are listed in Annex II and no species are listed in Annex III. This option makes sure that all possibilities are covered to bring about uniform complete reference to the species of gulper shark in the Mediterranean the way they were once designated (as *C. granulosus*, which many people still use), and also covers the way they should be probably be named now as *C. uyato*. However, we note that White *et al*. (2022) have shown that the use of the name *C. uyato* for the smaller Mediterranean species is not yet definitive.

**Option C.** The third option is to rely on the most current taxonomic research and recognize only one species in the Mediterranean Sea; therefore, list only the Little Gulper Shark as *C. uyato* in Annex II, and delete all listings of *C. granulosus* from any of the Annexes. This is the most up-to-date scientific option, but in our opinion, it is not the best for reporting and for enforcement issues. Besides, using the name *C. uyato* for the Mediterranean Little Gulper Shark has still not been determined definitively to be correct (White *et al*., 2022).

Based on Option A, the rest of this proposal will use the common name to refer to the species of gulper shark that occurs in the Mediterranean Sea, no matter under which scientific name the information on them was collected in the past; so we will call them Little Gulper Shark in English, and petit squale-chagrin, in French.

The Little Gulper Shark qualifies for listing in Annex II in accordance with the “Common Criteria for proposing amendments to Annexes II and III of the Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean” (Decision IG 17/14, UNEP(DEPI)/MED IG.17/10 Annex V). Although only one of the three common criteria for listing a species in Annex II would be necessary for listing, Little Gulper Shark qualifies under the following two of the three criteria

- the species is in decline with a substantial reduction in its numbers (observed, estimated, inferred or suspected);
- the species or its Mediterranean population figures on the IUCN red list as critically endangered, endangered or vulnerable.

**Biological data**

**Brief description of the species:**

The Little Gulper Shark, is a mid-sized, rare deepwater shark characterized by late maturity, and low fecundity, and can attain a maximum size of about 110 cm total length. It is slender, has a relatively short snout, and dark markings on the fins.

Like all the gulper sharks, the Little Gulper Shark has an extremely low reproductive rate. Little Gulper Sharks have only one pup per litter, a gestation period (pregnancy) of about two years, and occasional resting periods between pregnancies. Sexual maturity occurs for males at about 82 cm.

The larger *C. granulosus* has a generation length of 16-20 years, and therefore its three-generation period is estimated to be about 50 to 60 years. This probably makes it the elasmobranch species with the lowest reproductive potential. Age of sexual maturity for Little Gulper Shark is estimated in the Mediterranean as 8.5 years for males and 16.5 years for females with maximum age estimates of 25 years and 39 years for males and females, respectively (Guallart, 1998). This results in a generation length of 28 years for Little Gulper Shark.

**Distribution (current and historical)**

Little Gulper Shark is found in the Mediterranean, and the Atlantic and Indian Ocean, and in the northwest and southwest Pacific (Fishbase).

**Population estimate and trends:**

The recent IUCN Global Red List assessment (Finucci *et al*, 2024b) designates Little Gulper Shark as globally **Endangered** with an overall suspected population decline of 50–79%; population declines of >96% estimated in southeast Australia, 99% suspected in India, 86% suspected in Mauritania; moderate population increase in Gulf of Mexico, and refuge in Western Australia.

Both the IUCN assessment of the species for Europe (Guallart & Walls, 2015) and for the Mediterranean (Guallart *et al*., 2016) categorize *C. granulosus* as **Critically Endangered**. It is important to note that the assessment in the Mediterranean Sea was conducted under the name *C. garulosus*, but actually refers to the Little Gulper Shark, as follows (from Guallart *et al*., 2016):

> The Gulper Shark is extremely rare in the Mediterranean Sea. This species has one of the lowest reproductive potentials of all elasmobranchs, characterized by a late onset of maturity (12–16 years in females), only one pup per litter, and a two-year gestation period with occasional resting periods. This makes it extremely susceptible to overexploitation and population depletion.
>
> Although no data are available from the Mediterranean Sea with which to accurately calculate population trends, it can be inferred that the species has the same status in these waters as the neighbouring Northeast Atlantic. In the Northeast Atlantic, this species has declined by >99% and this decline is projected to continue due to bycatch of the species. There is management in place protecting the Gulper Shark in the Northeast Atlantic, and not in the Mediterranean Sea, where the species may still be retained if caught, whether targeted or as bycatch. It is therefore inferred that the status of this shark is the same, if not worse, in the Mediterranean Sea than in the Northeast Atlantic.
>
> Based on i) inference of a 99% decline over three generations (1990–2040 and 1990–2050) from Northeast Atlantic data; ii) extremely slow life history traits; iii) documented localized depletion following a number of known target fishery attempts in the region; iv) ongoing bycatch of the

species throughout its Mediterranean depth and bathymetric range (given the overlap with fisheries); and v) its overall rarity in the region, the Gulper Shark is assessed as **Critically Endangered** under Criterion A4b in the Mediterranean Sea.

**Habitat(s):**

The Little Gulper Shark has a widespread global range, inhabiting the upper continental slopes and outer continental shelf area. This shark is likely demersal or benthopelagic and occurs at depths of 210–700 m, occasionally to 1,500 m (White *et al*., 2022), with most records between 300 and 800 m depth.

**Threats**

**Existing and potential threats**

All gulper sharks are targeted world-wide for their high-value liver oil that is rich in squalene, which is used in the cosmetics and pharmaceutical industries (Finucci *et al*., 2024a).

Population trends of Little Gulper Sharks are not well known in Mediterranean and European waters, though rapid decreases in local abundance in areas where intensive fishing pressure has occurred have been estimated. A decrease in the area of occupancy is also suspected due to present fishing pressure in the depth range this species inhabits (Guallart *et al*., 2016).

**Exploitation:**

In the Mediterranean Sea, they are caught mainly as bycatch, with bottom longlines and bottom gillnets and in bottom trawls targeting the red shrimp (*Aristeus antennatus*; Fischer *et al.* 1987). In the Mediterranean Sea, all waters deeper than 1000 m are designated by GFCM as an FRA (fisheries restricted area) where the use of towed dredges and trawl nets in is banned to protect deep-sea benthic habitats. However, as mentioned above, most records of gulper shark capture in the Mediterranean Sea are between 300 and 800 m depth.

Another potential threat facing this species is unreported, unregulated target fisheries using longlines and gillnets in some areas of the continental slope, where the Little Gulper Shark tends to aggregate.

There are reports of catches in the past of several tens or even hundreds of specimens in a journey from a single fishing vessel using bottom longlines or bottom gillnets in the Balearic Sea (western Mediterranean Sea), but generally these slow-growing fish have not recovered in areas where they were previously caught.

**Proposed protection or regulation measures**

The current proposal is to list the entire genus of gulper sharks *Centrophorus* spp. in Annex II of the SPA/BD protocol, which would also designate them as protected under two binding GFCM Recommendations, GFCM/42/2018/2 on (sharks and rays) and GFCM/45/2022/12 (on recreational fisheries).

:

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**Form for proposing amendments to Annex II and Annex III to the Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean**

Proposed by: Israel

**Species concerned:** ***Prionace glauca***

**Amendment proposed:**

| | |
|---|---|
| ✓ | Inclusion in Annex II |
| | Inclusion in Annex III |
| | Removal from Annex II |
| ✓ | Removal from Annex III |

**Taxonomy**

Class: Chondrichthyes

Order: Carcharhiniformes

Family: Carcharhinidae

Genus and Species: *Prionace glauca* (Linnaeus, 1758)

Known Synonym(s):
*Squalus glaucus*

Common name(s) (English and French):

**English**: Blue Shark

**French**: requin bleu, requin peau bleue

**Inclusion in other Conventions:**

| | |
|---|---|
| **SPA/BD Protocol** | Annex III |
| **CITES** | Appendix II |
| **CMS** | Appendix II |
| **CMS Sharks MOU** | No |
| **Bern Convention** | Annex III |

**IUCN Red List assessments**

Mediterranean (2016) – Critically Endangered (CR)

Europe (2015) - Near threatened (NT)

Global (2019) – Near threatened (NT)

**Justification for the proposal**

The species concerned, *Prionace glauca*, qualifies for listing in Annex II in accordance with the "Common Criteria for proposing amendments to Annexes II and III of the Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean" (Decision IG 17/14, UNEP(DEPI)/MED IG.17/10 Annex V).

Although only one of the three common criteria for listing a species in Annex II, would be necessary for listing a species, *P. glauca* qualifies under these two of the three criteria:

- the species is in decline with a substantial reduction in its numbers (observed, estimated, inferred or suspected);
- the species or its Mediterranean population figures on the IUCN red list as critically endangered, endangered or vulnerable.

**Biological data**

**Brief description of the species:**

The Blue Shark is the only species of its genus. It is easily recognized, due to its morphological characteristics, such as an elongated body with long pectoral fins, large eyes with a nictitating membrane below the eye, a dark blue dorsal side and white coloration on its ventral side. Maximum length is approx. 300 cm. Feeds on relatively small prey: usually squid and pelagic fish, but also invertebrates and bottom-dwelling fish and small sharks. Sometimes takes seabirds at the surface of the water (da Silva *et al*., 2021).

Longevity is approximately 20 years. Generation length is calculated as 10 years in the Atlantic and 10.5 years in the Pacific. Reproduction is viviparous. In European waters, pups remain in offshore nursery areas until they reach about 130 cm in length, when they begin to migrate with other sharks of the same age and sex. Males mature at 4-6 years: females at 5-7. Mature females may breed annually, or on alternate years. They have anywhere between 4 to 135 pups per litter (usually 15 to 30), which are born in the spring and summer after a 9 to 12-month gestation period (Rigby *et al*., 2019).

**Distribution (current and historical)**

The Blue Shark is one of the most wide-ranging of all sharks, found throughout all oceans in tropical and temperate waters.

**Population estimate and trends:**

Population trend data are available from five stock assessment sources with estimated median reduction/increase rates over three generations (30-31.5 years), as follows (Rigby *et al*., 2019):

(1) in the North Atlantic - reduction of 53.9%;

(2) in the South Atlantic - reduction of 38.2%;

(3) in the North Pacific – increase of 8.5%;

(4) in the South Pacific – increase of 5.7%;

(5) in the Indian Ocean - reduction of 8.4%

This yields an overall global estimated median reduction of 20–29% over three generation lengths (Rigby *et al*., 2019). However, in the Mediterranean Sea, the situation is far more ominous, as the species has undergone steep declines, with an estimated decline of 96.5–99.8% in abundance and biomass since the early 19th century (Ferretti *et al*., 2008).

Although *P. glauca* is a relatively fast-growing and fecund oceanic shark, the Mediterranean subpopulation, despite its relatively high rate of growth, has undergone a decline of 78–90% over the past 30 years, and is therefore categorized as **Critically Endangered** (Sims *et al*., 2016).

**Habitat(s):**

The species is found throughout pelagic waters of the Mediterranean Sea from the surface to as deep as 1,160 m.

**Threats**

**Existing and potential threats**

The Blue Shark is rarely a targeted commercial species but it is a major bycatch of longline and driftnet fisheries, particularly from nations with high-seas fleets. Much of this bycatch is unrecorded, and much of it is likely to be valued and retained as 'byproduct' (Rigby *et al*., 2019).

**Exploitation:**

> The Blue Shark is apparently the most heavily exploited species of shark in the world; it constitutes between 85 and 90% of the total elasmobranchs caught by oceanic fisheries with pelagic longlines (da Silva *et al*., 2021)

Blue Sharks are often taken as by-catch but they are also in demand for their fins. Fisheries estimates on the global catch of *P. glauca* for the global fin trade suggest that volumes are close to, or possibly exceeding, the maximum sustainable yield, hence the species is categorized globally as **Near Threatened** (Rigby *et al*., 2019).

In the Mediterranean many catches are unreported, all are unregulated, and fishing effort is not declining. In the Mediterranean assessment, *P. glauca* is listed as **Critically Endangered** based on a past decline of up to 90% over three generations resulting from ongoing overfishing (Sims *et al*., 2016).

**Proposed protection or regulation measures**

While the global management of Blue Shark catches needs improvement, the Mediterranean subpopulation urgently requires more drastic and immediate measures to support its recovery.

The current protection levels of the Mediterranean subpopulation under other multilateral environmental agreements (as summarized in the table on the first page of this proposal) have proven insufficient to ensure sustainable fishing of this species in the Mediterranean Sea. Therefore, moving *P. glauca* from Annex III to Annex II of the SPA/BD Protocol is proposed in order to enhance its protection under the Barcelona Convention by the Contracting Parties.

Listing *P. glauca* in SPA/BD Annex II will also activate protections for the species under two GFCM Recommendations: GFCM/42/2018/2 (on sharks and rays) and GFCM/45/2022/12 (on recreational fisheries), which are legally binding on all GFCM members.

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**Form for proposing amendments to Annex II and Annex III to the Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean.**

Proposed by: Israel

**Species concerned:** *Echinorhinus brucus*

**Amendment proposed:**

| | |
|---|---|
| ✓ | Inclusion in Annex II |
| | Inclusion in Annex III |
| | Removal from Annex II |
| | Removal from Annex III |

**Taxonomy**

Class: Chondrichthyes

Order: Echinorhiniformes

Family: Echinorhinidae

Genus and Species: *Echinorhinus brucus* (Bonnaterre, 1788)

Known Synonym(s):
*Echinorhinus obesus*
*Echinorhinus spinosus*
*Echinorhinus mccoyi*
*Rubusqualus mccoyi*
*Squalus brucus*
*Squalus spinosus*

Common name(s) (English and French):

**English**: Bramble Shark

**French**: squale bouclé

**Inclusion in other Conventions:**

| | |
|---|---|
| **SPA/BD Protocol** | No |
| **CITES** | No |
| **CMS** | No |
| **CMS Sharks MOU** | No |
| **Bern Convention** | No |

**IUCN Red List assessments**

Mediterranean (2016) - Endangered (EN)

Europe (2015) - Endangered (EN)

Global (2020) – Endangered (EN)

**Justification for the proposal**

The species concerned, *Echinorhinus brucus*, qualifies for listing in Annex II in accordance with the "Common Criteria for proposing amendments to Annexes II and III of the Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean" (Decision IG 17/14, UNEP(DEPI)/MED IG.17/10 Annex V).

Although only one of the three common criteria for listing a species in Annex II, would be necessary for listing a species, *E. brucus* qualifies under these two of the three criteria:

the species is in decline with a substantial reduction in its numbers (observed, estimated, inferred or suspected).

the species or its Mediterranean population figures on the IUCN red list as critically endangered, endangered or vulnerable

**Biological data**

**Brief description of the species:**

The species concerned, *Echinorhinus brucus*, is a rare, large, sluggish, deepwater shark. This unusual species is one of only two known species in the entire Order *Echinorhiniformes,* which has just one Family and one genus (the other species, *E. cookei*, occurs in the Pacific) (Fishbase).

The entire body is covered with irregularly distributed thorns some of which can be very large (single denticles up to about 15mm in basal diameter in adults), and some have their bases fused into compound plates. It reaches a maximum size of 394 cm total length (TL) (Weigmann, 2016); males mature ~150 cm TL and females mature at 200–220 cm TL. Ovoviviparous with 15 to 26 young in a litter. Size at birth between 29 and 90 cm. Size at maturity unknown, but adult males of 150 cm and adult females of 213 cm have been reported (Fishbase). Although very little is known of its life history, it is apparently a slow-growing, late-maturing species with low overall productivity (Ferretti & Buscher, 2015, 2016).

**Distribution (current and historical)**

This rare deep-water shark has a widespread, yet patchy, lobal distribution in the Mediterranean Sea, and the Atlantic, Indian and western Pacific Oceans (Finucci *et al*., 2020).

Historic records indicate the species was relatively common until the 19th century; reports of the species rose sharply in the 1860s, peaked in the 1880s and collapsed in the early 20th century, strongly corresponding with advancements in steamships and growth of regional fishing performance (Iglésias *et al*., 2018). The species is thought to be locally extinct from many European countries.

The following information about its historical Mediterranean distribution is from Ferretti & Buscher (2016):

> Historically, the Bramble Shark was present throughout much of the Mediterranean Sea. It is now only reported sporadically from the western central and northeast areas. The Bramble Shark was detected in the heavily trawled Gulf of Lions in the 1940s, but not in later decades. In the Gulf of Naples, retired Italian bottom longline fishermen called this species 'Fico d'india', but the current generation of fishermen no longer have this nickname for it. In Turkish waters, the Bramble Shark was caught in high numbers at the beginning of the 20$^{th}$ Century, its meat sold and consumed locally and is now only detected sporadically in these waters. It is

suspected and inferred from these declines and disappearances throughout the Mediterranean basin that the Bramble Shark has declined by >50% over 100 years (less than three generations).

**Population estimate and trends:**

In places where the species was fished in the past, there have been major declines reported and even collapses of the deepwater shark fisheries, for example, in India, Brazil and in most European countries (Finucci *et al*., 2020).

Globally, the Bramble Shark was estimated to have undergone a population reduction of 50–79% over the past three generations (48 years) based on abundance data and actual levels of exploitation, and is assessed globally as **Endangered** (Finucci *et al*., 2020).

In the Mediterranean, there is no information on trends in abundance for the last few decades, but it is suspected that the Bramble Shark has undergone a regional decline of >50% over a century (approximately three generations), therefore classifying the species as **Endangered** (Ferretti & Buscher, 2016).

**Habitat(s):**

This bottom-dwelling shark occurs on upper and middle continental slopes, mainly at depths of 400−900 m (based on relatively few captures), but it has also been taken in water as shallow as 18 m and as deep as 1,214 m.

Individual specimens of this rare species have been recorded sporadically at widely dispersed localities. This species may be present at greater depths than it is commercially fished

**Threats**

**Existing and potential threats**

The species is vulnerable to both targeted fishing and bycatch, and it apparently has a low reproductive rate which makes population recovery difficult (Akhilesh et al., 2020)**.**

When dealing with a rare species there is danger of creating a negative feedback loop from overfishing – in other words, the rarer they become, the more vulnerable they are to fishing impacts, which makes them even rarer. This is why any fishing can be especially devastating to already-depleted populations of slow-reproducing rare species like the Bramble Shark.

**Exploitation:**

The liver oil of deepwater sharks, is valuable as it rich in squalene, which is used in the pharmaceutical and cosmetics industries (Finucci *et al*., 2024). The liver oil of the Bramble Shark is considered an especially valuable shark oil (Finucci *et al*., 2020).

**Proposed protection or regulation measures**

Currently, the species is not protected by any international body. A listing in Annex III of the SPA/BD Protocol would not be especially beneficial, as a managed fishery of the species in the Mediterranean Sea would not be to its benefit due its rarity. Rather, the species *E. brucus* should be fully protected in the Mediterranean Sea, by listing it in Annex II.

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**Form for proposing amendments to Annex II and Annex III to the Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean.**

Proposed by: **Greece**

Species concerned: ***Neophrissospongia* spp.**

**Amendment proposed:**

| | |
|---|---|
| × | Inclusion in Annex II |
| | Inclusion in Annex III |
| | Removal from Annex II |
| | Removal from Annex III |

**Taxonomy**

Class: Demospongiae Order: Tetractinellida Family: Corallistidae

Genus and Species: *Neophrissospongia* spp.

*N. endoumensis* Pisera and Vacelet, 2011

*N. nolitangere* (Schmidt, 1870)

*N. nana* Manconi and Serusi, 2008

*N. radjae* Pisera and Vacelet, 2011

Known Synonym(s): *N. nolitangere* was originally described as *Corallistes nolitangere* Schmidt, 1870

Common name (English and French): rock sponges or lithistids or desmas-bearing demosponges

Inclusion in other Conventions: No

IUCN Red List status of species: Not evaluated

**Justification for the proposal:**

Sponges of the genus *Neophrissospongia* are characterized by a massive siliceous skeleton, which lends them a rock-like consistency and the common name of "rock sponges" or "lithistid" demosponges. Few of such lithistid sponges exist today, being all relict Jurassic fauna that have persisted into the present era. In the Mediterranean, this genus comprises four species: *N. nolitangere* (Schmidt, 1870), *N. endoumensis* Pisera and Vacelet, 2011, *N. radjae* Pisera and Vacelet, 2011, and *N. nana* Manconi and Serusi, 2008. Three of them are considered rare endemics and are exclusively found in marine caves (at least so far) which are characterized by groundwater infiltration enriched in silicates, facilitating their skeletal growth.

Recent research suggests that these sponges likely colonized these caves from adjacent deep-sea habitats between 7,000 and 3,000 years ago, following the last glaciation (Pisera & Gerovasileiou, 2021). These sponges are highly vulnerable not only because of their relict status and vital dependence from singular cave environments, but also because of their exceptionally slow growth rates. Age estimates based on related species indicate that the largest individuals of *N. endoumensis*—reported from marine caves in the Aegean Sea and reaching approximately 2 meters across—may be between 769 and 2,000 years old (Pisera & Gerovasileiou, 2021; Pisera *et al*., 2022, 2023; Gerovasileiou, unpublished data). *Neophrissospongia* species also play a key role in marine cave ecosystems as microhabitat engineers.

These sponges develop a deeply convoluted plate-like morphology and growth in aggregation, forming complex structures with numerous interstitial cavities. These cavities provide shelter for a diverse assemblage of vagile invertebrates, including crinoids, echinoids, and mollusks, while the hard surfaces of the sponges support a large variety of sessile organisms, including brachiopods and encrusting sponges (Pisera & Gerovasileiou, 2021). The recent discovery of several marine caves across the Eastern Mediterranean (mostly in Greece) harboring *Neophrissospongia* aggregations has led to the recognition of a distinct ecological facies for these sponge aggregations, classified as MC3.531d (Facies with lithistid sponges) in the "Interpretation Manual of Marine Habitat Types in the Mediterranean Sea" (UNEP-MAP/SPA-RAC, 2021).

Marine caves hosting *Neophrissospongia* populations face a continuously increasing number of threats that compromise their ecological significance and uniqueness. These include arrival of non-indigenous species, climate change-related stressors (e.g., heat-wave related sponge necrosis), and unregulated human recreational activities (Gerovasileiou & Bianchi, 2021). In addition, deep-sea populations of *Neophrissospongia* remain largely unexplored and may also be at risk from various anthropogenic activities, likewise other Mediterranean deep-water lithistids (e.g., *Leiodermatium* spp.), such as bottom trawling and resource extraction (e.g., oil and gas exploration). New research and conservation efforts are essential to assess these threats and enhance our understanding of these ancient and ecologically significant sponges. Important conservation actions for habitat forming sponge species in the Mediterranean Sea, are to include them in conservation lists, especially in Annex II (List of Endangered and Threatened Species) of the Protocol concerning Specially Protected Areas and Biological Diversity (SPA/BD) under the Barcelona Convention.

**Biological data**

**Brief description of the species**:

The four Mediterranean *Neophrissospongia* species are characterized by different morphology (Pisera and Vacelet, 2011; Manconi and Serusi, 2008; Pisera & Gerovasileiou, 2021): *N. nolitangere* may be ear-shaped or can form large, folded masses; *N. endoumensis*, when small (type specimen), is cup-shaped but can be developed to folded masses when large; the two other species are either massive club shaped (*N. radjae*) or encrusting (*N. nana*). These species have similar skeletal characters (i.e., dicranoclone desmas, streptaster-spiraster ectosomal microscleres, and microtylostyle microscleres) and differences are observed in minor skeletal details (Pisera & Gerovasileiou, 2021). Malformed desma skeleton, rare or absent ectosomal spicules, and lack of microscleres have been observed in small encrusting specimens from caves with limited availability of silicate water content (Pisera *et al*., 2022, 2023).

**Distribution (current and historical)**

In the Mediterranean Sea the genus *Neophrissospongia* is distributed from the Aegean Sea (Greek waters) in the Eastern Mediterranean to the Alboran Sea (Spanish waters) in the Western Mediterranean. More specifically:

- *N. nolitangere* has been recorded from two marine caves (3PP and Gaméou caves) in France (Pisera & Vacelet, 2011), deep waters in Menorca Channel at 120–329 m depth (Santín *et al*., 2018) and off Tilos Island (Greece, Aegean Sea), at 313–352 m depth (Pisera & Gerovasileiou, 2021). In addition, this species occurs in the Atlantic Ocean (Azores, Madeira, Selvagens, and Canary Islands) (Carvalho *et al*., 2015; Xaiver *et al*., 2021).
- *N. endoumensis* was originally described in a single marine cave (Endoume cave) in France (Pisera & Vacelet, 2011) but was recently found in Aegean caves (Greece), often in high abundances and forming large masses (Pisera & Gerovasileiou, 2021; Gerovasileiou, unpublished data).
- *N. radjae* has been found in a marine cave of Korčula Island (Croatia, Adriatic Sea) (Pisera & Vacelet, 2011) and a marine cave of Spain in the Alboran Sea (Pisera, unpublished data).
- *N. nana* was described from a single marine cave (Grotta delle Terrazze) in Sardinia (Manconi & Serusi, 2008) but has been also recorded from a marine cave in Agios Efstratios Island, Aegean Sea, Greece (Pisera & Gerovasileiou, 2021).

Additional observations of sponges which possibly belong to the genus *Neophrissospongia* (> 30 individuals) have been made with a Remotely Operated Vehicle (ROV) on rocks off SW Chios (473 m depth), in the central Aegean Sea (Smith *et al*., 2022).

**Population estimate and trends:**

Limited information is available on the population status and trends of *Neophrissospongia* spp. in the Mediterranean Sea. Three species (*N. endoumensis*, *N. radjae* and *N. nana*) are known only from a few marine caves while one species (*N. nolitangere*) is known from a few caves and deep-sea locations in the Mediterranean Sea, yet densities of the latter are low (Santín *et al*., 2018). The species *N. radjae* and *N. nana* are only known from a few samples/individuals. On the other hand, *N. endoumensis* is known to occur in abundance in a few Aegean marine caves with groundwater inputs. In deep waters, several individuals (> 30) of the genus were observed with ROV in the Aegean Sea.

Although scarce information exists about growth rates of rock sponges, recent estimates suggest the large masses of *N. endoumensis* in Aegean marine caves to be approximately 769–2000 years old (Pisera & Gerovasileiou, 2021; Gerovasileiou, unpublished data). The fact that these species are known from a few Mediterranean areas which are located hundreds of kilometers away suggests that unknown deep-water populations are to be discovered between them.

**Habitat(s):**

Rock sponges have heavily silicified skeleton and occur typically in bathyal environments of warm and tropical areas but may be found in certain shallow marine caves, especially where water silicate concentration is high (e.g., inputs of groundwater into shallow marine caves). Mediterranean deep-sea records of the genus *Neophrissospongia* are known from a depth range of 120–473 m, while in shallow marine caves they can be found at depth range of ca. 0–30 m, at both semi-dark and dark zones. The recent finding of rock sponges, sometimes in high abundances and large masses, in several marine caves with groundwater infiltrations across the Eastern Mediterranean basin (Figure 1), led to the description of a new facies named “MC3.531d Facies with lithistid sponges” in the “Interpretation Manual of Marine Habitat Types in the Mediterranean Sea” (Gerovasileiou et al., 2021). This facies is characterized by high heritage value and offers information services to humans, especially for various fields of scientific research (e.g., marine ecology, deep-sea biology, cave biology, palaeobiology, and evolutionary biology), because rock sponges represent unique faunal elements and include slow-growing, endemic and deep-water species. In addition, *Neophrissospongia* species play a key role in the fragile marine cave ecosystems as microhabitat engineers.

Several invertebrates (e.g., crinoids, sea urchins, and mollusks) find shelter in their cavities while small-sized taxa (e.g., brachiopods and encrusting sponges) develop on their hard surfaces (Pisera & Gerovasileiou, 2021).

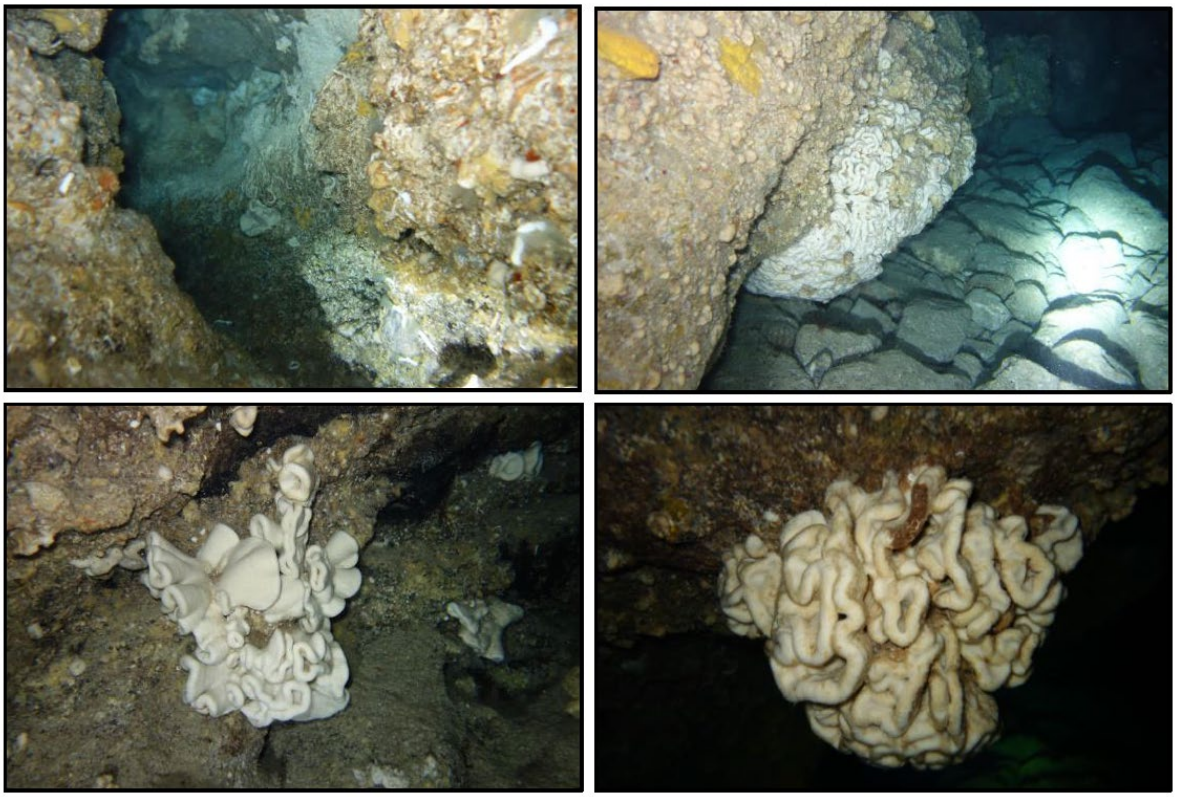


Figure 1: Facies and large masses of the rock sponge Neophrissospongia endoumensis in shallow marine caves of Crete, Greece (© V. Gerovasileiou).

**Threats**

**Existing and potential threats:**

Limited information is available on the existing and potential threats of *Neophrissospongia* spp. in the Mediterranean Sea. For instance, the fact that *N. nolitangere* has been caught as bycatch during experimental trawling activities in the Aegean Sea shows that this species is vulnerable to bottom trawling activities (Pisera & Gerovasileiou, 2021). Rock sponges are considered indicator species for Vulnerable Marine Ecosystems (VMEs), as defined by the Food and Agriculture Organization (FAO) of the United Nations and have been included in the "*Identification of vulnerable species incidentally caught in Mediterranean fisheries*" by MedBycatch project (Otero *et al*., 2019). Deep-water populations of *Neophrissospongia* spp. remain largely understudied and thus are vulnerable to possible anthropogenic impacts related to the exploitation of living and non-living resources (e.g., fisheries, oil and gas exploration, offshore activities, deployment and maintenance of pipes and cables).

Shallow populations of *Neophrissospongia* develop in marine caves with particular features. Marine caves are considered unique and fragile habitats threatened by multiple global and local pressures. Several natural and human-induced threats and pressures impact on cave communities, such as water temperature rise, pollution, coastal infrastructure constructions, and unregulated recreational activities (Ouerghi *et al*., 2019; Gerovasileiou & Bianchi, 2020, 2021 and references therein).

The consequences of climate change, water temperature rise and sea level rise on shallow marine caves with freshwater runoff—which facilitates the skeletal growth of rock sponges through the provision of silicate—are unknown. Pollution of phreatic continental waters and of marine coastal waters may also represent a threat for specialized cave biota. In addition, several non-indigenous species have been recorded in marine caves of the Eastern Mediterranean Sea where rock sponges occur (Gerovasileiou *et al*., 2022). Nevertheless, the potential impacts of the above-mentioned threats/pressures on rock sponges and their habitats are difficult to predict and hard to assess, highlighting the need for a plan of monitoring and conservation initiatives.

**Exploitation:**

There are no records of this species being utilized.

**Proposed protection or regulation measures**

The occurrence of such rare, slow-growing and ecosystem-engineering sponges of high scientific and conservation value in shallow marine caves and in deep waters highlight an urgent need for further study, appropriate management and conservation actions.

Research and monitoring activities are needed for the mapping and increase of knowledge regarding these unique species. Protection of areas where these species occur should be also considered.

Important conservation actions for habitat forming rock sponges in the Mediterranean Sea, are to include them in conservation lists, especially in Annex II (List of Endangered and Threatened Species) of the Protocol concerning Specially Protected Areas and Biological Diversity (SPA/BD) under the Barcelona Convention.

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**Form for proposing amendments to Annex II and Annex III to the Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean.**

Proposed by: **Spain.**

Species concerned: ***Foraminospongia balearica***

**Amendment proposed:**

| | |
|---|---|
| ✓ | Inclusion in Annex II |
| | Inclusion in Annex III |
| | Removal from Annex II |
| | Removal from Annex III |

**Taxonomy**

Class: Demospongiae
Order: Agelasida Family: Hymerhabdiidae
Genus and Species: *Foraminospongia balearica* Díaz, Ramírez-Amaro & Ordines, 2021

Known Synonym(s): None

Common name (English and French): False *Aplysina*

Inclusion in other Conventions:

IUCN Red List status of species : Not evaluated

**Justification for the proposal**

*Foraminospongia balearica* Díaz, Ramírez-Amaro & Ordines, 2021 is a Mediterranean endemic species recently described from the Balearic Archipelago (Diaz *et al*., 2021) and soon after reported from Italy, where it occurs in the Ligurian Sea, theTyrrhenian Sea, and the Strait of Sicily (Toma *et al*., 2024). However, prior to its formal description, the species had been recorded under different names, specifically as *Rhabderemia* sp. in the Menorca Channel (Santín *et al*., 2018) and as *Aplysina* spp. in the Mallorca Channel seamounts (OCEANA, 2011).

This species is a key component of the mesophotic zone where it often dominates and characterizes several types of benthic communities, coexisting with other mesophotic sponges such as *Poecillastra compressa* Bowerbank (1866)*, Foraminospongia balearica* Díaz, Ramirez-Amaro & Ordines, 2021*, Penares* spp., and *Pachastrella* spp. alongside gorgonians and black corals (Antipatharia). Together, these species form distinctive Mediterranean mesophotic grounds that provide structural complexity to the seabed and serve as habitat for numerous organisms. These grounds are unique to the Mediterranean and contain an important but poorly known reservoir of biodiversity (Diaz *et al*., 2024).

Its high abundance in non-trawled areas, contrasted with its rarity in nearby trawled seabeds, underscores its vulnerability to bottom trawling and highlights its potential as an indicator of well-preserved habitats (Diaz *et al*., 2024).

*Foraminospongia balearica* thrives in the circalittoral zone, where it associates with red algal beds, including several protected habitats such as maerl bottoms or the coralligenous beds (MSFD, 2008/56/EC, UNEP-MAP-RAC/SPA 2008 and UNEP/MAP 2017). Its inclusion in Annex II (List of Endangered and Threatened Species) of the Protocol concerning Specially Protected Areas and Biological Diversity (SPA/BD) under the Barcelona Convention would further support conservation policies aimed at protecting these ecologically important habitats and their associated species.

**Biological data**

*Foraminospongia balearica* specimens typically exhibit a massive, massive-tubular, or bushy growth form, with the largest individuals reaching up to 6 cm in diameter. When present, chimneys measure 2–3 cm in height and approximately 1 cm in diameter, sometimes fusing together (Fig. 1, Diaz *et al*., 2021).



**Figure 2 :** *F. balearica* specimen at the summit of the Ausias March seamount (Mallorca channel), serving as substrate for a crustacean, a bryozoan and multiple polychaetes. © IEO-CSIC.

The sponge has a slightly elastic but brittle consistency, breaking easily when manipulated. Its surface is smooth but rough to the touch. In life, it displays a golden-yellow coloration, turning tan after preservation in ethanol. A translucent dermal membrane is present, with subdermal grooves forming a distinct pattern. Oscula are circular, ranging from 0.3 to 0.6 cm in diameter, and are typically positioned at the tips of tubes. The ectosome consists of an aspicular dermal membrane supported by a plumoreticulated skeleton composed of styles, subtylostyles, and tylostyles. The choanosome is confusedly plumoreticulated, containing styles, subtylostyles, tylostyles, rhabdostyles, and curved or angulated oxeas. The species can easily be misidentified as *Aplysina* spp. based only on photographic/video evidence, as it has similar color, size and shape.

**Distribution (current and historical):**

*Foraminospongia balearica* is a Mediterranean endemic species, so far only known from the western basin, with records from Spain and Italy. In Spain it is reported throughout the Balearic Archipelago while in Italy it is known from the Ligurian Sea, the Tyrrhenian Seas, and the Sicily Channel (Diaz e*t al*., 2024, Toma *et al*., 2024)

**Population estimate and trends:**

Density estimates are available for the Mallorca Channel seamounts (3.5 ± 4.7 individuals $m^{-2}$ on average, with maximum densities of 20 individuals $m^{-2}$, unpublished data) and the Menorca Channel (6.2 ± 6.5 individuals $m^{-2}$, with maximum densities of 43 individuals $m^{-2}$; Santín *et al*., 2018). Sporadically, few specimens are captured in trawling bottoms of the Balearic Islands (Diaz *et al*., 2024).

In Italy, average densities range from 9.5 ± 1.6 to 37.2 ± 4.3 individuals $m^{-2}$, with the species being rare in the Ligurian Sea but abundant in the north-central Tyrrhenian Sea.

The highest recorded densities occur in Orosei Canyon (north-central Tyrrhenian Sea), reaching 86 individuals $m^{-2}$ (Toma *et al*., 2024).

**Habitat(s):**

The species is predominantly found in the lower mesophotic zone, at depths ranging from 80 to 200 meters, though it can thrive at depths between 55 and 511 meters. It colonizes both rocky and sedimentary bottoms and is frequently associated with rhodolith beds, which serve as a substrate (Fig. 2). The species is particularly abundant on seamounts; for example, it is the fourth most common sponge species in the Mallorca Channel seamounts and characterizes the sponge communities on the mesophotic summits of the Ausiàs March and Emile Baudot seamounts (Diaz *et al*., 2024).



**Figure 3 :** Typical mesophotic sponge ground dominated by *Foraminospongia balearica* and Haliclona poecillastroides at 90-100 m on the Balearic Promontory. Distance between the laser points is 15 cm. © IEO- CSIC.

**Threats**

**Existing and potential threats**:

*Foraminospongia balearica* is highly vulnerable to direct damage from bottom trawling, longlines, and trammel nets. Although no specific studies have quantified the impact of these activities on *F. balearica*, several factors predict significant damage:

Fragility and Breakability: *F. balearica* has a brittle and easily breakable structure, meaning that any physical interaction with fishing gear will cause damage.

Dependence on calcareous rhodophytes (coralline algae): this species predominantly grows on rhodolith beds and coralline rhodophytes, relying on them as a substrate for attachment. Since these algae are highly sensitive to bottom-contact fishing (Farriols *et al*., 2021), their degradation directly threatens *F. balearica.*

Indirect Effects of Sediment Resuspension:

- Light Attenuation: Bottom trawling stirs up sediments, forming nepheloid layers that reduce light penetration (Arjona-Camas *et al*., 2022). This negatively affects red algae by limiting photosynthesis, which in turn impacts *F. balearica* due to its dependence on these algae.
- Sediment Deposition: Once resuspended sediments settle, they may smother sponges, obstructing their aquiferous system and potentially leading to suffocation. (McGrath *et al*., 2017). It can also reduce the effective range of larval dispersal and the success of larval settlement and/or early juvenile survival (Abdul-Whaba *et al*., 2019).

Evidence from Trawled vs. Non-Trawled Areas:

Observations indicate that *F. balearica* reaches very high densities in non-trawled areas, whereas in trawled regions, its bycatch presence is drastically reduced or nearly anecdotal (Diaz *et al*., 2024). This stark contrast strongly suggests that bottom-contact fishing has a severe negative impact on the species, highlighting its potential as an indicator of pristine habitats.

**Exploitation:**

The species is not exploited for commercial uses.

**Proposed protection or regulation measures**

- Promotion of Scientific Research and Monitoring: implement research and long-term monitoring programs to assess the status of *F. balearica* and its vulnerability to different fishing methods, including bottom trawling, trammel nets, and longlines.
- Science-Based Management Plans: develop conservation and management strategies based on scientific evidence to mitigate threats and support the recovery of *F. balearica* populations.
- Establishment of Marine Protected Areas (MPAs): Use the gathered scientific data to designate MPAs aimed at preserving and restoring *F. balearica* populations, ensuring the long-term protection of both the species and its associated habitats.

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**Form for proposing amendments to Annex II and Annex III to the Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean**

Proposed by: **Spain.**

Species concerned: ***Haliclona poecillastroides***

Amendment proposed:

| | |
|---|---|
| ✓ | Inclusion in Annex II |
| | Inclusion in Annex III |
| | Removal from Annex II |
| | Removal from Annex III |

**Taxonomy**

Class: Demospongiae Order: Haplosclerida

Family: Chalinidae

Genus and Species: *Haliclona poecillastroides*

Vacelet, 1969

Known Synonym(s): *Reniera poecillastroides*, *Xestospongia poecillastroides*

Common name (English and French): None

Inclusion in other Conventions:

The species is not included in any existing convention lists.

**Justification for the proposal**

*Haliclona poecillastroides* is a Mediterranean endemic sponge with a wide distribution across both the western and eastern basins. This large species is commonly found in the mesophotic zone, where it coexists with other mesophotic sponges such as *Poecillastra compressa* Bowerbank (1866)*, Foraminospongia balearica* Díaz,Ramirez- Amaro & Ordines, 2021*, Penares* spp., and *Pachastrella* spp. alongside gorgonians and black corals (Antipatharia). Together, these species form characteristic Mediterranean mesophotic grounds that provide structural complexity to the seabed and serve as habitat for numerous organisms. These sponge grounds are unique to the Mediterranean and represent an important but poorly known reservoir of biodiversity.

*Haliclona poecillastroides* is known to be particularly sensitive to bottom trawling, which directly causes physical damage. Due to their fragile and low-density body, individuals likely do not survive when physically damaged or displaced into the water column as bycatch. In its shallowest depth range, *H. poecillastroides* hosts photosynthetic symbionts, making it potentially vulnerable to sediment resuspension and light attenuation caused by fishing activities (Diaz et al., 2024).

This species thrives in the circalittoral zone, where it associates with red algal beds, including several protected habitats such as maerl bottoms or the coralligenous (MSFD, 2008/56/EC, UNEP-MAP-RAC/SPA 2008 and UNEP/MAP 2017).

Important conservation actions for this and other habitat forming species in the Mediterranean Sea are to include them in conservation lists, especially in Annex II (List of Endangered and Threatened Species) of the Protocol concerning Specially Protected Areas and Biological Diversity (SPA/BD) under the Barcelona Convention. More research on the distribution and ecology of the species as well as its conservation status and trends is highly recommended.

**Biological data**

**Brief description of the species:**

Massive to massive-encrusting, sometimes forming irregular lamellar shapes, reaching up to 1 m in diameter and 2 cm in thickness (Fig. 1). Color varies from pink to whitish. When collected or disturbed, the sponge releases copious amounts of mucus. Its consistency is slightly firm to the touch yet friable, breaking easily. The surface is slightly rough to the touch but lacks visible hispidation. A thin membrane covers the inhalant pores. Rounded oscula, measuring 1–5 mm in diameter.

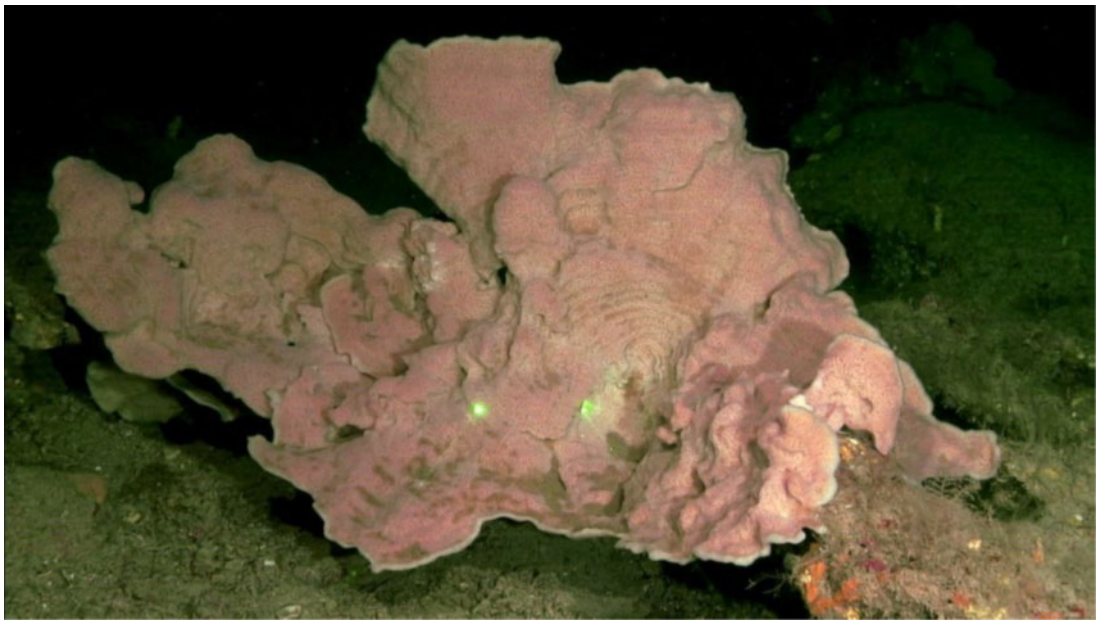


**Figure 4:** Haliclona *poecillastroides* specimen on a mesophotic ground north of Mallorca. Distance between laser points is 15 cm. © IEO-CSIC.

**Distribution (current and historical):**

*Haliclona poecillastroides* is a Mediterranean endemic species, with presence along the coasts of Spain (including the Balearic Archipelago), France, Italy, Greece, Turkey, and Israel (Vacelet, 1969, 1976, Diaz et al., 2020, 2024, Idan et al., 2021).

**Population estimate and trends:**

As for most mesophotic and deep-sea Mediterranean species, the population status and trends of *H. poecillastroides* remain poorly known. In a recent work, It was one of the most frequently recorded species along the Italian coasts of the Ligurian Sea, the Tyrrhenian Sea and the Strait of Sicily, accounting for 17.8% of total species frequency observations (Toma et al., 2024). At the Balearic Promontory, it was identified as a key species characterizing mesophotic communities in both trawl fishing grounds and the Ausiàs March and Emile Baudot seamounts within the Mallorca Channel (Massuti et al., 2021, Díaz et al., 2024).

The species abundance is several orders of magnitude lower in impacted areas. For example, in the non-trawled seamounts of the Mallorca Channel, individual densities ranged from 0.01 to 3.5 individuals $m^{-2}$, with an average of 0.5 ± 0.6 individuals $m^{-2}$, and biomasses between 0.7 and 59.5 g/100 $m^2$, averaging 11.2 ± 18.3 g/100 $m^2$. In contrast, within trawl fishing grounds, biomasses were significantly lower, ranging from 0.001 to 2.4 g/100 $m^2$, with an average of 0.4 ± 0.6 g/100 $m^2$ (unpublished data).

**Habitat(s):**

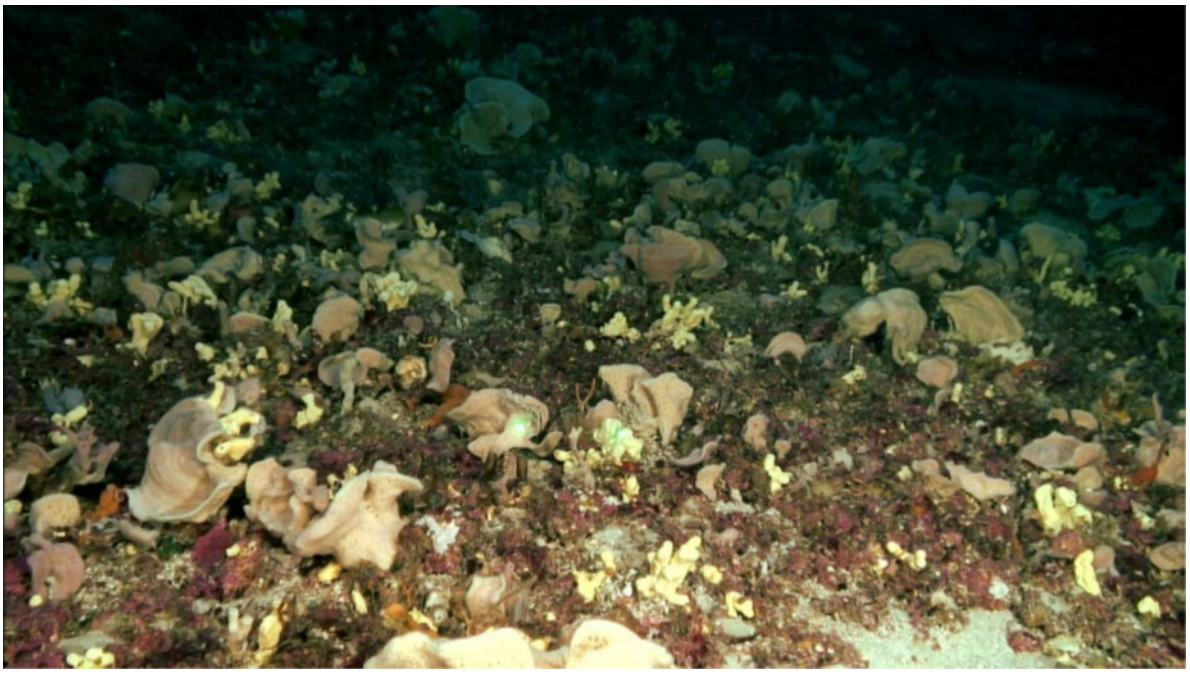


**Figure 5:** Mesophotic sponge ground north of Mallorca, dominated by *H. poecillastroides and F. balearica.* Distance between laser points is 15 cm. © IEO-CSIC.

The species' bathymetric distribution ranges from 74 to 257 meters, but it is predominantly found in the mesophotic zone, between 90 and 150 meters. It colonizes both rocky and sedimentary bottoms and is frequently associated with rhodolith beds, which serve as a substrate (Fig. 2, Santin et al., 2018, Diaz et al., 2024).

**Threats**

*Haliclona poecillastroides* is highly vulnerable to direct damage by benthic fishing activities such as bottom trawling, longlines, and trammel nets.

Fragility and Breakability: *H. poecillastroides* has a brittle, friable and easily breakable structure, meaning that any physical interaction with fishing gear is likely to cause significant damage.

Dependence on coralline rhodophytes (calcareous red algae): this species predominantly grows on rhodolith beds and coralligenous red algae, relying on them as a substrate for attachment. Since these algae are highly sensitive to bottom-contact fishing (Farriols et al., 2021), their degradation directly threatens *H. poecillastroides*.

Indirect Effects of Sediment Resuspension:

- Light Attenuation: Dredging, mining and bottom trawling stir up sediments, forming nepheloid layers that reduce light penetration (Arjona-Camas et al., 2022). This negatively affects red algae by limiting photosynthesis, which in turn impacts *H. poecillastroides* due to its dependence on these algae. Light reduction also has an impact on the photoautotrophic symbionts of *H. poecillastroides.*
- Sediment Deposition: Once resuspended sediments settle, they may smother sponges, obstructing their aquiferous system and potentially leading to suffocation (McGrath et al., 2017). It can also reduce the effective range of larval dispersal and the success of larval settlement and/or early juvenile survival (Abdul-Whaba et al., 2019).

Evidence from Trawled vs. Non-Trawled Areas: Observations indicate that *H. poecillastroides* reaches very high densities in non-trawled areas, whereas in trawled regions its abundance is drastically reduced or becomes anecdotal. This stark contrast strongly suggests that bottom trawling has a severe negative impact on the species. This hypothesis was tested with a predictive model, which confirmed that this species would be one of the most impacted by bottom trawling (see Díaz et al., 2024, Fig. 9B).

**Exploitation:**

The species is not exploited for commercial uses.

**Proposed protection or regulation measures**

- Promotion of Scientific Research and Monitoring: implement research and long-term monitoring programs to assess the status of *H. poecillastroides* and its vulnerability to different fishing methods, including bottom trawling, trammel nets, and longlines.
- Science-Based Management Plans: develop conservation and management strategies based on scientific evidence to mitigate threats and support the recovery of *H. poecillastroides* populations.
- Establishment of Marine Protected Areas (MPAs): Use the gathered scientific data to designate MPAs aimed at preserving and restoring *H. poecillastroides* populations, ensuring the long-term protection of both the species and its associated habitats.

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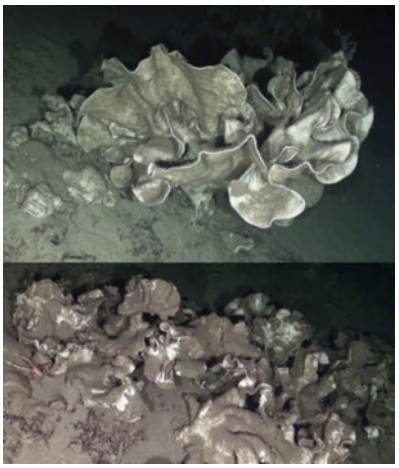
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<table>
<tr><td colspan="2">Form for proposing amendments to Annex II and Annex III to the Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean.</td></tr>
<tr><td rowspan="2">Proposed by: Spain</td><td>Species concerned: Leiodermatium spp.</td></tr>
<tr><td>Amendment proposed:<br><table><tr><td>×</td><td>Inclusion in Annex II</td></tr><tr><td></td><td>Inclusion in Annex III</td></tr><tr><td></td><td>Removal from Annex II</td></tr><tr><td></td><td>Removal from Annex III</td></tr></table></td></tr>
<tr><td>Taxonomy<br><br>Class: Demospongiae<br><br>Subclass: Heteroscleromorpha<br><br>Order: Tetractinellida<br><br>Family: Azoricidae<br><br>Genus and Species: Leiodermatium spp.<br><br>Leiodermatium pfeifferae (Carter, 1873); Leiodermatium lynceus Schimdt, 1870<br><br>Known Synonym(s):<br><br>Azorica pfeifferae Carter, 1873<br><br>Leidermatium lynceus tenuilaminaris (Sollas, 1888)<br><br>Azorica pfeifferae tenuilaminaris Sollas, 1888<br><br>Common name (English and French): plate rock sponge, lithistid or desmas-bearing demosponge</td><td>Inclusion in other Conventions: No<br><br>IUCN Red List status of species: Not evaluated</td></tr>
</table>



**Justification for the proposal:**

In the Jurassic oceans, before modern corals appeared, two types of sponges played a dominant role as reef builders. One of the sponge types were “rock- like demosponges”, characterized by massive siliceous skeletons that make them as hard as rocks. Shortly after the Jurassic/Cretaceous boundary (approximately 65 mya), these sponge reefs vanished, leaving behind fossils that account for that past splendor. In 2015, the amazing discovery of a living reef-like formation reminiscent of the Jurassic sponge reefs was communicated (Maldonado *et al*., 2015). The formation was established at the summit of a seamount located between the coast of Valencia and the Island of Ibiza in the Spanish Mediterranean, at depths ranging from 500 to 900 m. It consisted of reef-like aggregations of giant, plate-like individuals (up to 180 cm height and 114 cm across) of the rock-like sponge *Leiodermatium pfeifferae* (Carter, 1873) (see Fig. 1A-B). Additional populations of this sponge were also documented on adjacent seamounts in the area.

Despite their uniqueness and the identification of serious threats to the integrity of these large sponges (see section on "Threats"), the species and the habitat remain unprotected. A compelling argument for their preservation lies in their relict nature: unequivocal fossils remnants of a congeneric species, *Leiodermatium calloviensis* (Moret, 1928) (originally described under its junior synonym *Azorica calloviensis*), were reported from Middle Jurassic formations of the Tethys Sea, within what is now the European continent (Moret, 1928; Charbonnier *et al*., 2007). These fossils prove that the genus *Leiodermatium* was already present in Jurassic reef ecosystems and has remarkably persisted into the present. Therefore, the genomic and microbiomic information in *Leiodermatium pfeifferae* may provide crucial insights into the adaptive mechanisms that have enabled these sponges to survive and continue forming aggregations reminiscent of those found in Mesozoic oceans. Likewise, genomic and physiological analyses of this species are expected to provide invaluable information to understand how sponge Jurassic reefs functioned. Many of the above arguments also apply to the only other species of the genus in the Mediterranean, *Leiodermatium lynceus* Schmidt, 1870.

Another compelling argument for the preservation of these sponges is that they form unique habitats that become important deep-sea biodiversity reservoirs, as explained in subsequent sections. Indeed, the ecological significance of the *Leiodermatium* formations and their uniqueness in the contemporary ocean have led to the formal recognition of a new Mediterranean habitat for these sponge aggregations: "ME2.5 Upper bathyal biogenic habitat; ME2.51 Upper bathyal reefs; ME2.512 Facies with large and erect sponges" (UNEP-MAP/SPA-RAC, 2021). Paradoxically, despite official recognition of this habitat's distinctiveness and vulnerability, the sponge species that creates it remains unprotected. The situation is made more critical by the fact that both *L. pfeifferae* and *L. lynceus* are inherently rare species, with only a few scattered records of isolated individuals collected from bathyal depths in the Mediterranean and the Central Atlantic Ocean. Importantly, the bathyal aggregations described above represent the only known occurrence of the species *L. pfeifferae* in the Mediterranean Sea, with these Mediterranean individuals being about ten times larger than their Atlantic conspecifics. This extreme singularity further emphasizes the need to protect these emblematic species within the Mediterranean Sea.

**Biological data**

Most *Leiodermatium* species display a foliated or vase-like body shape; one surface bearing oscules, the other inhalant pores. The massive siliceous skeleton typically consists of desmas (strongly spinose rhizoclones) and large flexuous oxeas, lacking special ectosomal spicules or microscleres (Pisera & Lévi, 2002). The particular conditions that have favored the impressive individual size and abundance of *Leiodermatium* at the seamounts of the Balearic Sea remain unclear, since availability of particulate food and silicate concentration are low at those depths in this marine area. However, the sponges appear to have special adaptations to accumulate on one of their sides (the feeding side) the organic debris sinking in the water column. These deposits of decaying debris would act as a culturing medium for microorganisms, facilitating proliferation and self-maintenance of a bacterial community that may represent an important food source to the sponge. Likewise, accumulation of sinking diatoms and the recycling of their frustules might complement the huge amounts of silicate that these sponges require to make their massive skeletons, which are difficult to be explained solely from the relatively modest silicate concentration (8–10 µM) in the seawater mass surrounding the sponge habitats (Maldonado *et al*., 2015). Whatever the mechanism of food and silicate delivery to these sponge populations is, it seems to happen in episodic pulses. This is deduced from growth marks evident on the sponge bodies. Whether growth marks account for seasonal, annual, or other periodicity remains to be elucidated. Overall, these *Leiodermatium* aggregations offer the opportunity to learn about how the Jurassic aggregations could have functioned.

**Distribution (current and historical)**

Two species are known in the Mediterranean Sea in this sponge genus, *Leiodermatium lynceus* Schmidt, 1870 and *Leiodermatium pfeifferae* (Carter, 1873). These two species have largely overlapping bathymetrical and geographical distribution ranges, but *L. lynceus* is probably more common than *L. pfeifferae*.

*Leiodermatium lynceus* has been recorded in the Aegean Sea (off Epidaurus, Peloponnese) at 207 m depth (Vamvakas, 1970), off Cape Santa Maria di Leuca in the Ionian Sea at 425– 469 m (Longo *et al*., 2005; Mastrototaro *et al*., 2010) and in the Tyrrhenian Sea at 700 m (Magnino *et al*., 1999).

*Leiodermatium pfeifferae* has been recorded in the "Stone Sponge Seamount" at 730–1300 m depth and in the Baudot Seamount South at 600 m depth in the Balearic Sea (Maldonado *et al*., 2015). It has also been recorded (but still pending from confirmation of species identity) from Ulisse Seamount in the Ligurian Sea at 500-508 m depth (Bo *et al*., 2020).

Additional records of non-identified material attributable to the genus *Leiodermatium* in the Mediterranean Sea are reported from Méjean Bank at 417–490 m depth (Fourt *et al*., 2017), from bycatch in experimental fisheries surveys in the eastern Ionian Sea (492 m depth) (Salomidi *et al*., 2021; Gerovasileiou *et al*., 2022b), and from Kasos Strait (South Aegean Sea), where living formations were recorded with a Remotely Operated Vehicle at depths of 450–617 m (Gerovasileiou *et al*., 2022a,b; Smith *et al*., 2022).

Both species are also known from scattered records across the central region of the Atlantic Ocean.

**Population estimates and trends**

The information available regarding population effectives and dynamics for these rare species is very scarce. Initial ROV counts at the most dense sponge formations on the seamounts in the Balearic Sea indicated that densities of L. pfeifferae ranges from a single large individual per m2 in some areas to about 15–16 in others, with 5 individuals of diverse size per m2 being the modal value, while in other seamount, average densities were estimated 0.1 individuals per m2 (Maldonado *et al*., 2015). Unfortunately, no study has subsequently monitored population dynamics or trends. Yet, at the seamount with the highest sponge density, serious damages to the integrity of these large sponges were observed over two large areas of the population, in which approximately about 90 and 60% of sponge individuals were broken down, laying on the bottom in an unnatural position, while being covered by sediment and their skin showing evident signs of necrosis (Maldonado *et al*., 2015). The causes of such damage are addressed in further detail in the section of "Threats". However, since there is no available information on the sexual or asexual reproduction for the species, their larval stage and their recruitment rates, it is impossible to foresee how the populations could recover from damage and how long it would take.

If the individuals discovered from Ulisse Seamount in the Ligurian Sea at 500–508 m depth (Bo *et al*., 2020) are finally confirmed to be L. pfeifferae, it would suggest potential existence of undiscovered deep-water populations between the Ligurian Sea and the Balearic Sea. High densities of undetermined *Leiodermatium spp.* are also known from the Mejean High (Ligurian Sea) between 380 m and 455 m and isolated large-sized specimens which have been observed in the Kasos Strait (South Aegean Sea) at 450–617 m depth.

**Habitat(s)**

*Leiodermatium spp*. occur typically in bathyal environments of temperate and tropical areas, but, unlike other lithistid species, have not yet been reported from shallow-water caves. Mediterranean records of the genus *Leiodermatium* are known from a depth range of 207–1300 m. Availability of suitable substrate, food and silicate water content probably affect the distribution, abundance and individual size of *Leiodermatium spp.* When growing in aggregation, these sponges become habitat engineers, as exemplified by the reef-like formations of L. pfeifferae, whose distinctiveness in the modern ocean has led to the formal recognition in the "Interpretation Manual of Marine Habitat Types in the Mediterranean Sea" of a new facies in the upper bathyal zone for these sponge formations, defined as "ME2.512 Facies with large and erect sponges" (Bo & Enrichetti, 2021).

Due to their three-dimensional body shape, these sponges provide refuge and substrate for countless bathyal organisms, attracting a diverse sessile and vagile fauna dominated by fish, crustaceans and echinoderms, with common occurrence of conger eels, shrimps, squat lobsters, crabs, starfish, sea urchins, mollusks, bryozoans, alcyonids, hydroids, gorgonians, etc., as well as other sponges. Initial counts have revealed nearly 80 invertebrate taxa occurring in association with this sponge habitat (Maldonado *et al*., 2015). Interestingly¸some of these organisms are protected species, such as *Desmophyllum dianthus* (Annex II SPA/BD, IUCN Red List EN).

**Threats**

**Existing and potential threats**

The discovery of two large population areas with numerous broken sponge individuals lying on the bottom indicates that real threats are actually impacting on such unique sponge populations. Initial ROV surveys in those areas identified that approximately 90 and 60% of sponge individuals were broken down, laying on the bottom in an unnatural position, while being covered by sediment and their skin showing evident signs of necrosis (Maldonado *et al*., 2015). Because these large, erect, plate-like sponges have evolved such a body condition to be suited to exploit horizontal prevailing currents and to deal with siltation, the individuals that are broken and fall to the bottom in an unnatural position are thought to have minimum chances of surviving.

It was advanced that the observed damage to these giant, plate-like sponges likely was concomitant with the utilization of seismic waves systems by private companies conducting exploration of the marine bottom in that Mediterranean area to localize deposits of hydrocarbons for subsequent commercial exploitation (Maldonado *et al*., 2015). These sponges should be understood as analogous to sheets of window glass (SiO2), vulnerable to the impact of seismic waves emitted from exploration vessels to characterize the seafloor's geomorphology. Their structure — erect, plates composed in approximately 95% of pieces of skeletal silica (SiO2) fused into a rigid framework— makes them particularly susceptible to such impacts, much as window glass, which is also made of silica. Consequently, the force of seismic waves is expected to fracture the largest sponges, leading to the observed damage. It is worth noting that seismic exploration is not only conducted by private companies seeking natural resources, but also by scientific research expeditions aimed at characterizing the geomorphology of the seafloor. Currently, the Mediterranean continental margin of Spain is being targeted for extensive drilling and prospecting plans for commercial gas hydrate extraction, fracking of natural gas and oil, and mineral mining (Glasby, 2003; Milkov, 2004). Therefore, urgent conservation measures are required to prevent further damage of this rare species and their unique habitat.

The architectural organization of this large sponge makes it particularly vulnerable to physical damage by several other agents, which are perceived as potential threats. One identified potential threat is that seamounts are becoming increasingly attractive and accessible to benthic fishing and, in fact, a few fishing lines were found tangled around the sponges (Maldonado *et al*., 2015). The fact that *Leiodermatium* specimens were caught as bycatch during experimental trawling activities in the eastern Ionian Sea further illustrates this species vulnerability to bottom trawling activities (Salomidi *et al*., 2021; Gerovasileiou *et al*., 2022b). Abrasion of *Leiodermatium cf. pfeifferae* due to entanglement with abandoned, lost or otherwise discarded fishing gear has been reported from the Ligurian Sea (Bo *et al*., 2020). ROV observations in the Aegean Sea also revealed plastic litter




entangled on Leiodermatium sponges at 617 m depth (Gerovasileiou *et al*., 2022b: Fig. 2).

**Figure 2:** Plastic waste debris entangled in a large *Leiodermatium* specimen within an aggregation at a depth of 617 meters in the Aegean Sea. (Source: HCMR).

The three-dimensional body forms of *Leiodermatium spp*. make them particularly vulnerable to mechanical damage by not only fishing gear, but also underwater vehicles and tools used for deployment and reparation of submarine pipes and cables, dredging, and mining activities.

Altogether, a growing awareness about the vulnerability of *Leiodermatium spp*. has prompted their inclusion (under the classification of lamellate rock sponges) in the recently published "Identification of vulnerable species incidentally caught in Mediterranean fisheries" by MedBycatch project (Otero *et al*., 2019). Rock sponges, in broad sense, are considered indicator species for

VMEs, as defined by the Food and Agriculture Organization (FAO) of the United Nations. In addition, *Leiodermatium* reefs have been listed in the Dark Habitats Action Plan.

The lack of detailed spatial and ecological information about these unique sponge species and their aggregations, coupled with the increasing anthropogenic impacts in deep waters, highlights the need for further monitoring and conservation initiatives.

**Exploitation**

There are no records of this species being exploited.

**Proposed protection or regulation measures**

The slow-growing and ecosystem-engineering sponges in the genus *Leiodermatium* require immediate action to ensure their effective management and conservation, as well as that of their habitats, given their uniqueness, vulnerability and paleontological significance. Activities such as seismic seafloor exploration, bottom fishing, and operation of underwater vehicles in the vicinity of mapped sponge habitats should be regulated. Creation of regulated enclosures and Marine Protected Areas should be considered to ensure preservation of such an invaluable natural heritage. Further research and monitoring activities should also be promoted in the regulated areas and their vicinity to improve mapping and deepen our understanding of these unique, relict systems.

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**Form for proposing amendments to Annex II and Annex III to the Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean.**

Proposed by: **Spain**

Species concerned: ***Pheronema carpenteri***

Amendment proposed:

| | |
|---|---|
| × | Inclusion in Annex II |
| | Inclusion in Annex III |
| | Removal from Annex II |
| | Removal from Annex III |

**Taxonomy**

Class: Hexactinellida
Order: Amphidiscosida
Family: Pheronematidae
Genus and Species: *Pheronema carpenteri* (Thomson, 1869)
Known Synonym(s):
*Holtenia carpenteri* Thomson, 1869;
*Pheronema grayi* Kent, 1869
Common name (English and French):
Bird's nest sponge (EN)

Inclusion in other Conventions: No

- OSPAR List of Threatened and/or declining species and habitats (Agreement 2008-06)
- Red List of Balearic fauna and flora (VU)

**Justification for the proposal:**

Benthic communities dominated by the "bird's nest" glass sponge *Pheronema carpenteri* (Thomson, 1869) occur on muddy bottoms in the upper bathyal (300 – 1500 m depth) along the European and northwest African coasts and islands, where the sponge is known to form dense aggregations. The sponge functions as a habitat engineer that provides refuge and substratum for a multitude of organisms, including fish, crustaceans and cephalopods of commercial interest. Given its low growth rate, limited dispersal capabilities, role in habitat provision, and high susceptibility to disturbance, the species is recognized as an indicator of Vulnerable Marine Ecosystems (VMEs) by OSPAR commission (ICES, 2020). Data from Atlantic populations in the Porcupine Seabight (Vieira *et al*., 2020) has shown dramatic decreases in density in areas where trawling occurs. However, there is a lack of basic data on the distribution and ecological context of this species in the Mediterranean. Notwithstanding, indirect evidence suggests potential population damages due to trawling (Álvarez, 2016), and predictive models indicate a reduction of suitable habitat for the species within Mediterranean waters, which could lead to population collapse (Gregório *et al*., 2024).

To enhance conservation efforts for this and other habitat-forming species in the Mediterranean Sea, it is crucial to include them in protective frameworks, particularly in Annex II (List of Endangered and Threatened Species) of the Protocol concerning Specially Protected Areas and Biological Diversity (SPA/BD) under the Barcelona Convention. Further research on the species' distribution, ecological role, conservation status, and population trends is strongly recommended.

**Biological data**

**Brief description of the species:**

*Pheronema carpenteri* (Thomson, 1869) is a globular to subcylindrical sponge (up 20 cm or more in diameter) possessing a wide and deep atrial cavity with a large apical oscula, which might be surrounded by a spicular fringe (Fig. 1).

The surface of the sponge is hispid due to projecting spicules, while coloration varies between white to orange brownish; it is common for it to be covered in fine sediment. It inhabits deep sedimentary bottoms, anchoring itself to soft substrate by means of a basal characteristic tuft of spicules (Boury-Esnault *et al*., 1994; Reiswig & Champagne, 1995).



**Figure 6 :** *Pheronema carpenteri* specimen collected in the Cantabrian Sea. © Javier Cristobo. IEO-CSIC.

**Distribution (current and historical):**

The species has a wide distribution across the temperate Northeast Atlantic, from the Hatton-Rockall Basin to the Moroccan slope, with dense populations being known from the Porcupine Seabight, the Cantabrian Sea, the Azores archipelago and the continental slope off Morocco (Topsent, 1904, 1928; Rice *et al*., 1990; Barthel *et al*., 1996). As opposed to its wide distribution in the Atlantic, Mediterranean sightings appear to be far more restricted, being only known from certain areas of the the Alboran Sea (Boury-Esnault *et al*., 1994), the Balearic Sea (Aguilar *et al*., 2010), the Strait of Messina (Topsent, 1928), the Ligurian Sea (Vacelet, 1960) and the Gulf of Lion (Marion, 1883; Topsent, 1928; Vacelet, 1960), with most records coming just from the latter two. There are also unverified reports of this species from the Algerian coast (Zibrowius, 1985). No records are known from the Eastern Mediterranean Sea. While the species has been known from the Mediterranean since the early 1880's (Marion, 1883), contemporary Mediterranean records of the species are almost nonexistent (Boury-Esnault *et al*., 2015).

**Depth limits (Mediterranean):** 360–2170 meters.

**Population estimate and trends:**

Population assessment of deep-sea sponges (e.g., density, biomass, body-size distribution) is challenging due to the scarce baseline and monitoring information available for these species. Despite its wide distribution in the Atlantic, only a handful of articles have assessed *P. carpenteri* populations, which report average densities of ca. 1-1.5 ind./m2 with occasional clumps of up to 20 ind./m2 (Rice *et al*., 1990; Hugues & Gage, 2004). No monitoring or quantitative estimates have ever been conducted for Mediterranean *P. carpenteri* populations. The only information regarding its population estimates are semi-quantitative appreciations, with the species being mentioned as 'common' in the Alboran Sea and one of the Corsica Channel stations where it was encountered (Vacelet, 1960; Boury-Esnault *et al*., 1994).

The species is also considered as 'common' in bathyal muds across the Balearic archipelago (Álvarez, 2016), yet no sightings have been reported from bathyal fishing grounds (from 100 to 750 m depth) in the area after decades of monitoring (Díaz pers. comm.; unpublished data). Similarly, *P. carpenteri*'s population trends have never been evaluated; however, substantial decreases in Atlantic populations (density decrease of one order of magnitude) have been observed over a 40-year period in the Porcupine Seabight, which has been hypothesized to be related to trawling events occurring in the area (Vieira *et al*., 2020). While no direct studies have been performed in Mediterranean populations, distribution models predict a decrease in habitat suitability for the species under different climate change scenarios, which point towards a drastic reduction or total extinction in the Mediterranean in the most pessimistic scenarios (Gregório *et al*., 2024). Recently, it was found that *P. carpenteri'*s larvae have poor dispersal capabilities, which translates in low connectivity between Pheronema populations even at local scales (Viegas *et al*., 2024). Given the patchy distribution of the species in the Mediterranean, it could be hypothesized that connectivity between populations is low.

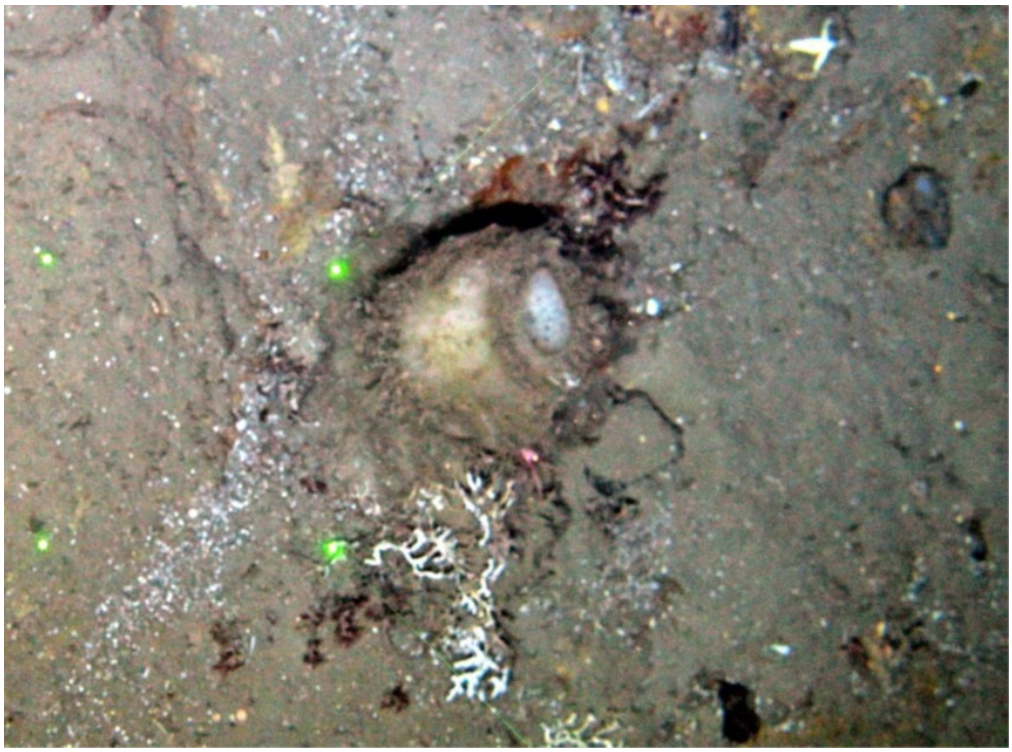


**Figure 7 :** *In situ* picture of a *Pheronema carpenteri* from bathyal muds of the Cantabrian Sea. © Javier Cristobo. IEO-CSIC.

**Habitat(s):**

Generally, the species is mainly associated with soft bottoms of fine sediments (Fig. 2), particularly bathyal muds between 500 to ca. 1700 m depth and in areas where temperature is below 13 °C (Gregório *et al*., 2024). Despite limited information, it seems that Mediterranean populations extend their distribution toward shallower waters than their Atlantic counterparts, with the shallowest known limit for the species occurring in Mediterranean waters, at 335 m depth (Corsica Channel, Vacelet, 1960). The species is known to be an ecosystem engineer and provides habitat to multitude of other organisms (Rice *et al*., 1990; Barthel *et al*., 1996), including fish, crustacean and cephalopod species of commercial interest (Hogg *et al*., 2010). In Mediterranean waters, the species co-occurs within the same habitats as Lophogaster typicus M. Sars, 1857 and *Ethusa granulata* Norman, 1873 and has also been observed to provide habitat for cephalopod species (Marrion, 1883).

**Threats**

**Existing and potential threats:**

Two main categories of threats can be recognized for *P. carpenteri*: trawling activities & global change scenarios.

- Trawling activities:

Sponge habitats are known to be negatively affected by bottom trawling, with extensive damage and little sign of recovery several years later after impact (Hogg *et al*., 2010). While specific examples do not exist for all sponge species, *P. carpenteri* is amongst the few for which quantifiable data on human impact exists. In 1983–1984, a dense, healthy population was first recorded in situ from the Porcupine Seabight (Ireland), an area where the species has proven to be particularly prevalent (Rice et al., 1990). However, monitoring after 40 years reported a marked decrease in density, biomass and body diameter of *Pheronema* within the area (Vieira *et al*., 2020). Vessel monitoring data indicated the presence of bottom fisheries in the area, which was further corroborated by the presence of trawl marks. While it could not be unequivocally proven, there were clear signs that bottom fisheries might have been the major driver behind the population's density reduction by an order of magnitude in just 40 years.

While no quantifiable data exists for the Mediterranean, in the Balearic Archipelago, the species is listed as regionally Vulnerable (VU), under the A2c and B2ab (iii) of the IUCN Red List Criteria. A2c refers to a known or suspected decrease of at least 30% in area of occupancy, extent of occurrence and/or quality of habitat, whereas B2ab refers to Area of occupancy estimated to be less than 2,000 km2, with a fragmented population and a continuing decline, observed, inferred or projected in area, extent and/or quality of habitat. While no quantitative data is given, the support for this decision comes from habitat fragmentation, paired with low growth rates and the impact of trawling on its populations (Álvarez, 2016).

Additionally, while no quantitative information is available regarding the impact of trawling on Mediterranean *Pheronema* populations, trawling was the main driver behind the almost disappearance of a pristine population of Isidella elongata (Esper, 1788) in just 15 years (Cartes *et al*., 2013). Both *Isidella elongata* and *Pheronema carpenteri* inhabit Mediterranean bathyal muds and constitute an essential habitat for several commercial species. In 2017, *I. elongata*, was evaluated as Critically Endangered (CR) within the Mediterranean, reasoning that its facies had almost completely disappeared due to trawl fishing in many Mediterranean areas (Otero *et al*., 2017). Altogether, a growing awareness about the vulnerability of VME-indicator species prompted the inclusion of *P. carpenteri* in the recently published "Identification of vulnerable species incidentally caught in Mediterranean fisheries" by MedBycatch project (Otero *et al*., 2019).

- Global change scenario:

Given the complex nature and inaccessibility of the deep sea, at present it remains practically impossible to understand the impacts of climate change on deep-sea sponge aggregations. Further research will help inform better management and conservation measures. To address this, modelling methods have emerged as a useful tool to use, given their capability to predict species' distributions and suitable habitat, even from incomplete and discontinuous information. Predictive models for *P. carpenteri* under optimistic (RCP 2.6), intermediate (4.5) and pessimistic (8.5) emission scenarios found that *P. carpenteri* suitable habitat likely shifts towards higher latitudes. In the Mediterranean, small areas with suitable habitat would only remain under RCP 2.6 scenario, with the species facing extinction under RCP 4.5. and RCP 8.5 scenarios (Gregório *et al*., 2024). Nevertheless, due to our current lack of knowledge on the most basic biotic and abiotic parameters of Mediterranean *Pheronema* populations, those models are exclusively based on Atlantic data, which could skew medialization.

**Exploitation:**

No uses are known for this species.

**Proposed protection or regulation measures**

Important conservation actions for this and other habitat forming species in the Mediterranean Sea, are to include them in conservation lists, especially in Annex II (List of Endangered and Threatened Species) of the Protocol concerning Specially Protected Areas and Biological Diversity (SPA/BD) under the Barcelona Convention; as well as in regional and country specific catalogs of threatened species in the areas where it occurs. So far, in the Mediterranean, *P. carpenteri* has been listed as Vulnerable (VU) by the Balearic Archipelago Regional Government (Álvarez, 2016).

*Pheronema carpenteri* grounds as are covered under the Habitats Directive [92/42/EEC], Annex I as 'EUNIS A6.621 *Pheronema carpenteri* field on Atlantic lower bathyal mud' and 'EUNIS 2008 A6.621 *Pheronema carpenteri* field on Atlantic mid bathyal mud'; however, said habitats refer exclusively to the Atlantic populations. An amendment to the Directive's Annex I to include Mediterranean *Pheronema carpenteri* fields as separate habitat would be advisable. In the Mediterranean Sea, *P. carpenteri* is mentioned as a typical species of habitat "ME6.51 Upper bathyal mud" in the "Interpretation Manual of Marine Habitat Types in the Mediterranean Sea" by UNEP-MAP/SPA-RAC (2021).

- As mentioned before, one of the main priorities in order to be able to better apply conservation measures for *P. carpenteri* is further research on the species, with emphasis on:
- Mapping its current distribution at regional and subregional-local scales, particularly revisiting those areas where its presence is known from old literature sources;
- Provide solid data on its demographic characteristics, health status and population trends;
- Studying the connectivity of its population, both amongst each other and with the Atlantic.
- Establishment of closures for regulating bottom activities and/or Marine Protected Areas where dense aggregations of these species occur should be also considered.

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**Form for proposing amendments to Annex II and Annex III to the Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean.**

Proposed by: **Spain**

Species concerned: ***Poecillastra compressa***

Amendment proposed:

| | |
|---|---|
| × | Inclusion in Annex II |
| | Inclusion in Annex III |
| | Removal from Annex II |
| | Removal from Annex III |

**Taxonomy**

Class: Demospongiae

Order: Tetractinellida

Family: Vulcanellidae

Genus and Species:

*Poecillastra compressa* (Bowerbank, 1866)

Known Synonym(s):

*Poecillastra scabra* (Schmidt, 1868)

*Poecillastra crassa* (Bowerbank, 1874)

*Poecillastra stylifera* (Lendenfeld, 1897)

*Poecillastra tenuipilosa* (Lendenfeld, 1907)

Common name (English and French): -

Inclusion in other Conventions: No

IUCN Red List status of species: Not evaluated

**Justification for the proposal**

*Poecillastra compressa* is one of the few massive sponge species in the deep waters of the Mediterranean Sea. They may occur in large numbers, It is a key species of the mesophotic zone, coexisting with other mesophotic sponges such as Foraminospongia balearica, Haliclona poecillastroides, Penares spp., Pachastrella spp. and corals, thereby creating extensive three-dimensional (3D) structured habitats used by numerous other organisms as micro-habitats (Bo *et al*., 2012). Therefore, these sponges have an essential ecosystem engineering role that supports entire habitats. In fact, the species is listed as one of the main components of the 'A4.27. Communities of Mediterranean lower circalittoral rock' and the 'IV.3.3. Community of the shelf-edge rock (Open-sea rocks – OR)', from the EUNIS Habitats and Barcelona Convention, respectively (Gubbay *et al*., 2016). Both are listed under the Habitats Directive [92/42/EEC] Annex I '1170 Reefs'. Although populations of *P. compressa* are poorly known, its high abundance in non-trawled areas, contrasted with its rarity in nearby trawled seabeds, underscores its vulnerability to bottom trawling and highlights its potential as an indicator of well-preserved habitats (Diaz *et al*., 2024a). This has already led to their consideration as indicator species for Vulnerable Marine Ecosystems (VMEs), as defined by the Food and Agriculture Organization (FAO) of the United Nations (Marin *et al*.,

2016).

Important conservation actions for this and other habitat forming species in the Mediterranean Sea, are to include them in conservation lists, especially in Annex II (List of Endangered and Threatened Species) of the Protocol concerning Specially Protected Areas and Biological Diversity (SPA/ BD) under the Barcelona Convention. More research on the occurrence, ecology of the species as well as its conservation status and trends is highly recommended.

**Biological data**

Brief description of the species: Cryptic or massive encrusting in the shallow coralligenous, they often become larger on deeper hard-bottoms, with massive lamellar shapes with a broad base (up to 15 cm high and 1 cm thick, there is no stalk) (Figures 1-3). External color of specimens alive is white, whitish, grayish or yellowish to orange (Figures 1-3). Compressible. Surface is regular and slightly hispid. No clear visible cortex. Oscules and pores are on opposite sides of the lamellar shape. (Cárdenas & Rapp, 2012; Díaz *et al*., 2024b).



**Figure 8 :** White-orange specimen of *Poecillastra compressa* from Solan Bank, northern Scotland, 80 m depth. Specimen is 30 cm long and 10 cm high. © JNCC and Annika Clements.

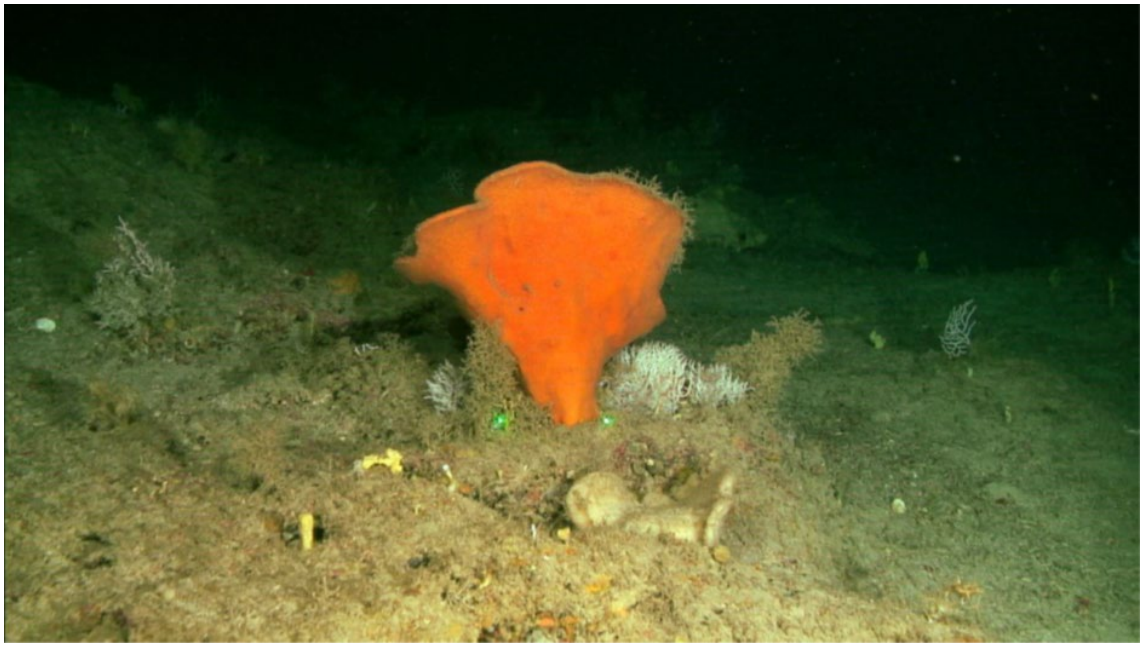


**Figure 9 :** Orange specimen of *Poecillastra compressa* found at Mallorca (Balearic Islands, Spain), at 117 m depth. Distance between the laser points is 15 cm. © IEO-CSIC.



**Figure 10 :** White specimen of *Poecillastra compressa* (in the center) found near the Cabrera archipelago (Balearic Islands, Spain), at 170 m depth. Distance between the laser points is 15 cm. © IEO-CSIC.

**Distribution (current and historical)**

*Poecillastra compressa* is widespread in the Northeast Atlantic and the Mediterranean Sea (Cárdenas & Rapp, 2012; Cárdenas & Rapp, 2015) but has not been found beyond the Mid-Atlantic Ridge.

In the Mediterranean Sea, it appears to be particularly common in the Western Mediterranean Sea, being found from the Alboran Sea (Maldonado, 1992; Pansini, 1987), to the Italian coasts, with known populations in the Catalan Margin (Santín *et al*., 2021), the Balearic Archipelago (Santín *et al*., 2018, 2019; Díaz *et al*., 2024a, 2024b), Corsica (Vacelet, 1969), Malta (Calcinai *et al*., 2013), the Gulf of Lion (Fourt *et al.*, 2017) and the Tyrrhenian (Rützler, 1966) and Ligurian Seas (Pulitzer-Finali, 1983). In the Eastern Mediterranean the species has only been reported for the Adriatic (Pansini *et al*., 1987) Ionian (Longo *et al.*, 2005; Bo *et al*., 2012) and Aegean Seas (Greek waters, Voultsiadou, 2005; Smith *et al*., 2022) (cf. distribution map in Cárdenas & Rapp, 2015, fig. 13D).

**Population estimate and trends:**

There is limited information on the population status of *P. compressa* but several records show that there are large populations in the mesophotic zone in the canyons off southeast France and Corsica (Vacelet, 1969; Fourt *et al*., 2017), in the Balearic Island continental shelf (Santín *et al*., 2018; 2019) and seamounts (Diaz *et al*., 2024a), and Southern Italy (Bo *et al.*, 2012). In the latter record, *P. compressa* is one of the dominant species: e.g. in the Amendolara Bank (Ionian Sea) between 120 and 180 m depth, *P. compressa* averages a total abundance of 7.3 ± 1.1 specimens m2 (approximately 230 gWW m2 of biomass). In the Menorca Channel, the species is considered one of the main ecosystem engineers of both the shelf edge (90–110 m depth) and upper slope (110–200 m depth) benthic communities (Santín *et al*., 2018), with an estimated densities of up to 1.1 ind/m2) and medium sized dominated populations (Santín *et al*., 2019). There is no knowledge about the reproduction or growth rate of this species. However, based on the size-frequency unimodal distributions in Southern Italy, Bo *et al.* (2012) hypothesize that this species grows quickly.

**Habitat(s):**

*P. compressa* is found on hard-bottoms (rocks, dead corals) and soft bottoms (mostly associated to rocks or rhodolith beds), in mesophotic to lower bathyal waters: 100-1740 meters depth (Bo *et al*., 2012; Cárdenas & Rapp, 2015), with Poecillastra mixed facies being considered one of the main dominating communities in Mediterranean mesophotic environments (Maldonado *et al*., 2017). having been recorded even from inside shallow water coralligenous concretions (Bertolino et al., 2013). It also commonly co-occurs in Cold-Water Corals dominated habitats, particularly Desmophyllum (ex-Lophelia) and Madrepora reefs (Bo *et al*., 2012; Bertolino *et al*., 2019; Santín *et al*., 2021), which are listed under the Habitats Directive [92/42/EEC] Annex I '1170 Reefs'. This species has been recorded only once from the Mediterranean sublittoral zone, and from a marine cave in the Gulf of Naples, Italy (Russ & Rützler, 1959). *Poecillastra compressa* typically occurs in the facies named "ME1.512 Facies with large and erect sponges" according to the recent "Interpretation Manual of Marine Habitat Types in the Mediterranean Sea" (UNEP-MAP/SPA-RAC, 2021). It is also listed as a typical sponge species in habitat types "ME1.51 Upper bathyal rock invertebrate-dominated", "MF2.51 Lower bathyal reefs" and "MF1.51 Lower bathyal rock", but is also reported from several vulnerable deep-sea facies (e.g., ME1.513 Facies with Antipatharia, ME1.514 Facies with Alcyonacea, ME2.513 Facies with Scleractinia, ME2.52 Thanatocoenosis of corals, or Brachiopoda, or Bivalvia, or sponges). *Poecillastra compressa* is also listed as one of the main habitat-forming species of the 'IV.3.3. Community of the shelf-edge rock (Open-sea rocks – OR)', from the Barcelona Convention (Gubbay *et al*., 2016), which is listed as declining in the Mediterranean.

**Threats**

**Existing and potential threats:**

Limited information is available on the existing and potential threats of *P. compressa* in the Mediterranean Sea. Deep-water populations of *P. compressa* remain poorly mapped and studied overall but are potentially vulnerable to anthropogenic impacts related to the exploitation of living and non-living resources (e.g., fisheries, oil and gas exploration, offshore activities, various pipes and cables).

Sponge habitats, in general, are known to be negatively affected by bottom trawling, with extensive damage and little sign of recovery several years later after impact (Hogg *et al*., 2010). The fact that *P. compressa* has been found in lower numbers on fishing grounds than in seamounts in the Balearic Islands (Díaz *et al*., 2024a) suggest that these *P. compressa* facies must also be threatened by fisheries. In the seamounts around the Balearic Islands, where no fishing takes place, this species actually ranks among the most abundant (Díaz *et al*., 2024a). This hypothesis was tested with a predictive model, which confirmed that this species would be the most impacted by bottom trawling (Díaz *et al*., 2024a, fig. 9B). Altogether, a growing awareness about the vulnerability of VME-indicator species prompted the inclusion of *P. compressa* (as "fan-shaped sponges") in the recently published "Identification of vulnerable species incidentally caught in Mediterranean fisheries" by MedBycatch project (Marin *et al*., 2016).

**Exploitation:**

There are no records of this species being utilized.

**Proposed protection or regulation measures**

The occurrence of such an important ecosystem-engineering sponge of high scientific and conservation value in deep waters highlights an urgent need for further study, appropriate management, and conservation actions.

Important conservation actions for this and other habitat forming species in the Mediterranean Sea, are to include them in conservation lists. The species is currently listed as one of the main habitat forming species of the 'IV.3.3. Community of the shelf-edge rock (Open-sea rocks – OR)', from the Barcelona Convention (Gubbay *et al*., 2016), so it would be especially important to also include it into the Annex II (List of Endangered and Threatened Species) of the Protocol concerning Specially Protected Areas and Biological Diversity (SPA/BD) under the Barcelona Convention; as well as in regional and country specific catalogs of threatened species in the areas where it occurs.

Research and monitoring activities are needed for the mapping and increase of knowledge regarding *P. compressa* population connectivity and trends. Protection of areas where this species occurs should be also considered.

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