UN environment CMS

MEMORANDUM OF UNDERSTANDING ON THE CONSERVATION OF MIGRATORY SHARKS

CMS/Sharks/MOS4/Doc.9.1.1
28 November 2022
Original: English

4th Meeting of the Signatories (Sharks MOS4)
Bonn, 28 February – 2 March 2023
Agenda Item 9

ASSESSMENT OF THE PROPOSAL FOR THE INCLUSION OF THE TOPE SHARK (*Galeorhinus galeus*) IN ANNEX 1 OF THE MOU

(Prepared by the Advisory Committee and the Secretariat)

1. This document contains an updated assessment of the proposal for inclusion of the Tope Shark (*Galeorhinus galeus*), also known as School Shark[1], in Annex 1 of the Memorandum of Understanding on the Conservation of Migratory Sharks (Sharks MOU). The assessment was prepared by the Advisory Committee and provided in Annex 1 to this document.

2. Annex 2 to this document provides an excerpt from an earlier analysis of the same proposal also prepared by the Sharks MOU Advisory Committee (AC) and submitted to the 4th Meeting of the Sessional Committee to the CMS Scientific Council.

Background

Assessment of the proposal to include Tope Shark (*Galeorhinus galeus*) in Appendix II of the Convention

3. Prior to the 13th Meeting of the Conference of the Parties to the Convention on Migratory Species of Wild Animals (CMS COP13 (CMS COP13)), the AC was invited by the CMS Secretariat to provide comments on proposals for the inclusion of shark species in CMS Appendices. This included the proposal to include *Galeorhinus galeus* in Appendix II as submitted by the EU (UNEP/CMS/COP13/Doc. 27.1.10).

4. In response, the AC assessed the proposal and concluded that this species met the criteria for being regionally 'migratory' for at least some populations, and being in 'unfavourable conservation status' (see UNEP/CMS/ScC-SC4/Inf.4). The relevant part of this is included in Annex 2 to this document.

5. This analysis was welcomed by the 4th Meeting of the Sessional Committee to the Scientific Council (ScC-SC4), held, on 12-15 November 2019 and included into its own review of the proposal, which in turn. are included in UNEP/CMS/COP13/Doc.27.1.10/Add.1.

[1] Tope Shark is known by a range of common names, including School Shark, Tope, and Soupfin Shark. To ensure consistency with the proposal and other sources, it is henceforth referred to as *G. galeus* in this document.

6. The ScC-SC4 supported the proposal for some populations, but not at a global scale. The ScC-SC4 recommended that the proponent reconsider the scope of the proposal to address regional populations which are threatened and exclude the population in Australia and New Zealand. The EU provided additional information on their original proposal (UNEP/CMS/COP13/Doc.27.1.10/Add.2). Subsequent CMS Party comments on the proposal are also available (UNEP/CMS/COP13/Doc.27.1/Add.1).

7. It was agreed by the Parties at COP 13 that *G. galeus* would be listed in Appendix II of the Convention.

8. In accordance with CMS/Sharks/MOS4/Doc.9.1., any shark or ray species listed on CMS, will be automatically considered for listing in Annex 1 of the Sharks MOU at its next meeting

Assessment of the proposal to include Tope Shark (*Galeorhinus galeus*) in Annex 1 of the Sharks MOU

9. In accordance with paragraph 6 of CMS/Sharks/Outcome 3.2 "Modifying the Species List (Annex 1) of the MOU", the AC has considered the above information and recently published information in order to develop its advice on whether the species meets the criteria for listing in Annex 1 of the MOU. The AC noted that Signatories to the Sharks MOU agreed at MOS3 to amend the criteria for listing a species in Annex 1 of the MOU.

10. In summary, the AC concluded that *G. galeus* is a regionally migratory species that will cross national jurisdictional boundaries within each of the various parts of their biogeographic range. The AC, however, could not determine if this was a significant proportion of the population among all regional populations. The AC also concluded that the global conservation status of *G. galeus* is unfavourable. The AC noted that all geographic populations would benefit from collaborative studies from relevant Parties and Range States. Consequently, the AC would recommend that *G. galeus* be included on Annex 1 of the Sharks MOU.

11. This updated assessment of the proposal, which is provide as Annex 1 to this document, should be used in conjunction with the AC's earlier comments on the CMS listing proposal for *G. galeus* (Annex 2 to this document).

Action requested:

12. The Meeting is requested to:

    a) Note the information included in the updated assessment, provided in Annex 1 to this this document;

    b) Note the previous assessment of the proposal, provided in Annex 2 to this document;

    c) Consider the findings of the Advisory Committee when taking a decision on the inclusion of Tope Shark (*Galeorhinus galeus*) in Annex 1 of the MOU.

ANNEX 1

UPDATED ASSESSMENT OF THE PROPOSAL FOR INCLUSION OF THE TOPE SHARK IN ANNEX 1 OF THE MEMORANDUM OF UNDERSTANDING ON THE CONSERVATION OF MIGRATORY SHARKS (15 November 2022)

(*Prepared by the Advisory Committee*)

Introduction

1. The AC has re-assessed the proposal to include *Galeorhinus galeus in Annex 1 of the Sharks MOU* in accordance with the agreed criteria described in paragraphs 7 - 12 of CMS/Sharks/Outcome 3.2 "Modifying the Species List (Annex 1) of the MOU":

> *"7. The broad, biological criteria used under the CMS Convention to determine whether a species qualifies for listing should be used under the MOU. This will ensure a simple approach and maintain consistency with the parent Convention.*
>
> *8. Annex 1 of the MOU shall list **migratory species** which have an **unfavourable conservation status**, and which require international agreements for their conservation and management, as well as those which have a conservation status which would significantly benefit from the international cooperation that could be achieved by an international agreement.*
>
> *9. In accordance with paragraph 3 d) of the MOU the conservation status is considered "favourable" when all the following conditions are met:*
>
> *a) population dynamics data relative to appropriate biological reference points indicate that migratory sharks are sustainable on a long-term basis as a viable component of their ecosystems;*
>
> *b) the distributional range and habitats of migratory sharks are not currently being reduced, nor are they likely to be reduced in the future to levels that affect the viability of their populations in the long term; and*
>
> *c) the abundance and structure of populations of migratory sharks remains at levels adequate to maintain ecosystem integrity.*
>
> *10. In accordance with paragraph 3 e) of the MOU, the conservation status will be taken as "**unfavourable**" if any of the above conditions are not met.*
>
> *11. The term "**migratory species**" is defined by CMS in Article I (1), II (1) and IV (1) and further specified in the explanatory notes to the format for proposals to amend CMS Appendices. To better differentiate between the geographical extent of migrations, the following categories should apply:*
>
> *a) Highly migratory: Those species whose migrations extend over the scale of oceanic basins, so encompassing national waters and high seas;*
>
> *b) Regional migratory: Those species whose migrations extend over the scale of regional (often shelf) seas, although a small proportion of the population may make longer-distance movements, including excursions into oceanic basins;*
>
> *c) Sub-regional migratory: Those species that migrate over smaller spatial scales, but with clear evidence of cyclical and predictable migrations across jurisdictional boundaries.*

d) Smaller scale coastal migrations or non-migratory: Those species that are generally site specific or make only shorter distance movements (e.g. seasonal inshore-offshore or north-south migrations). These species are considered to not meet the criteria of "migratory species" as defined by CMS in Article I (1), II (1) and IV (1).

12. Notwithstanding the rules of CMS, species or species groups may be listed as "look-alike" species, if differentiation from an Annex 1 listed species is difficult and confusion with the latter is likely. A "look-alike" species does not necessarily have to meet all the criteria for inclusion in Annex 1 itself."

Conservation status

2. The most recent IUCN Red List Assessment for *G. galeus* (Walker *et al.*, 2020) considers the species as Critically Endangered globally (decline of >80% over the past three generations). Whilst available data from New Zealand indicated a lower decline (30–49% over the past three generations, making this population eligible for IUCN category Vulnerable), this should be viewed in the context of the more limited time-series (1990–2016; cf. the data used for Australia which was for the period 1927–2000), and how such data may then be extrapolated to cover the required three-generation period, as used through JARA[2] (Just Another Red List Assessment), a type of Bayesian state-space models (BSSM).

3. Assessments of *G. galeus* in Australian waters have, to date, been based primarily on an age structured stock assessment model which used a time-series of commercial gillnet catch-per-unit-effort (CPUE) data as an index of abundance. The most recent estimate indicated that this stock of *G. galeus* was 12 per cent of unfished biomass (Thomson and Punt 2009). The 2020 IUCN assessment utilised the results of this modelling. Management measures introduced to protect *G. galeus* in Australian waters, however, may have impacted the reliability of the fishery-dependent CPUE index as an indicator of abundance in this region. More recently, close kin mark recapture (CKMR) modelling has provided an estimate of absolute abundance that is independent of fishing behaviour. The Australian stock was assessed in 2018 using a CKMR model (Thomson *et al.*, 2020). The CKMR assessment provided an estimate of current absolute abundance and trend back to 2000. Unlike previous stock assessments, it is unable to provide an estimate of depletion from unfished biomass. This model estimated an abundance of approximately 50,000 mature individuals during 2000 (which is lower than the 2012 estimate of 250,000 adults; Thomson *et al.*, 2012), with a possible positive trend (0.23) indicating possible signs of recovery between 2000 and 2011. It should be noted that this is a preliminary study, and further sampling over the next three years is expected to increase the reliability of this approach.

4. The CMS Scientific Council "noted that the population in New Zealand was not in an unfavorable conservation status" (UNEP/CMS/COP13/Doc.27.1.10/Add.2). The most recent New Zealand Department of Conservation Threat Classification lists the New Zealand population of *G. galeus* as "Not Threatened" (Duffy *et al.*, 2018), with the criteria for this category relating to species that are "resident native taxa that have large, stable populations". In New Zealand the fishery for *G. galeus* has been regulated under a Quota Management System (QMS) since 1986. Commercial landings have been relatively stable at around 3,000 tonnes per year since that time, and the stock is currently classified as 'favourable'[3]. Since the 2020 IUCN assessment, an updated stock assessment for the New

[2] See Sherley *et al.* (2019).
[3] See: https://www.mpi.govt.nz/dmsdocument/17653-stock-status-table-for-fish-stocks.

Zealand stock has been published (Tremblay-Boyer, 2021) and outlined in the New Zealand 2021 fishery status report[4]. This documentation indicated that standardised catch rates of *G. galeus* were increasing in one management region[5], declining in one region[6], and stable in two regions[7]. There were conflicting trends observed in the fifth region[8]. The IUCN decline criteria, however, must assess a three-generation period (estimated at 79 years for *G. galeus*), and so the AC does not consider this new information would change the IUCN global assessment.

5. The AC considers that the available evidence indicates that the conservation status of *G. galeus* globally, can be considered as 'unfavourable'.

Migratory Nature

6. The AC were aware of several new scientific papers relating to the movements and migrations of *G. galeus* since earlier comments were provided to the CMS at ScC-SC4 and COP13. These are detailed below.

7. De Wysiecki *et al.* (2022) used environmental niche modelling to examine seasonal patterns in distribution and habitat use in the South-west Atlantic, which included the waters from southern Brazil to southern Argentina. The authors concluded that "results supported large-scale partial migrations (i.e. some individuals migrate while others remain resident) of the *G. galeus* population".

8. Nosal *et al.* (2021) provided information from acoustic tracking of *G. galeus* in the North-east Pacific. This study was based on 34 mature females implanted with acoustic transmitters (and six further specimens with conventional tags), with data collected from 337 acoustic receivers[9] over 7 years. This study indicated complex, triennial migratory patterns that were influenced by the triennial reproductive cycle and possible philopatry. Some individuals made cumulative distances of >8000 km (1559 days at liberty), with four individuals being reported from >1600 km from the tagging site. This study did not have receivers in Canadian or Mexican waters, although at least six of the forty tagged specimens (15%) were caught by Mexican fisheries. This study could not inform on whether or not *G. galeus* undertook any oceanic excursions in this area, but it did indicate migratory movements between national jurisdictions linked to reproductive behaviour.

9. Schaber *et al.* (2022) reported on four tagged *G. galeus* that moved from shelf seas (North Sea and west of Scotland) that then moved into more oceanic areas off the shelf, being recaptured from the Porcupine Bight, Bay of Biscay, off Gibraltar and off Madeira. The maximum recorded depths of these four sharks ranged from 654–730 m. *G. galeus* in more oceanic waters displayed 'diel vertical migration', inhabiting the epipelagic zone (mostly <100 m depth) during the night and occurring in deeper (400–500 m) water during the day.

[4] See: https://www.mpi.govt.nz/dmsdocument/45376-Fisheries-Assessment-Plenary-May-2021-Stock-Assessments-and-Stock-Status-Volume-3-Red-Cod-to-Yellow-Eyed-Mullet
[5] See: https://www.mpi.govt.nz/dmsdocument/45376-Fisheries-Assessment-Plenary-May-2021-Stock-Assessments-and-Stock-Status-Volume-3-Red-Cod-to-Yellow-Eyed-Mullet
[6] The region defined as 'Lower SCH 3 & SCH 5'.
[7] The regions defined as 'SCH 4 (Chatham Rise) and SCH 7, SCH 8 & lower SCH 1W'.
[8] The region defined as 'SCH 2 & top of SCH 3'.
[9] The receivers were located (north to south) from the states of Washington and Oregon (n = 29), Sonono to San Luis Obispo counties (Central California, n = 109), Santa Barbara and Ventura counties, including the northern Channel Islands (Southern California, n = 33), Los Angeles, Orange and San Diego counties (Southern California, n = 121) and La Jolla (the southernmost part of the study area, n = 45).

10. McMillan *et al.* (2021) reported on the role of liver size and energy storage in terms of the dispersal of *G. galeus*. This study concluded that the smaller livers of early life-history stages of *G. galeus* limited their distribution to their inshore nursery grounds. This study did not provide details on the movements of larger individuals.

Connectivity between Australia and New Zealand: Background

11. The Scientific Council "noted that recent genetic work confirmed that there were five separate populations of Tope/School shark around the world and that the population occurring in Australian and New Zealand waters were considered as a single population. However, it was noted that both genetic and tagging studies demonstrated limited connectivity and that therefore the Australian-New Zealand population did not meet the definition of migratory as a significant proportion of the population did not undertake predictable and cyclical movements across national jurisdictional boundaries. Hence, the Scientific Council agreed that the Australian-New Zealand population should be excluded from further consideration for listing" (UNEP/CMS/COP13/Doc.27.1.10/Add.2).

12. The AC therefore considered this matter further. Connectivity/migration between Australia and New Zealand has been investigated primarily through tagging and genetic studies, which are summarised below:

Evidence of movements of *G. galeus* between Australia and New Zealand

13. The Oceania population of *G. galeus* comprises the nominal Australian and New Zealand stocks. The stock structure within this region has long been considered complicated (Stevens and West, 1997; Walker *et al.*, 2008). In Australia, the species is considered overfished, has been shown to meet the criteria as a threatened species nationally, and is listed as a Conservation Dependent species under Australian environmental law. In contrast, *G. galeus* around New Zealand is classified nationally as "Not Threatened" and considered to be fished sustainably. These two stocks are assessed separately, and the national fisheries also managed separately.

14. Substantial tagging effort has examined movement/migration of *G. galeus* between Australia and New Zealand. Early tagging results from Australia were summarised by Walker *et al.* (2008). From 2,686 tagged sharks released in Australia (1990–1999), 541 resulted in tag recaptures, 25 of these were recovered from New Zealand. One shark was seen to travel to New Zealand and return to Australia over a 7-year period. Of 3,950 tagged sharks released in New Zealand (1985–1997), 26 were recovered from Australia (Hurst *et al.*, 1999). Hurst *et al.* (1999) reported that, overall, 76% of recaptured sharks were recaught within 500 km, while 10% moved from New Zealand to Australia. Francis (2010) analysed tagged release-capture data from New Zealand (1985–2008), with a total of 320 recaptures from 4506 releases. Fifty-five percent of returned sharks were recaptured within 500 km of the original tagging location, while 8.4% of recaptured sharks were caught off Australia. A higher proportion of female recaptures (19%) than males (8%) had moved to Australia.

15. Since the 1950s, obligate seasonal migration of pregnant females within the Australian *G. galeus* stock from regional aggregation areas to south-eastern (Bass Strait and Tasmanian) pupping areas has been assumed (Olsen, 1954; Rogers *et al.*, 2017). Recently McMillan *et al.* (2019) has demonstrated a much more complex seasonal movement pattern within Australia. Of 11 pregnant females tagged in the Great Australian Bight (South Australia), seven remained in the tagging area, three moved to known south-eastern pupping areas,

and one moved to New Zealand; suggesting a complex partial migration of adult females with some travelling to distant pupping areas and some remaining resident in winter aggregation areas, possibly similar behaviour to that discussed by Nosal *et al.* (2021; see bullet 11).

Evidence of genetic connectivity of *G. galeus* between Australia and New Zealand

16. Early genetic studies have indicated subtle differences between *G. galeus* from Australia and New Zealand (Ward and Gardner, 1997). This study concluded that "*The genetic data, indicating small but statistically significant genetic differences between Australian and New Zealand fish, suggest that the interchange of sharks between these two regions is too limited to lead to panmixia (possibly the tagged trans-Tasman sharks do not breed in Australian waters), and that pending the results of further analyses these stocks should continue to be regarded as effectively separate for management purposes*".

17. More recent genetic studies have indicated that *G. galeus* from Australia and New Zealand are genetically indistinct (i.e. forming a single, panmictic population; Hernández *et al.*, 2015; Devloo-Delva *et al.*, 2019).

18. A recent study using CKMR to assess the Australian stock of *G. galeus* (Thomson *et al.*, 2020) and subsequent review by Simpfendorfer *et al.* (2021) also considered the potential exchange of *G. galeus* between Australia and New Zealand. Thomson *et al.* (2020) stated that "*it is clear from the relatively small absolute abundance found in this study that the correspondingly large NZ School Shark population has not formed part of this abundance estimate, indicating that migration rates are low".* Thomson *et al.* (2020) also asserted that "*School Sharks have long been known to pup in bays and inlets of Tasmania and Victoria and have recently been shown to pup in South Australia. It is possible that these pupping locations represent reproductively separate populations that have their own spatial distributions and movement patterns (while at the same time undertaking large migrations and intermingling on the fishing grounds throughout their range)".* The review panel queried the information relating to movements, stock structure and potential immigration/emigration, concluding that "*emigration from Australian waters have no effect on CKMR estimates since emigration is embedded within the estimated mortality rate, which is common to all individuals. Immigration (e.g., from NZ in particular), if not accounted for, could cause positive bias in the estimated breeding population unless it is accounted for…*" (Simpfendorfer *et al.*, 2021). The review panel also noted that improved studies of stock structure were required in order to help interpret assessment results and guide potential management actions.

Other evidence of *G. galeus* movements in oceanic waters

19. *G. galeus* can move into more oceanic waters off the continental shelf, and also travel long distances. For example, *G. galeus* tagged off North-western Europe have been recaptured from Gibraltar and Madeira, with reported longer-distance movements in the magnitude of 2708–4691 km (Schaber *et al.*, 2022). Movements of >1600 km have been reported for *G. galeus* tagged in the North-east Pacific (Nosal *et al.*, 2021). Within Oceania, Hurst *et al.* (1999) reported a maximum distance travelled of 4940 km, with *G. galeus* tagged off New Zealand being recaptured from Australia (1730–3700 km), and *G. galeus* tagged off Australia being recaptured from New Zealand moving 1570–2290 km. *G. galeus* from New Zealand are also known to occur around the Chatham Islands (some 800 km east of New Zealand), including proportionally more large individuals (Tremblay-Boyer, 2021). There

are, however, more limited data to gauge the frequency of *G. galeus* in the more offshore waters of the Tasman Sea.

20. The AC consider that there is evidence that *G. galeus* from Australia and New Zealand mix, as indicated by the recaptures of tagged individuals and genetic studies. The AC could not fully determine the extent of mixing of *G. galeus* across Oceania, nor fully conclude whether this mixing would comprise "*a significant proportion of whose members cyclically and predictably cross one or more national jurisdictional boundaries*", as per the definition of the CMS. It is plausible that the Oceania population of *G. galeus* is a metapopulation comprised of multiple stock units that are largely, but not fully, separated. The AC also note that the reported movements of *G. galeus* across the Tasman Sea, whilst relatively low as a proportion of tagged individuals, should be viewed in the context of the triennial migratory behaviours reported for other populations of *G. galeus* (Nosal *et al.*, 2021), that it may only be certain stages that undertake such behaviours (e.g. mature females) and that the level of reporting may have been impacted by differences in fishing effort at the times when some of the sharks were tagged and released.

21. The aforementioned studies would support the previous view of the AC, in that "*available evidence indicates that Tope/School Shark is a regionally migratory species that will cross national jurisdictional boundaries within each of the various parts of their biogeographic range. However, it could not be determined if this was a significant portion of the population among all regional populations*".

Summary

22. The AC concluded that *G. galeus* is a regionally migratory species, and that the global conservation status is unfavourable. The AC also noted that all geographic populations would benefit from collaborative studies from relevant Parties and Range States. Consequently, the AC would recommend that *G. galeus* be included on Annex 1 of the Sharks MoU.

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ANNEX 2

EXCERPT FROM THE

ANALYSIS OF PROPOSALS FOR INCLUSION OF SHARK SPECIES IN THE APPENDICES OF THE CONVENTION ON THE CONSERVATION OF MIGRATORY SPECIES OF WILD ANIMALS (CMS) AT THE 13TH MEETING OF THE CONFERENCE OF THE PARTIES (CMS COP13)

Originally submitted to the 4th Meeting of the Sessional Committee of the Scientific Council (November 2019) as CMS/SCC-SC4/Inf.4

(Prepared by the Advisory Committee of the Memorandum of Understanding on the Conservation of Migratory Sharks – Sharks MOU)

Introduction

1. The Sharks MOU Advisory Committee (AC) has reviewed proposals for the inclusion of three species of sharks in the Appendices of the Convention (Table 1), that were submitted by CMS Parties for consideration at the 13th Meeting of the Conference of the Parties (COP13) to CMS and provided its comments in this document.

Background

2. CMS Resolution 11.33 *Guidelines for Assessing Listing Proposals to Appendices I and II of the Convention*

> *"Requests the Secretariat to consult other* ***relevant intergovernmental bodies,*** *including RFMOs, having a function in relation to any species subject to a proposal for amendment of the Appendices and to report on the outcome of those consultations to the relevant meeting of the Conference of Parties;"*

3. The Sharks MOU, which was concluded in accordance with Article IV (4) of CMS, represents such a relevant intergovernmental body in relation to the three species proposed. It aims to achieve and maintain a favourable conservation status for migratory sharks that are included in its Annex 1, most of which are also included in the Appendices of CMS.

4. In an exchange of letters between the Chairs of the AC and the CMS Scientific Council in July 2018, the Chair of the Scientific Council invited the AC to review all listing proposals for sharks and rays that will be submitted to COP so that they may be made available to the CMS Scientific Council for its consideration at its last meetings preceding COP.

5. At the 3rd Meeting of the Signatories to the Sharks MOU (Sharks MOS3), Signatories agreed activity 11 of the **Programme of Work 2019–2021** which requests the AC to "*provide comments on proposals for the inclusion of shark and ray species in the Appendices of CMS to the Scientific Council and the Conference of the Parties.*"

6. The AC has reviewed the listing proposals with regard to the accuracy and completeness of the information and assessed the proposals against the agreed CMS criteria for listing. Based on its findings, the AC has provided its independent expert opinion on whether the species meet the criteria for listing under CMS. Furthermore, the AC has commented on information in the proposals that were incomplete or incorrect and has provided additional scientific information relevant to the proposed listings which may be taken into account.

Table 1: Proposals for the inclusion of shark species in the Appendices of CMS, which were submitted to CMS COP13, and which are subject to this review by the Sharks MOU AC.

Species	**CMS App.**	**Proponent**	***Relevant Documents***
Tope Shark *Galeorhinus galeus*	App. II	EU	https://www.cms.int/sites/default/files/document/cms_cop13_doc.27.1.10_proposal-inclusion-tope-shark_eu_e.pdf

Listing criteria

7. The AC noted the following information relating to CMS listing criteria:

- A migratory species may be listed in Appendix I of the CMS "provided that reliable evidence, including the best scientific evidence available, indicates that the species is endangered".
- According to the CMS, "Appendix II shall list migratory species which have an unfavourable conservation status, and which require international agreements for their conservation and management, as well as those which have a conservation status which would significantly benefit from the international cooperation that could be achieved by an international agreement".
- Migratory means that "the entire population or any geographically separate part of the population of any species or lower taxon of wild animals, a significant proportion of whose members cyclically and predictably cross one or more national jurisdictional boundaries".
- A species is considered to have an "Unfavourable conservation status" if any of the following is not met:

  (1) population dynamics data indicate that the migratory species is maintaining itself on a long-term basis as a viable component of its ecosystems;

  (2) the range of the migratory species is neither currently being reduced, nor is likely to be reduced, on a long-term basis;

  (3) there is, and will be in the foreseeable future sufficient habitat to maintain the population of the migratory species on a long-term basis; and

  (4) the distribution and abundance of the migratory species approach historic coverage and levels to the extent that potentially suitable ecosystems exist and to the extent consistent with wise wildlife management;

Review

Comments on the EU proposal to list Tope (or School) Shark (*Galeorhinus galeus)* on Appendix II of CMS

8. Given the reported distribution of Tope Shark, the AC considered the data available for the following five geographical areas (Chabot & Allen, 2009):

   - North-east Atlantic and Mediterranean Sea
   - Southern Africa (including the south-west Indian and south-east Atlantic Oceans)
   - Eastern North Pacific
   - South America (including the south-west Atlantic south-east Pacific Oceans)
   - Australasia (including Australia and New Zealand, noting that there have been some genetic differences observed between these areas)

9. Migratory nature: There is evidence of seasonal, latitudinal migrations that indicate Tope Shark move southwards from the British Isles to north-west Africa. The movements from EU waters to north-west Africa would cross jurisdictional boundaries. There is also evidence of Tope Shark moving between the national waters of Argentina, Uruguay and southern Brazil, thus crossing national jurisdictional boundaries, with this relating to a seasonal migration of Tope Shark that move north (to off Brazil) in winter, and south in spring and summer (to off Argentina), with preferred water temperatures 12–17°C (Jaureguizar *et al.*, 2018).

10. Recent genetic studies indicate that while Tope Shark are unlikely to migrate across ocean basins in the Southern Hemisphere, the species does move across national boundaries such as between Australian and New Zealand waters (Hernandez *et al.*, 2015; Bester-van der Merwe *et al.*, 2017). The high level of connectivity within both New Zealand and Australian waters is supported by intensive tagging efforts (Hernandez *et al.*, 2015). These studies consider the Australian-New Zealand Tope Shark population a single clade (Hernandez *et al.*, 2015; Bester-van der Merwe *et al.*, 2017). These movements appear to be linked to reproduction events (Hernandez *et al.*, 2015; Delvoo-Delva *et al.*, 2019; McMillan *et al.*, 2018). Suggestions are that Tope Shark in Australia demonstrate “partial migration” (some individuals are migrants, some are residents), some tagged pregnant females were found to swim large distances from the Great Australian Bight to find nursery grounds, one tagged female swimming as far as New Zealand (McMillan *et al.*, 2019).

11. The AC considered that available evidence indicates that Tope Shark is a regionally migratory species that will cross national jurisdictional boundaries within each of the various parts of their biogeographic range. However, it could not be determined if this was a significant portion of the population among all regional populations.

12. The AC also considered that Tope Shark should not be referred to as ‘highly migratory’ in the Overview section of the proposal, given that Tope Shark from the five areas have been reported to be genetically distinct. In addition, the latest indications from Australian/New Zealand waters is that this population is “partially migratory” (some individuals migrate, some remain residents). (see McMillan *et al.*, 2018).

13. The AC also noted that when some of the longer distances are recorded from tagging studies (e.g. from the British Isles to the Mediterranean), it should be recognised that these may be based on limited observations (sometimes individual fish) and so would be better referred to as 'longer-distance movements'. There is no evidence that these longer-distance movements are 'migrations', given that there is no evidence that a significant proportion of the population display that behaviour, or that these are cyclical.

14. Conservation status: Tope Shark is listed as Vulnerable globally on the IUCN Red List (Walker *et al.* 2006). However, there are regional variations in the assessments, ranging from Least Concern (eastern North Pacific) to Critically Endangered (Southwest Atlantic). The scientific basis for the listings varies between regions.

15. There should be concern over the exact status of Tope Shark in the south-west Atlantic, given the (2006) Critically Endangered listing. However, whilst both the IUCN Red List and the proposal refer to "drastic declines" the underlying evidence to support this is unclear. For example, whilst Elias *et al.* (2005) reported a decline in Catch per Unit Effort (CPUE), this was between periods of different fishing practices ('experimental' and 'commercial' fishing). More recently, Bovcon *et al.* (2018) noted that "*These [Tope Shark] fisheries have been described as over-exploited, although their status has not been properly evaluated (Chiaramonte, 1998; Nion, 1999; J. A. Peres, unpublished data, 1998)*". The Red List assessment for Tope Shark (from 2006) is currently being updated and the regional listing for the south-west Atlantic could usefully be better substantiated in any future Red List assessment.

16. The status of Tope Shark elsewhere in their range is mostly uncertain, but the species is regarded as Vulnerable by the IUCN. In terms of whether "*population dynamics data indicate that the migratory species is maintaining itself on a long-term basis as a viable component of its ecosystems",* the only assessed stock is that occurring in Australian waters, where it is classed as 'overfished'. It may be noted, however, that there are conservative management measures in place and Patterson *et al.* (2018) reported some positive signs in stock recovery, though this should be treated with caution given the large uncertainty associated with the trend data. The Australian National Threatened Species Scientific Committee assessed this species for listing as a threatened species in 2009 (https://www.environment.gov.au/biodiversity/threatened). Their assessment recommended the species (in Australian waters) was eligible for listing as Endangered. This assessment remains current.

17. In terms of "*there is and will be in the foreseeable future sufficient habitat to maintain the population of the migratory species on a long-term basis*", the AC note that Tope Shark typically give birth to their pups in the outer reaches of large estuaries and bays. Such habitats are often subject to a range of anthropogenic activities that may impact on both habitat and water quality.

18. Overall, the AC did consider that the available evidence would allow the conservation status of Tope Shark to be considered as 'unfavourable'.

19. International cooperation: Although Tope Shark may move into oceanic environments, these do not appear to be regular migrations into the high seas (international waters), and Tope Shark is typically found in continental shelf seas (national waters). The stock units for Tope Shark are not fully defined. There are five distinct geographical regions where Tope Shark occurs, with published studies indicating these areas have genetically distinct populations (Chabot & Allen, 2009). However, there is evidence of mixing between adjacent range states and migrations between management jurisdictions within each of these five broad areas.

20. Consequently, the AC considered that the management and conservation status of Tope Shark would benefit from international cooperation.

21. Comments on the proposal: The AC considered that the proposal contained the majority of available scientific information, but would note the following:

- The taxonomy of species is not correct because the author and year must be put in parenthesis: (Linnaeus, 1758). Moreover, the species has numerous synonyms used in the past (e.g. *Galeus australis*, *Galeus chilensis*, *Galeorhinus vitaminicus*, etc.) see Eschmeyer's Catalog of Fishes[10].
- The second paragraph in the Overview should refer to “Animals tagged around the British Isles…”, as both the UK and Ireland have been involved in tagging studies.
- Section 4.2 (Population) stated that “In the North Eastern Pacific (west coast of North America), CPUE data –albeit inconsistent- showed a strong decline/stock collapse after an industrialized fishery targeting tope for their liver oil in the first half of the 20th century, and there currently are no indications that the stock has returned to its original level (Holts, 1988), although Pondella & Allen (2008) noted an increasing trend in CPUE from a gill-net monitoring program between 1995 and 2004 and also first time observations of tope during scientific SCUBA monitoring programs” could usefully be re-worded, as it seems strange to use information from 1988 as ‘currently’. This section would be better as “In the North Eastern Pacific (west coast of North America), CPUE data - albeit inconsistent - showed a strong decline/stock collapse after an industrialized fishery targeted tope for their liver oil in the middle of the 20th century, with limited evidence of stock recovery in subsequent decades (Holts, 1988). More recently, Pondella & Allen (2008) noted an increasing trend in CPUE from a gill-net monitoring program between 1995 and 2004 and also first-time observations of tope during scientific SCUBA monitoring programs.”
- Section 6.2 (International protection status) includes information on OSPAR, but Tope Shark is not included on the OSPAR List of Threatened and/or Declining Species. Hence such text is superfluous.
- Section 6.2 also includes HELCOM, although Tope Shark is a marine species that would not be expected to be anything but a vagrant to the Kattegat and Baltic. It may occur in those parts of the Skagerrak outside the HELCOM area. Hence, information on HELCOM is not relevant.
- Section 6.3 (Management measures) contains some ambiguous statements. The text “EU vessels have not been allowed to land line-caught tope from EU and some international waters since 2010. The EU Council Regulation 2018/120 lists tope on the EU list of prohibited species, effectively prohibiting longline fisheries for this species in Union waters of ICES Division 2a, ICES Subarea 4 as well as in Union and international waters of ICES Subareas 1, 5, 6, 7, 8, 12 and 14 (EU, 2018)” should

[10] https://www.calacademy.org/scientists/projects/catalog-of-fishes

be re-written as “EU fishing regulations prohibit landing tope when it has been caught by longline in EU waters of ICES Division 2.a and Subarea 4 and from EU and international waters of ICES Subareas 1, 5–8, 12 and 14 (EU, 2018).”

- The proposal indicated some of the publications that had shown recent increases trends in Tope Shark (e.g. Pondella & Allen, 2008). Patterson *et al.* (2018) was used to correctly state that the Australian Tope Shark population was overfished, but that this report also stated, “There are indicators that school shark biomass may be increasing”, which was seemingly overlooked in the proposal. More recently, Emery *et al.* (2019) presented status information for School Shark, and noted ”Although there were indications in the CKM (close-kin monitoring) that some stock recovery occurred during 2000–2017, there was large uncertainty associated with this trend”. Such information could usefully also be included.
- The proposal brought together much information from disparate sources, but a more consistent approach to presenting information by each of the five main geographical areas would have helped the reader.
- A reference in the bibliography was wrong (Vacchi *et al.*, 2002) and should be: Duarte P. N., A. Silva, and G. M. Menezes. 2002. First results of a tagging program on tope shark, Galeorhinus galeus, and thornback ray, Raja clavata, in Azorean waters. 4th Meeting of the European Elasmobranch Association Proceedings. M. Vacchi, G. La-Mesa, F. Serena, and B. Séret (eds.) Paris France Societe francaise d'Ichtyologie, p. 197.

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