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CONSERVATION IMPACTS OF THE GLOBAL TRADE IN FISH MAW ON MIGRATORY SPECIES

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Summary:

This document contains a review of conservation impacts of the global trade in fish maw on migratory species to support UNEP/CMS/COP15/Doc.25.1.1 Bycatch and Other Fisheries-induced Mortality.

Conservation Impacts of the Global Trade in Fish Maw on Migratory Species
The Need for International Collaboration

Summary

The high value, growing global trade in fish maw (swim bladders) is having a detrimental impact on target species of migratory Sciaenidae fish as well as migratory species of cetaceans, sharks, rays and sea turtles caught as bycatch in fisheries targeting fish for their maw. This document establishes an urgent need for CMS to expand its existing work on migratory target and bycatch species, in collaboration with other intergovernmental organizations, to better understand the impacts of the maw trade, develop and implement bycatch mitigation measures for maw fisheries, and list impacted species on the Appendices. These actions would contribute towards implementation of targets 1.1, 1.3, 3.1, 4.2 and 6.4 of the CMS Samarkand Strategic Plan for Migratory Species (2024-2032), Resolution 12.22 on bycatch, and Decisions 14.31-14.34 relating to bycatch, Decisions 14.69-14.73 on conservation priorities for cetaceans, and Decisions 14.93-14.95 related to marine turtles.

Background

1. Swim bladders (fish maw) are highly valued in Asian countries (Sadovy de Mitcheson et al., 2019) where they are used in haute cuisine, traditional medicine, as a symbol of status and wealth, as a beauty product, and as a financial investment. Trade data indicate that the Hong Kong Special Administrative Region of the People's Republic of China (Hong Kong SAR) is the global hub of the maw trade, with imports from 110 countries/territories (Sadovy de Mitcheson et al., 2019). The volume of fish maw in global trade and its associated value is now comparable to shark fin and sea cucumber; maw has become one of the most used alternatives to shark fin in soup for banquets (Ho and Shea, 2021).

2. Croaker and drum fishes from the Sciaenidae family, especially larger species in the taxon, are the highest-valued and most consumed species in the maw trade due to their large, thick, and collagen-rich maws (Tuuli et al., 2016). There are 68 genera and 297 species within the Sciaenidae family (Fricke and Fong, 2025) which is distributed globally, mostly in temperate and tropical continental shelf waters, including estuaries and river mouths.

3. The value of fish maw is largely species-dependent and has increased over time. Large-bodied croaker species have the highest value maws in international markets, reaching thousands or tens of thousands of dollars per kilogram, or for a particularly large individual maw (Sadovy de Mitcheson et al., 2019). Most maw fisheries are in lower-income countries where the incentive of exceptionally high market prices for fish maw can contribute to a “gold rush” mentality, lead to illegal trade, and attract organized criminal syndicates (Sadovy de Mitcheson et al., 2019, Alvarado-Martinez and Martinez, 2018; Radwin, 2024; Garcia et al., 2025). The vaquita (*Phocoena sinus*) is on the verge of extinction, with fewer than 10 individuals remaining due in large part to ongoing illegal fishing for and illegal trade in totoaba (*Totoaba macdonaldi)* maws, including the involvement of drug cartels (Cárdenas-Hinojosa et al., 2024).

4. The intensification and expansion of targeted fisheries for large-bodied sciaenid species (Smith et al., 2023; Amepou et al., 2024) is causing fishers to engage in destructive, wasteful, as well as illegal, unreported and unregulated fishing practices for short term gain (Azzaro, 2019; Sadovy de Mitcheson et al., 2019; Amepou et al., 2024; Alvarado Martinez and Martinez, 2018). This results in the overexploitation of both target (Sadovy de Mitcheson et al., 2019; Liu et al., 2020; Jimenez et al., 2021) and incidentally caught species (Grant et al., 2022; Rojas-Bracho et al., 2022; Smith et al., 2023; Amepou et al.,

2024). The disparity in value between maws and meat has led to meat from target species and other comparatively low value bycaught specimens being discarded (Azzaro, 2019; Sadovy et Mitcheson et al., 2019; Zulman et al., 2019; Ho and Shea, 2021). Although once a byproduct of certain fisheries, due to its high value maw has become the target in certain fisheries to the extent that flesh may be discarded and only the maw retained. These trends are diminishing the ability of both target and non-target species to fulfil their role in the ecosystem and reduce long-term food and economic security for fishers and their communities.

Impact on target species: croakers

5. Most fishes of the family Sciaenidae are characterized by slow growth, longevity, and predictable spawning aggregations (Sadovy de Mitcheson, 2016). These characteristics contribute to unsustainable removals of large, mature fish – those in highest demand due to the size of their maws – during their spawning season, when large numbers of adults migrate and concentrate briefly and predictably in confined areas in and around estuaries and adjacent shallow water coastal habitats to spawn (Sadovy and Cheung, 2003; Cisneros et al., 2021; Smith et al., 2023).

6. Overall, overexploitation is the major threat to Sciaenidae, impacting more than 50 percent of species. According to data from the IUCN Red List of Threatened Species, 29 of 286 croaker species known to be exploited for the maw trade were at a high risk of extinction (Gorman, 2020). As the value of, and demand for, fish maw increases and currently targeted species decline, maw fisheries are expected to expand both in intensity and in the range of species targeted. This will likely increase the number of species at risk of extinction.

7. Extensive and targeted fishing for the Chinese bahaba (*Bahaba tapingensis*), primarily for its maw, has led to its Critically Endangered status and decreasing population trend (Liu et al., 2020). Ongoing take of the CITES Appendix I-listed and IUCN-designated Vulnerable totoaba for illegal trade in its maws has raised concerns about the sustainability of that fishery (Cárdenas-Hinojosa et al., 2024; Cisneros-Mata, 2020). Similar conservation concerns apply to the Vulnerable acoupa weakfish (*Cynoscion acoupa*) (Jiminez et al., 2021; Moura et al., 2025) and the Near Threatened blackspotted croaker (*Protonibea diacanthus*) (Smith et al., 2023).

Bycatch in maw fisheries

8. The adverse impact of bycatch of non-target species in maw fisheries, including Convention on the Conservation of Migratory Species of Wild Animals (CMS) Appendix I- and II-listed marine mammals (dolphins, porpoises and dugongs), marine turtles, sharks and rays, is of increasing concern. Smith et al. (2023) estimated that 46.3 percent of the global total of shark and ray, marine mammal and marine turtle species occurring in waters where most high-value croakers also occur, are Threatened with extinction (CR, EN or VU) while another 13.1 percent are considered Near Threatened (NT).[1] An unknown number of the 54 overlapping species currently considered Data Deficient may also be threatened.

[1] IUCN classifies species into one of nine Red List Categories: Extinct, Extinct in the Wild, Critically Endangered, Endangered, Vulnerable, Near Threatened, Least Concern, Data Deficient and Not Evaluated. Vulnerable, Endangered and Critically Endangered species are considered to be threatened with extinction.

9. In Papua New Guinea (PNG), Australian snubfin dolphins (*Orcaella heinsohni*), Australian humpback dolphins (*Sousa sahulensis*) and dugongs (*Dugong dugon*) are threatened with extinction due to croaker maw fisheries (Grant et al., 2022; Amepou et al., 2024). Further, all four Critically Endangered Indo-Pacific sawfish species (dwarf sawfish (*Pristis clavata*); narrow sawfish (*Anoxypristis cuspidata*); green sawfish (*Pristis zijsron*); and Largetooth sawfish (*Pristis pristis*)) are now seldom observed in landings as their populations have declined due to increased croaker maw fishing effort (Grant et al., 2021a; Grant et al., 2021b; and Grant et al. 2022). Other species bycaught in PNG maw fisheries include leatherback sea turtles (*Dermochelys coriacea*); pig-nosed turtles (*Carettochelys insculpta*); requiem (Carcharhinidae), winghead (*Eusphyra blochi*i), and hammerhead sharks (Sphyrnidae); giant guitarfishes (*Rhynchobatus djiddensis*) and wedgefishes (Rhinidae) (Grant et al., 2021a; Grant et al., 2021b; Grant et al., 2022). See table 1 for other range states.

10. Species bycaught in gillnets set for croakers in Bangladesh, where maws sell for as much as 5,000 USD per kg, include Irrawaddy dolphins (*Orcaella brevirostris*) (EN), Indo-Pacific humpback dolphins (*Sousa chinensis*) (VU), finless porpoises (*Neophocaena phocaenoides*) (VU) (Wildlife Conservation Society, 2013), CMS Appendix II-listed, scalloped hammerhead sharks (*Sphyrna lewini*) (CR) and olive ridley turtles (*Lepidochelys olivacea*) (VU), and longtail butterfly rays (*Gymnura poecilura*)) (VU) (Smith et al. 2023).

Discussion and Analysis

11. Bycatch of non-target species in fisheries is the greatest cause of mortality of most CMS-listed marine species. At least nine CMS-listed species, whose ranges include 55 CMS parties, are impacted by bycatch in maw fisheries. See Table 1. Given the increasing impact of the maw trade, it would be consistent with existing bycatch-related objectives and workplans, for CMS to directly address the impact of maw fisheries on CMS-listed species and consider the impact on other directly and indirectly impacted migratory species that might qualify for future listing.

Table 1: CMS-listed species documented as caught in maw fisheries

Taxon	Appendix I	Appendix II	Range states that are also CMS parties
Marine mammals		*Dugong dugon*	Australia, Bangladesh, Egypt, Eritrea, France, India, Kenya, Madagascar, Mozambique, Pakistan, Palau, Philippines, Saudi Arabia, Seychelles, Somalia, Sri Lanka, United Arab Emirates, Tanzania, Yemen
		Orcaella heinsohni	Australia
		Sousa sahulensis	Australia
Sea Turtles	*Lepidochelys olivacea*		Nesting: Angola, Australia, Bangladesh, Brazil, India, Kenya, Pakistan, Panama, Peru, Senegal, South Africa, Sri Lanka, Tanzania
	Dermochelys coriacea		Argentina, Brazil, India, Panama
Sharks	*Sphyrna lewini*		Angola, Australia, Bahrain, Benin, Brazil, Cameroon, Côte d'Ivoire, Cuba, Democratic Republic of Congo, Dominican Republic, Ecuador, Equatorial Guinea, Gabon, the Gambia, Ghana, Guinea, Guinea-Bissau, Honduras, India, Kenya, Liberia, Madagascar, Maldives, Mauritania, Mauritius, Mozambique, Nigeria, Pakistan, Palau, Panama, Peru, Philippines, Portugal, Republic of the Congo, Samoa, Saudi Arabia, Senegal, Seychelles, Somalia, South Africa, Spain, Sri Lanka, Togo, Trinidad and Tobago,
Rays	*Pristis clavata*	*Pristis clavata*	Australia
	Pristis zijsron	*Pristis zijsron*	Australia, Bangladesh, Bahrain, Djibouti, Egypt, Eritrea, India, Kenya, Pakistan, Philippines, Saudi Arabia, Somalia, Sri Lanka, Tanzania, United Arab Emirates, Yemen
	Pristis pristis	*Pristis pristis*	Angola, Bangladesh, Benin, Brazil, Cameroon, Côte d'Ivoire, Cuba, Democratic Republic of the Congo, Ecuador, Equatorial Guinea, Fiji, Gabon, the Gambia, Ghana, Guinea, Guinea-Bissau, India, Liberia, Madagascar, Mauritania, Mozambique, Nigeria, Pakistan, Panama, Peru, Philippines, Portugal, Saudi Arabia, Senegal, Somalia, South Africa, Sri Lanka, Tanzania, Togo, Trinidad and Tobago
	Anoxypristis cuspidate	*Anoxypristis cuspidate*	Australia, Bahrain, Bangladesh, India, Kenya, Mozambique, Pakistan, Saudi Arabia, Sri Lanka, Tanzania, United Arab Emirates, Yemen

12. CMS already has a long history of addressing bycatch through Resolutions,[2] Decisions,[3] Concerted Actions,[4] Action Plans,[5] Memoranda of Understanding[6] and Instrument.[7] While fisheries management is outside the remit of the Convention, CMS plays an important role in ensuring that avoiding or mitigating bycatch of migratory species remains a focus in deliberations in other relevant international fora, and that Parties and other stakeholders have accurate information at hand to address this threat more effectively. To this end, CMS and its regional agreements already work on bycatch with other intergovernmental agreements including the International Whaling Commission (IWC),[8] the Food and Agriculture Organization (FAO) of the United Nations,[9] Regional Fisheries Bodies (RFBs), and Regional Seas Conventions (RSCs), the Inter-American Convention for the Protection and Conservation of Sea Turtles, and the Caribbean Environment Programme. Through these and other collaborations, CMS is in a strong position to provide specific technical recommendations[10] to Parties on the most effective and appropriate measures to mitigate and reduce bycatch in maw fisheries.

13. As researchers and international organizations express increasing concern about the impact of expanding and intensifying maw fisheries on target species and other marine taxa taken as bycatch, intergovernmental organizations are already responding:

14. In 2021, the International Union for Conservation of Nature World Conservation Congress (Marseille) adopted IUCN Resolution 132 entitled 'Controlling and monitoring trade in croaker swim bladders to protect target croakers and reduce incidental catches of threatened marine megafauna' (IUCN, 2021). It requests the IUCN Species Survival Commission to prepare a report to examine the impact of the fish maw trade on threatened marine megafauna and to evaluate the efficacy of listing croakers under CITES, calls on IUCN members to support the establishment of national fish maw trade regulations, and urges IUCN members to document catches of croakers by volume, species, and value, and to document incidentally caught species. It encourages IUCN members that are range states for one or more species of threatened marine megafauna impacted by the fish maw trade to ban maw exports until conservation and recovery plans are developed and implemented.

15. In 2024, the IWC "express[ed] serious concern over the growing international demand for swim bladders from croaker (Sciaenidae) species which results in the bycatch of small cetaceans, some of which already face a high risk of extinction." (International Whaling Commission, 2024).

[2] Resolution 12:22: Bycatch (2017) consolidates several earlier resolutions
[3] For example, Decisions 14.31-14.34 relating to bycatch, Decisions 14.69-14.73 on conservation priorities for cetaceans, and Decisions 14.93-14.95 related to marine turtles
[4] For example, Concerted Action 13.5 for the Irrawaddy dolphin, Concerted Action 13.7 for the harbour porpoise
[5] For example, Action Plan for the Conservation of Small Cetaceans of Western Africa and Macaronesia
[6] For example, the Advisory Committee of the CMS Memorandum of Understanding for Marine Turtles of the Indian Ocean and South East Asia (IOSEA Marine Turtle MOU) recommends more attention is given to bycatch in the framework of the Convention and its relevant MOUs.
[7] For example, ACCOBAMS and ASCOBANS have a Joint Bycatch Working Group
[8] https://iwc.int/management-and-conservation/bycatch-and-entanglement-of-cetaceans-in-fishing/bycatch
[9] FAO published Guidelines to prevent and reduce bycatch of marine mammals in capture fisheries in 2021 following a consultation process that also involved the ACCOBAMS/ASCOBANS Joint Bycatch Working Group
[10] For example, CMS Technical Reports, fact sheets and guidelines:
• Technical Mitigation to Reduce Marine Mammals Bycatch and Entanglement in Commercial Fishing Gear: Lessons Learnt and Future Directions
• Review of Methods Used to Reduce Risks of Cetacean Bycatch and Entanglements
• Guidelines for the Safe and Humane Handling and Release of Bycaught Small Cetaceans from Fishing Gear - CMS Technical Series No.43

16. In October 2025, the European Parliament adopted a Resolution on the EU strategic objectives for the 20th meeting of the Conference of the Parties to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), to be held in Samarkand, Uzbekistan, from 24 November to 5 December 2025 (European Parliament, 2025). The resolution "regrets the increasing demand for swim bladders of Sciaenidae species; calls for actions to ensure that international trade does not jeopardise species survival or exacerbate risks to protected species caught incidentally; calls on the Parties to propose species of concern for inclusion in the Appendices where CITES criteria are met, and to ensure legal, traceable and biologically sustainable trade" and "calls on the Commission and the Member States to ensure that a resolution on improving the conservation status of, and regulation of international trade in, croaker (Sciaenidae) species is adopted at CoP20".

17. CITES will continue its consideration of compliance issues relating to the illegal trade in totoaba maws at the 20th meeting of its Conference of the Parties (COP20) from 24 November – 5 December 2025. A side event on the impacts of the global trade in fish maws hosted by a coalition of interested NGOs, including the IUCN Croaker and Drum Specialist Group, will discuss the need for international collaboration, including between CITES, CMS and IWC.

18. CMS should use the opportunity of upcoming meetings and the ongoing work of the Liaison Group of Biodiversity-Related Conventions, to strengthen cooperation, collaboration and synergies with CITES, IWC and other intergovernmental agreements to address the impacts of the maw trade. Specifically:

19. CITES: At COP20, CITES will consider a longstanding compliance issue relating to illegal trade in totoaba maw, a leading cause of the near extinction of the vaquita. A broader discussion of the impact of the maw trade on other endangered fauna, and the potential role of CITES, is anticipated in the context of draft Decisions on totoaba in Doc. 35.3. Under this agenda item, CMS/CITES Parties could speak in support of CITES adopting a Decision that directs the CITES Animals Committee to examine the maw trade and its impacts, including through an externally funded workshop to which CMS could provide expertise on bycatch impacts.

20. IWC**:** The IWC's bycatch work is coordinated through its Bycatch Mitigation Initiative (BMI), which aims to raise awareness on the need for action on cetacean bycatch at both national and international levels and to promote the use of effective tools to understand and tackle the issue. CMS Resolution 12.22 *Bycatch* requests the Secretariat to improve cooperation and communication on bycatch-related issues, and to cooperate with other relevant programs such as the BMI. The CMS Secretariat is represented in the IWC Bycatch Standing Working Group, which oversees the initiative. In addition, the CMS COP-appointed Councilor for Bycatch is a member of the IWC Expert Panel on Bycatch, which provides specialist advice to the Standing Working Group and the Bycatch Coordinator within the IWC Secretariat.

21. CMS should use the opportunity of IWC70 (28 September- 2 October 2026) to strengthen cooperation, collaboration and synergies with the IWC to address the impacts of the maw trade, including supporting a Resolution if one is proposed. We recommend that CMS Parties support CMS (through the Secretariat and Scientific Council experts) being involved in an expert workshop with IWC and CITES. Further, we recommend that CMS collaborate with the IWC to develop specific disentanglement and strandings response protocols for animals bycaught in maw fisheries.

22. FAO**:** FAO published Guidelines to prevent and reduce bycatch of marine mammals in capture fisheries in 2021 following a consultation process that also involved the

ACCOBAMS/ASCOBANS Joint Bycatch Working Group. These guidelines, developed for decision makers, managers, and all who are involved in developing and implementing policy and technical interventions, conclude that "arguably the greatest need for altering fishing practices, including the reduction of marine mammal bycatch, is to have an effective process that gets fishers to change how they fish". CMS could offer to collaborate with FAO and the IWC to develop guidelines specific to croaker fisheries to avoid and mitigate bycatch.

23. IUCN: In 2021, IUCN adopted a Resolution (107) calling for a detailed analysis of the impact of fisheries on biodiversity. That analysis is not yet complete, but engagement by CMS (Secretariat, Scientific Council) could be very useful in that process.

Recommended Actions

24. We recommend that the Conference of the Parties at COP15:

Urge Parties that have maw fisheries within their jurisdiction to:

a) take account of the best available scientific advice for mitigating bycatch, including the Hamilton and Baker (2019) assessment, available as UNEP/CMS/COP13/Inf.11, the Food and Agriculture Organization of the United Nations (FAO) Technical Guidelines to reduce bycatch of marine mammals in capture fisheries, and the Leaper and Calderan (2018) study of methods used to reduce risks of cetacean bycatch and entanglements (CMS Technical Series Publication No. 38), in addition to specific advice for the fisheries concerned;

b) implement effective bycatch mitigation measures for cetaceans, Sirenia, sharks, rays and turtles in their fishing operations;

c) report to the Conference of Parties at its 16th meeting on the progress in implementing these decisions.

Invite all Parties to review the impacts of the maw trade on non-CMS-listed target and bycaught species and consider submitting future listing proposals.

Direct the Scientific Council (and Working Group on Bycatch) to address the emerging threats of the maw trade as a priority bycatch threat, including by: (1) reviewing the gear- and species-specific characteristics of fishing for maws, (2) making technical recommendations to range states with maw fisheries that impact CMS-listed species to avoid and mitigate bycatch, including though the use of alternative gear, and (3) considering the potential for listing qualifying migratory species impacted by the maw trade in the CMS Appendices.

Request the Secretariat to seek opportunities to collaborate with CITES, the IWC, FAO, regional fishery bodies, Regional Seas Conventions and Action Plans, IUCN and other stakeholders to increase understanding, and mitigate the conservation and welfare impacts, of maw fisheries and the international trade in fish maws; express interest to CITES and the IWC in co-hosting, and contributing expertise to, an externally-funded expert workshop that would examine the biological status of Sciaenidae species whose maws are in international trade, available maw trade data, and the impact of bycatch mortality from maw fisheries and make recommendations for action, including further collaboration, to address impacts on target species and bycatch mortality; and invite collaboration with the IWC on bycatch mitigation and disentanglement protocols specific to maw fisheries.

Encourage Parties, intergovernmental and non-governmental organizations to provide financial and technical support to the activities recommended.

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