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ORIGINAL PAPER

International regulation of commercially exploited sharks: challenging the notion of shark "bycatch" in tuna RFMOs

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Abstract
This article examines the obligations of States under international fisheries law with respect to the conservation and management of oceanic sharks caught incidentally in fisheries under the competence of regional fisheries management organizations with a mandate to manage tuna and tuna-like species (t-RFMOs). It argues that, in certain t-RFMO-managed fisheries, specific commercially exploited shark species should be legally classified as (secondary) target stocks rather than non-target species under the United Nations Convention on the Law of the Sea, the Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks and other instruments of international fisheries law. It follows that t-RFMOs have a responsibility to manage such populations of commercially exploited sharks within their regulatory competence through precautionary, science-based, and effective conservation and management measures (CMMs). All t-RFMOs already have a competence to adopt CMMs with respect to commercial shark fisheries insofar as they are incidental to fisheries covered by the primary competence of the respective t-RFMOs, such as tuna. That said, our analysis of t-RFMO practice shows that t-RFMOs have not yet adequately fulfilled their responsibility to regulate commercially exploited sharks through effective CMMs, such as precautionary reference points, harvest strategies (including, but not limited to, harvest control rules), total allowable catches and retention limits.

Keywords Commercial shark fisheries · Conservation and management measures · Bycatch · Regional fisheries management organizations (RFMOs) · UNFSA · UNCLOS

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1 Introduction

Globally, oceanic shark populations are in rapid decline, with the fishing sector constituting the main contributor to this ecological crisis.[1] *Pacoureau and others* found that "since 1970, the global abundance of oceanic sharks and rays has declined by 71% owing to an 18-fold increase in relative fishing pressure."[2] Moreover, a recent article by *Worm and others* showed that "shark fishing continues to present a substantial threat to shark populations over much of the world, despite the widespread adoption of antifinning legislation and related measures."[3] While sharks are often considered unwanted bycatch, targeted and incidental catches[4] of several species of sharks are retained (i.e. not discarded) in fisheries for epipelagic fish such as tuna due to their considerable commercial value (hereinafter 'commercially exploited sharks').[5] Incidental catches of sharks of commercial interest, such as the blue shark (*Prionace glauca*) and shortfin mako (*Isurus oxyrinchus*), are particularly common in long-line fisheries targeting tropical tuna.[6] Such fleets frequently employ gears such as bite-proof wire leaders (also referred to as steel leaders) to ensure catch retention, which result in higher catches of sharks despite the existence of more sustainable alternatives such as monofilament nylon leaders.[7] Accordingly, catches of blue sharks are high, with the global catch in 2019 estimated at 189.783 t, with most coming from longline fisheries managed by regional fisheries management organizations (RFMOs) with a mandate to regulate tuna fisheries (t-RFMOs).[8] For example, catches were estimated at more than 43.000 t by the Indian Ocean Tuna Commission (IOTC)[9] and reported at more than 38.500 t in the South Atlantic[10] to the International Commission for the Conservation of Atlantic Tunas (ICCAT) in 2019. In some cases, blue sharks even make up a higher percentage of the overall value generation of such long-line fisheries than some primary target species (for

[1] Nathan Pacoureau and others, 'Half a century of global decline in oceanic sharks and rays' (2021) 589 Nature 567; Nicholas K Dulvy and others, 'Overfishing drives over one-third of all sharks and rays toward a global extinction crisis' (2021) 31(21) Current Biology 4773.e8.

[2] Pacoureau and others (n 1) 567.

[3] Boris Worm and others, 'Global shark fishing mortality still rising despite widespread regulatory change' (2024) 383(6679) Science 225, 229.

[4] The term "incidental catch" refers to catch that was unintentionally caught in a fishery but retained rather than discarded.

[5] Melissa R Cronin and others, 'Policy and transparency gaps for oceanic shark and rays in high seas tuna fisheries' (2023) 24(1) Fish and Fisheries 56, 57.

[6] Nuno Queiroz and others, 'Global spatial risk assessment of sharks under the footprint of fisheries' (2019) 572 Nature 461.

[7] Peter Ward and others, 'Large-scale experiment shows that nylon leaders reduce shark bycatch and benefit pelagic longline fishers' (2008) 90(1–3) Fisheries Research 100; Molly Scott and others, 'What's the catch? Examining optimal longline fishing gear configurations to minimize negative impacts on non-target species' (2022) 143(105186) Marine Policy 1; Catarina C. Santos and others, 'Leader material and bait effects on target and bycatch species caught in an Atlantic Ocean pelagic longline fishery' (2024) 278(107093) Fisheries Research 1.

[8] Rod Cappell and others, *Blue Shark: economic valuation of the global market for blue shark products and interdependent policy analysis for sustainable management and trade* (Poseidon 2022, commissioned by Oceana), https://doi.org/10.5281/zenodo.7311640 , https://oceana.org/reports/bycatch-no-more-blue-shark-is-a-411-million-fishery-that-deserves-proper-management/, 9.

[9] IOTC, Report of the 27th Session of the IOTC Scientific Committee, IOTC-2024-SC27-R, 2024, 149.

[10] ICCAT, Report for Biennial Period 2024–2025, Volume 2: SCRS, 2025, https://www.iccat.int/Documents/BienRep/REP_EN_24-25-I-2.pdf, 184.

example, overall global blue shark value is higher than any bluefin tuna species).[11] Despite the relative abundance of blue sharks and the higher fecundity of this species in comparison to other pelagic sharks,[12] the fishing pressure over the last 50 years has also taken its toll on this species. For example, the latest blue shark stock assessment of ICCAT shows that spawning biomass has dropped significantly between 1970 and 2020 in the North and the South Atlantic.[13] For the South Atlantic there is a 46.5% probability that the stock is subject to overfishing but not overfished (orange quadrant), and an 8.02% probability that this stock is in the red quadrant (overfished and experiencing overfishing).[14] The scale of catches of these shark species by certain long-line fisheries targeting tuna combined with their high commercial value and trade volume shows that these incidental shark catches are desired by the relevant fleets. In this respect, the IOTC website states quite openly: "Some fleets are known to actively target both sharks and IOTC species simultaneously."[15] An in-depth global report commissioned by Oceana in 2022 concluded: "Much of the blue shark catch is from targeted fisheries […]; it should not be considered merely as bycatch in swordfish and tuna fisheries."[16]

As pointed out by *James and others*, "the line between elasmobranch target catch and non-target catch is often unclear".[17] This lack of clarity also translates into uncertainty from an international legal perspective given that there are different sets of obligations concerning the conservation and management of target and non-target species.[18] The key applicable global treaties are the United Nations Convention on the Law of the Sea (UNCLOS)[19] and the Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks (UNFSA).[20] They envisage that States manage highly migratory fish stocks such as tuna through RFMOs. These bodies have the competence to regulate the relevant fisheries through binding conservation and management measures (CMMs).[21] The four t-RFMOs with a mandate for tropical tuna are: the Inter-

[11] Rod Cappell and others (n 8) 23–25. https://oceana.org/reports/bycatch-no-more-blue-shark-is-a-411-million-fishery-that-deserves-proper-management/

[12] Enric Cortés, 'Comparative Life History and Demography of Pelagic Sharks' in Merry D. Camhi and others (eds), *Sharks of the Open Ocean: Biology, Fisheries and Conservation* (Blackwell Publishing 2008) 309–322.

[13] ICCAT, Report of the 2023 ICCAT Blue Shark Stock Assessment Meeting, https://iccat.int/Documents/Meetings/Docs/2023/REPORTS/2023_BSH_ENG.pdf.

[14] ibid 33–69.

[15] https://iotc.org/science/status-summary-species-tuna-and-tuna-species-under-iotc-mandate-well-other-species-impacted-iotc.

[16] Rod Cappell and others (n 8) 52.

[17] Kelsey James and others, 'Drivers of retention and discards of elasmobranch non-target catch' (2016) 43(1) Environmental Conservation 3.

[18] Karen N Scott, 'Bycatch Mitigation and the Protection of Associated Species' in Richard Caddell and Erik J Molenaar (eds), *Strengthening International Fisheries Law in an Era of Changing Oceans* (Hart Publishing 2019) 167–171; Mercedes Rosello, Valentin Schatz and Eva R van der Marel, *Opinion on the Conformity of the European Union's Position with the UNFSA concerning the Conservation and Management of North Atlantic Shortfin Mako Shark at ICCAT* (Sustainable Fisheries and Communities Trust 2021) 14–15.

[19] 1833 UNTS 3 (1982).

[20] 2167 UNTS 3 (1995).

[21] UNFSA (n 20) arts 8–10.

American Tropical Tuna Commission (IATTC), ICCAT, IOTC, and the Western and Central Pacific Fisheries Commission (WCPFC).[22]

This article will examine the obligations of States under international fisheries law (UNCLOS, the UNFSA, the constitutive treaties of the selected t-RFMOs, and the CMMs adopted by these t-RFMOs) with respect to the conservation and management of commercially exploited sharks caught in tuna fisheries. While this article will focus primarily on the conservation and management of the blue shark, the main tenets of our analysis are transferable to all other commercially exploited sharks. This article will first analyze the obligations of States to sustainably manage commercially exploited sharks through t-RFMOs depending on their status as "target stocks" or "non-target species" (2.). Thereafter, it will argue that commercially exploited sharks such as the blue shark should be legally classified as (secondary) target stocks rather than non-target species, and managed accordingly by RFMOs and regional fisheries management arrangements (RFMAs)[23] (3.). This is followed by an analysis of the current competences of t-RFMOs to adopt CMMs for commercially exploited sharks (4.). Finally, this article assesses the regulatory progress of the four selected t-RFMOs with respect to CMMs that include the management of (secondary) target stocks (5.). The article ends with a conclusion (6.).

2 Obligations of States to manage commercially exploited sharks through RFMOs

With respect to highly migratory fish stocks listed in Annex I of UNCLOS,[24] Article 64(1) UNCLOS obliges States Parties to "cooperate directly or through appropriate international organizations with a view to ensuring conservation and promoting the objective of optimum utilization of such species throughout the region".[25] Paragraph 16 of Annex I of UNCLOS lists a number of "oceanic sharks", which cover most commercially exploited shark species, including all key pelagic species caught in tuna fisheries (e.g., blue shark, silky shark, hammerhead sharks, thresher sharks, porbeagle, and shortfin mako).[26]

Under Articles 117 and 118 UNCLOS, States Parties fishing on the high seas have additional obligations to cooperate either directly or through RFMOs. Article 119(1)(a) UNCLOS obliges States Parties to take measures based on the "best scientific evidence available" and designed "to maintain or restore populations of harvested species at levels which can produce the maximum sustainable yield [MSY]".[27] For species that are "associated with or dependent upon harvested species" but do not themselves qualify as "harvested species", Article 119(1)(b) UNCLOS contains a – relatively weak[28] – obligation of States

[22] The Commission for the Conservation of Southern Bluefin Tuna (CCSBT) will not be addressed as it follows the CMMs of the other t-RFMOs with respect to southern bluefin tuna fisheries in areas of competence.

[23] This article will use the term RFMO to refer to both RFMOs and RFMAs.

[24] James Harrison and Elisa Morgera, 'Article 64' in Alexander Proelss (ed), *United Nations Convention on the Law of the Sea (UNCLOS): A Commentary* (CH Beck, Hart, Nomos 2017) paras 1-12.

[25] ibid para 13.

[26] Daniel Owen, 'Annex I' in Alexander Proelss (ed), *United Nations Convention on the Law of the Sea: (UNCLOS): A Commentary* (CH Beck, Hart, Nomos 2017) paras 38–48.

[27] For detailed analysis, see Rosemary Rayfuse, 'Article 119' in Alexander Proelss (ed), *United Nations Convention on the Law of the Sea: (UNCLOS): A Commentary* (CH Beck, Hart, Nomos 2017) paras 14–30.

[28] Mercedes Rosello, Juan Vilata and Dyhia Belhabib, 'Atlantic Shortfin Mako: Chronicle of a Death Foretold?' (2021) 10(52) Laws 1, 8 https://doi.org/10.3390/laws10030052.

Parties to take into consideration the effects of fishing activities on these species "with a view to maintaining or restoring populations […] above levels at which their reproduction may become seriously threatened".[29]

With respect to highly migratory species, the overall objective of the UNFSA is "to ensure the long-term conservation and sustainable use […] through effective implementation of the relevant provisions of [UNCLOS]".[30] For this purpose, the UNFSA implements and further concretizes the mentioned cooperation obligations under UNCLOS for its States Parties.[31] It establishes a set of more detailed obligations of States Parties to conserve and manage highly migratory fish stocks as well as associated and dependent species.[32] The key obligations, which are entitled "general principles", are listed in Article 5 UNFSA (e.g., ensure long-term sustainability, ensure that CMMs are based on the best scientific evidence available, and apply the precautionary approach). The UNFSA also provides international cooperation mechanisms and designates RFMOs as the principal institutional framework through which States fulfill their obligations to manage and conserve highly migratory fish stocks.[33] Accordingly, States Parties must, in conserving and managing commercially exploited sharks through these RFMOs, adopt CMMs that are consistent with the requirements stipulated in the UNFSA.[34]

For the present purposes, it is important to note that UNCLOS and the UNFSA contain different sets of obligations with respect to "target stocks" (or "harvested species") on the one hand, and "non-target species" on the other.[35] Target stocks are subject to the full range of obligations contained in UNCLOS and the UNFSA, including the obligation under the UNFSA to adopt CMMs "to ensure long-term sustainability […] and promote the objective of their optimum utilization".[36] With respect to non-target species, States Parties have an obligation to assess the impact of fishing on species "belonging to the same ecosystem or associated with or dependent upon the target stocks"[37] and to adopt CMMs "with a view to maintaining or restoring populations of such species above levels at which their reproduction may become seriously threatened".[38]

This is an important difference compared to Article 119(1)(b) UNCLOS, which does *not* explicitly impose a requirement to adopt CMMs.[39] Moreover, catches of non-target species must be minimized through measures such as "the development and use of selec-

[29] For detailed analysis, see Rayfuse (n 27) paras 31–35.

[30] UNFSA (n 20) art 2.

[31] For a list of States Parties to the UNFSA, see 'Status of the Agreement (Signatures, Ratifications, Accessions)' (United Nations, Office of Legal Affairs, 21 July 2023) https://www.un.org/depts/los/convention_agreements/convention_overview_fish_stocks.htm.

[32] UNFSA (n 20) arts 5 *et seq.*

[33] UNFSA (n 20) arts 8 *et seq.* See generally Rosemary Rayfuse, 'Regional Fisheries Management Organizations' in Donald R Rothwell and others (eds), *The Oxford Handbook of the Law of the Sea* (1st edn. Oxford University Press 2015).

[34] Cf UNFSA (n 20) arts 8-10. See Rosello, Schatz and van der Marel (n 18) 14.

[35] Cf ibid art 5.

[36] ibid art 5(a).

[37] ibid art 5(d).

[38] ibid art 5(e).

[39] Rosello, Vilata and Belhabib (n 28) 9.

tive, environmentally safe and cost-effective fishing gear and techniques".[40] In this sense, the UNFSA provides for obligations applicable to sharks whether they are target species or not.[41] Moreover, core obligations such as the precautionary approach apply irrespective of the categorization of a species.[42] Additionally, the FAO's International Guidelines on Bycatch Management and Reduction of Discards (FAO Bycatch Guidelines), albeit non-binding, call on States and RFMOs to develop management plans for their fisheries that "include objectives for the use and management of that portion of the full catch of which bycatch" forms part.[43] Similar requirements may be found in the constitutive treaties of the selected t-RFMOs, albeit with significant differences depending on whether the relevant treaty was negotiated prior to or after the adoption of the UNFSA in 1995.[44]

A trend towards expectations of improved conservation, management and sustainable use of sharks may also be discerned in the annual resolutions on sustainable fisheries of the UN General Assembly (UNGA).[45] Specifically, the UNGA has called on RFMOs "with the competence to regulate highly migratory species to strengthen or establish precautionary, science-based [CMMs], as appropriate, for sharks taken in fisheries within their convention areas".[46] According to the UNGA,[47] these measures should be consistent with the FAO's International Plan of Action for Conservation and Management of Sharks (IPOA-SHARKS).[48] The IPOA-SHARKS, which was elaborated within the framework of the FAO Code of Conduct for Responsible Fisheries (CCRF),[49] *inter alia* calls on States to adopt and implement national plans of action for conservation and management of shark stocks (NPOAs).[50] It also reiterates that States should cooperate, *inter alia* through RFMOs, "with a view to ensuring the sustainability of shark stocks".[51] Where appropriate, this could include "the development of subregional or regional shark plans."[52] However, a recent review of

[40] UNFSA (n 20) art 5(f).

[41] Erika Techera and Natalie Klein, International Law of Sharks: Obstacles, Options and Opportunities (Brill 2017) 51–52; Rayfuse (n 27) para 25; International Guidelines on Bycatch Management and Reduction of Discards 2011 (FAO) paras. 2.2, 3.1.2(i) and 4.1.1.

[42] UNFSA (n 20) arts 5(c) and 6 in conjunction with Annex I. International Guidelines on Bycatch Management and Reduction of Discards (n 41) para 3.2.2(i); Code of Conduct for Responsible Fisheries 31 October 1995 (FAO) (CCRF) paras 6.5 and 7.5.2.

[43] FAO Bycatch Guidelines (n 41) paras 3.2.4(i) and 4.1.3.

[44] Cf Convention on the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean (WCPFC Convention) 2275 UNTS 43 (2000), art 5; Convention for the Strengthening of the Inter-American Tropical Tuna Commission Established by the 1949 Conventions Between the United States of America and the Republic of Costa Rica (IATTC Convention) (2003), art VII; International Convention for the Conservation of Atlantic Tunas (ICCAT Convention) 673 UNTS 63 (1966), art IV; Agreement for the Establishment of the Indian Ocean Tuna Commission (IOTC Agreement) 1927 UNTS 329 (1993), art V.

[45] See, eg, UN GA, A/RES/77/118, 'Sustainable fisheries, including through the 1995 Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks, and related instruments' (2022) para 30.

[46] ibid para 32.

[47] ibid.

[48] International Plan of Action for Conservation and Management of Sharks (IPOA-SHARKS) (1999).

[49] CCRF(n 42) art 2(d).

[50] IPOA-SHARKS (n 48) para 18.

[51] ibid para 25.

[52] ibid.

the implementation of the IPOA-SHARKS found that a significant portion of global shark catches comes from either States without an NPOA or States with NPOAs that are out of date (this includes the EU) and inadequate for managing and assessing efficacy.[53] With respect to the potential of regional plans, the study stated that the IPOA-SHARKS "could highlight the benefit of regional plans in defining regional-level output objectives, such as harvest strategies for highly migratory […] stocks."[54]

3 (Secondary) target stock status of commercially exploited sharks

Given the difference in obligations between "target stocks" and "non-target species" under the UNFSA, the question arises how commercially exploited sharks (i.e. sharks that are wanted incidental catch and are retained in fisheries for epipelagic fish such as tuna due to their considerable commercial value) should be classified. The legal criteria to be applied to the factual circumstances of each specific fishery for the purpose of this classification must be determined objectively by means of treaty interpretation.[55] As a starting point, the interpretation of the relevant provisions of the UNFSA, as a treaty that implements the relevant obligations under UNCLOS, should take into account Article 119(1)(a) UNCLOS. This provision requires a species to be "harvested" to be considered a target species requiring 'proper' management – without offering a definition of the characteristics and intensity that a fishery must reach to be classified as "harvesting". The UNFSA similarly lacks relevant definitions, thereby rendering the delimitation of the categories "target stocks" and "non-target species" challenging with respect to commercially exploited species that are incidental catch in tuna fisheries.[56]

At this junction, it is important to recall that commercially exploited sharks such as the blue shark and shortfin mako "occupy an unusual position on the continuum between bycatch and target species."[57] Interestingly, even the non-binding FAO Bycatch Guidelines refrain from establishing a "standard international definition of bycatch" due to the difficulties caused by different definitions, practices and approaches.[58] However, among the approaches mentioned in the Guidelines are "functional interpretations of bycatch" that "include catch that a fisher did not intend to catch but could not avoid, often did not want or chose not to use."[59] It is submitted that such a functional understanding is the most useful with respect to an interpretation of the terms "harvested species" under Article 119(1)(a) UNCLOS and "target stocks" and "non-target species" under the UNFSA. Commercially exploited sharks such as blue sharks are not *unwanted* catch in multispecies tuna fisheries but a highly valued component of the

[53] Eric Gilman and others, 'Global Governance Guard Rails for Sharks: Progress Towards Implementing the United Nations International Plan of Action' (2023) 25(1) Fish and Fisheries 1.

[54] ibid 11.

[55] Rosello, Schatz and van der Marel (n 18) 14; see arts 31 and 32 Vienna Convention on the Law of Treaties, 1155 UNTS 331 1969 (VCLT).

[56] Rosello, Schatz and van der Marel (n 18) 14.

[57] Scott (n 18) 178–179. See also Paula Walker, 'Oceans in the Balance: As the Sharks Go, So Go We' (2010) 17 Animal Law Review 97, 106.

[58] FAO Bycatch Guidelines (n 41) para 2.4.1.

[59] ibid para 2.4.1.

catch of, in particular, many long-line fleets.[60] Indeed, blue sharks make up a higher share of the value generation of some fisheries than some high-value target species.[61] The economic value of blue shark and shortfin mako is well documented, for example, in the context of ICCAT.[62] The fact that ICCAT manages (through ICCAT Panel 4) commercially exploited sharks via species-specific CMMs, some of which contain measures typical for the management of primary target stocks, provides further support to the contention that these species are not considered strictly non-target species (see Sect. 5 below).[63]

Finally, based on the interpretive maxims of systemic integration[64] and subsequent treaty-practice,[65] the status and treatment of marine species under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)[66] may be taken into account in the interpretation of UNCLOS and the UNFSA.[67] CITES has emerged as a key tool in regulating international trade in marine species, including sharks listed in Appendix II of CITES, which contains species that may become threatened unless trade is closely controlled.[68] Arguably, the legal framework and institutional practice under CITES lend some support to an interpretation of UNCLOS and the UNFSA that classifies certain commercially exploited sharks as (secondary) target stocks in fisheries that primarily target other species. First, proposals to include species on CITES Appendices are submitted by Parties, have to follow a specific format and must address criteria that Parties have elaborated in a resolution adopted by the Conference of the Parties (COP) of CITES.[69] Because of concerns that general CITES listing criteria might be inappropriate for species caught in fisheries, specific listing criteria for "commercially exploited aquatic species" were included.[70] Therefore, the inclusion of com-

[60] F. Dent and S. Clarke, 'State of the Global Market for Shark Products' (FAO Fisheries and Aquaculture Technical Paper vol 196, FAO 2015) 1.

[61] Cappell and others (n 8).

[62] See, eg, ICCAT, 'Report on the Intersessional Meeting of Panel 4' (2021) Doc. No PA4_804/2021, 2; Ruth Beatriz Mezzalira Pincinato and others, 'Market Incentives for Shark Fisheries' (2022) 139(105031) Marine Policy 1; Rui Coelho and others, 'Evaluation of the effects of hooks' shape & size on the catchability, yields and mortality of target and bycatch species, in the Atlantic Ocean and adjacent seas surface longline fisheries' [2020] Final Report, European Commission. Specific Contract No. 16 under Framework Contract No. EASME/EMFF/2016/008; Communication from the Commission on the European Citizens' Initiative (ECI) "Stop Finning—Stop the Trade" [2023] C(2023) 4489 final, 3.

[63] Rosello, Schatz and van der Marel (n 18) 14.

[64] VCLT (n 55) art 31(1)(c). On this principle of interpretation, see, for example, Panos Merkouris, 'Principle of Systemic Integration (2020)' in Anne Peters (ed), *Max Planck Encyclopedia of Public International Law* (Oxford University Press 2025).

[65] ibid arts 31(1)(b) and 32.

[66] 993 UNTS 243 (1973).

[67] Valentin Schatz and Daniel Kachelriess, Untangling the Net of 'Bycatch' in Commercial Shark Fisheries: The Interplay between International Fisheries Law and CITES (SharkProject & Gallifrey Foundation, 2023), https://gallifrey.foundation/Shark%20protection%20Opinion.pdf, 17 and 38. Compare also *South China Sea Arbitration (Republic of the Philippines v. People's Republic of China)* (2016) PCA Case No 2013–19 para 95; Yoshifumi Tanaka, 'Reflections on the Implications of Environmental Norms for Fishing: The Link between the Regulation of Fishing and the Protection of Marine Biological Diversity' (2020) 22 International Community Law Review 389.

[68] Schatz and Kachelriess (67) 24–35.

[69] CITES Resolution Conf 9.24 (Rev CoP17) on Criteria for amendment of Appendices I and II. See Schatz and Kachelriess (67) 28.

[70] See CITES Doc SC.41.19.1, Summary report presented to the CITES Standing Committee, and CITES Doc SC.41.19.1, Summary report presented to the CITES Standing Committee. See Schatz and Kachelriess (67) 28.

mercially exploited sharks in CITES Appendix II, if based on these specific listing criteria, can arguably be an indicator that CITES Parties consider this species as a target stock at least in some fisheries. Second, a listing in Appendix II of CITES triggers a requirement that international trade in the relevant species (to the extent it falls within the scope of CITES) is authorized only if there is a non-detriment finding (NDF) of the national Scientific Authority and a legal acquisition finding (LAF) by the national Management Authority.[71] For those shark stocks that are commercially targeted (unlike Appendix II species that are not commercially targeted in practice), a stringent NDF would require the existence of *appropriate* CMMs – which should arguably entail (secondary) target stock management for such stocks.[72] Moreover, an LAF should require a finding that any applicable CMMs adopted by RFMOs have been complied with.[73] Accordingly, a CITES Appendix II listing of a commercially exploited sharks classified (under CITES) as a "commercially exploited aquatic species" and the resulting obligations under CITES arguably support, or at the very least are in line with, the classification of certain commercially exploited sharks as (secondary) target stocks under UNCLOS and the UNFSA.[74]

Overall, it is submitted that commercially exploited sharks such as blue sharks are not usually bycatch from the perspective of UNCLOS or the UNFSA. Rather, in many t-RFMO-managed fisheries, they must be classified as (secondary) target stocks under these legal frameworks.[75] It follows that these species must in principle be managed in accordance with the obligations laid down in the UNFSA for *target stocks*. In this respect, it should be noted that, from a legal perspective, it is not within the discretion of RFMOs to incorrectly designate species as "bycatch" or "non-target" to evade relevant obligations if the species in question are in reality (secondary) target stocks under UNCLOS and the UNFSA.[76]

4 Competences of t-RFMOs to manage sharks as (secondary) target stocks

As recognized by the UNGA, the ability of RFMOs to regulate incidental or directed shark fisheries depends on whether sharks fall within their competence.[77] The spatial and species-specific extent of the competence of t-RFMOs depends first and foremost on their constitutive treaties. Leaving aside the question of whether the spatial scope of the competence of

[71] See the detailed explanation by Schatz and Kachelriess (67) 31–35.

[72] Compare, for example, the long-term actions proposed for NDFs regarding oceanic whitetip shark: CITES, Review of Significant Trade in Specimens of Appendix-II Species: Compliance, Twenty-seventh meeting of the Plants Committee Geneva (Switzerland), 12–19 July 2024, AC33 Com. 7, https://cites.org/sites/default/files/documents/E-AC33-Com-07_0.pdf, 5: "consideration of each stock as a separate management unit for conservation and harvest purposes, paying particular attention to any RFMO measures, as appropriate, in place".

[73] Compare ibid 3 (where the issue was only raised, but not answered). For a critical view, see the statement of Mexico in CITES, Summary Record, Thirty-third meeting of the Animals Committee Geneva (Switzerland), 12–19 July 2024, AC33 SR, https://cites.org/sites/default/files/eng/com/ac/33/E-AC33-SR.pdf, 14: "it is inappropriate and sets a bad precedent for CITES to verify compliance with another international body".

[74] Schatz and Kachelriess (67) 38.

[75] Rosello, Schatz and van der Marel (n 18) 15–16 (for shortfin mako at ICCAT); in this direction also Rosello, Vilata and Belhabib (n 28) 9.

[76] Rosello, Schatz and van der Marel (n 18) 14.

[77] UN GA Res 77/118 (n 45) para 32.

t-RFMOs covers maritime zones of coastal State sovereignty (in particular the territorial sea and archipelagic waters), it is undisputed for IATTC, ICCAT, IOTC and WCPFC that their competence extends to the EEZs of coastal State members of the RFMO and the high seas.[78] The species-specific mandates of t-RFMOs to manage commercially caught sharks are less uniform. As an example of best practice, WCPFC's mandate includes management of "highly migratory fish stocks",[79] which are then defined as "all fish stocks of the species listed in Annex 1 of [UNCLOS] occurring in the Convention Area, and such other species of fish as the Commission may determine".[80] Therefore, there is no doubt that WCPFC has the competence to regulate all sharks listed in Annex I of UNCLOS even as *primary* target species.[81]

The primary target stock mandate of IATTC extends to "fish stocks covered by [the IATTC Convention]",[82] which are defined as "stocks of tunas and tuna-like species *and other species of fish taken by vessels fishing for tunas and tuna-like species in the Convention Area*" (emphasis added).[83] Therefore, it does not have a *primary* target stock competence for sharks as they cannot be classified as "tuna-like species". However, IATTC may, based on this wording, regulate sharks as incidental catch associated with fisheries whose primary target species are tuna or tuna-like species.[84] This is also supported by Article VII(1)(f) IATTC Convention, pursuant to which it is one of IATTC's functions to "adopt, as necessary, conservation and management measures and recommendations for species belonging to the same ecosystem and that are affected by fishing for, or dependent on or associated with, the fish stocks covered by this Convention". IATTC's mandate to adopt such CMMs is also confirmed by its institutional practice.[85]

The mandates of other t-RFMOs are less clear. ICCAT's explicit mandate only covers the management of "tuna and tuna-like fishes that may be taken in the Convention area"[86] without an explicit reference to the incidental capture of other species in ICCAT-managed fisheries. The definition of "tuna-like fishes" does not cover sharks.[87] Against this background, ICCAT's Working Group on Convention Amendment agreed in 2013 that ICCAT's "mandate to regulate certain shark fisheries both as a target and non-targeted activity should be clarified."[88] In 2019, an amendment of the ICCAT Convention was adopted but has not

[78] Martin Tsamenyi and Quentin Hanich, 'Fisheries Jurisdiction under the Law of the Sea Convention: Rights and Obligations in Maritime Zones under the Sovereignty of Coastal States' (2012) 27 International Journal of Marine and Coastal Law 783.

[79] WCPFC Convention (n 44) art 2.

[80] ibid art 2(f).

[81] Stijn von Osch, 'Save Our Sharks: Using International Fisheries Law within Regional Fisheries Management Organizations to Improve Shark Conservation' (2012) 33 Michigan Journal of International Law 383, 411; Techera and Klein (n 41) 166.

[82] IATTC Convention (n 44) art II.

[83] ibid art I(1).

[84] Osch (n 81), 411; Techera and Klein (n 41) 165.

[85] Cf IATTC, Resolution C-24–05 Conservation Measures for the Protection and Sustainable Management of Sharks (2024).

[86] ICCAT Convention (n 44) art VIII(1)(a).

[87] ibid art IV(1).

[88] ICCAT, 'Report of the 1 st Meeting of the Working Group on Convention Amendment (Sapporo, Japan – July 10 to 12, 2013)' (2013), 2.

Table 1 Competences of t-RFMOs to regulate shark fisheries

t-RFMO	Competence for Incidental Catches	Competence for Directed Catches
IATTC	yes	no
ICCAT	yes	no
IOTC	yes	no
WCPFC	yes	yes

yet entered into force.[89] It adds "elasmobranchs that are oceanic, pelagic and highly migratory" to ICCAT's primary management mandate.[90] An ICCAT recommendation of the same year specifies that all key species of sharks are included in the term "elasmobranchs that are oceanic, pelagic, and highly migratory".[91] The legal situation is similar for IOTC, whose explicit mandate only covers species listed in Annex B to the IOTC Agreement.[92] This list currently does not contain any pelagic shark or ray species.[93] The 2nd IOTC Performance Review noted – also with respect to sharks – that this "limited scope of the IOTC Agreement means there is incomplete fisheries management and conservation coverage".[94]

However, even in the absence of a *primary* mandate for the conservation and management of sharks within their geographical competence, the practice of ICCAT and IOTC shows implicit recognition that these RFMOs – like IATTC – may fully regulate shark fishing by vessels that catch tuna and tuna-like species within their mandate (see Sect. 5 below).[95] This regulatory practice provides evidence that States consider RFMOs to have an implied power,[96] and indeed have the responsibility,[97] to ensure that fisheries managed by them do not result in unsustainable impacts on non-target or secondary target species (Table 1).[98]

Recently, this position was challenged by the Japanese and Chinese delegations at the 24th Special Meeting of ICCAT in 2024. Belize had called for a vote on a proposal concerning sharks caught in association with ICCAT-managed fisheries.[99] Japan objected to a vote, arguing that ICCAT (and presumably similar t-RFMOs such as IOTC) had "no legal mandate on bycatch species, such as sharks, under the current Convention, and thus can adopt a

[89] International Convention for the Conservation of Atlantic Tunas (ICCAT)—Protocol amending the Convention concluded in Mallorca in 2019, FAOLEX Treaties (2019) (Protocol amending the ICCAT Convention), https://www.fao.org/faolex/en/.

[90] Protocol to amend the International Convention for the Conservation of Atlantic Tunas [2019] OJ L313/3, art V(1)(a).

[91] ICCAT, 'Recommendation 19–01 on Fishes Considered to Be Tuna and Tuna-Like Species or Oceanic, Pelagic, and Highly Migratory Elasmobranchs' (2019) para 2.

[92] IOTC Agreement (n 44) art III.

[93] ibid Annex B; IOTC, 'Report of the 2nd IOTC Performance Review' IOTC–2016–PRIOTC02–R[E]' (2016) 7–8.

[94] ibid 7–8.

[95] For ICCAT: Osch (n 81) 411; Techera and Klein (n 41) 165–166.

[96] See generally Niels Blokker, 'International Organizations or Institutions, Implied Powers' in Anne Peters (ed), *Max Planck Encyclopedia of Public International Law* (Oxford University Press, last updated 2021).

[97] Compare UNFSA (n 20) art 5(f).

[98] Contra: Report of the 2nd IOTC Performance Review (n 98) 7–8, where it is argued that IOTC "expanded its mandate" through this practice.

[99] Draft Recommendation by ICCAT concerning the conservation of sharks caught in association with fisheries managed by ICCAT, PA4_806_REV_SPONS_13/2024.

management measure by consensus only."[100] China supported this position.[101] In response, the chairperson signalled that "the legal bases would not be clear" and that "the best way to establish a legal basis is by ratifying" the amendment to the ICCAT Convention.[102] From a legal perspective, this treatment of the Belize's call for a vote is unfortunate and sets a bad example. All t-RFMOs have a competence to adopt CMMs concerning the impact of the fisheries under their competence on other species, most importantly in the context of bycatch/incidental catches. This is confirmed by their institutional practice, which is evidenced by the vast amount of bycatch-related CMMs adopted by IATTC, ICCAT, IOTC and WCPFC. It is also in line with requirements of UNCLOS and the UNFSA (see Sects. 2 and 3 above). Legally, it does not matter if these CMMs were adopted by consensus or through a vote. Such an argument is foreign to international institutional law, pursuant to which there is either a competence or not (regardless of the mode of decision-making). To the contrary, adoption by consensus could imply universal acceptance of an existing mandate. Moreover, there are examples in the practice of t-RFMOs that clearly contradict the Japanese position. For example, in 2010, the IOTC adopted a shark-related CMM[103] through a vote, and Japan did not raise the same legal argument and subsequently did not object to the CMM.[104] The fact that the Japanese view prevailed at ICCAT in this instance could – if it becomes the established view at ICCAT – severely undermine the ability of ICCAT to agree on effective shark-related CMMs until the amendment to the ICCAT Convention enters into force.

5 State of play: existing (secondary) target stock management of commercially exploited sharks in t-RFMOs

Recalling the obligations under the UNFSA for commercially exploited sharks discussed above, it is submitted that States, through t-RFMOs, have not yet completely fulfilled their responsibility to regulate commercially exploited sharks that are targeted in fisheries for tuna and tuna-like species, via the adoption of adequate management measures (see Table 2).

IATTC, ICCAT, IOTC and WCPFC have all adopted measures concerning issues specifically relevant for non-target shark species management, such as data collection, mitigation measures to reduce bycatch and bycatch-mortality, retention bans (meaning an obligation to discard any individual of a specific species), and measures to restrict or prohibit shark finning (see Table 3).[105] These existing measures, which are certainly important (especially due to their ability to reduce mortality through measures such as prohibitions of certain gears, including shark lines and wire leaders) but not the focus of this article, can be broadly categorized as – albeit frequently insufficient – implementations of Article 5(d) to (f) UNFSA.

However, it is submitted that commercially exploited sharks that are incidentally caught in tuna fisheries additionally require robust stock assessments and "precautionary, science-

[100] ICCAT, Report for Biennial Period, 2024–25, Part I (2024), Vol. 1 (2025), 16.

[101] ibid.

[102] ibid 17.

[103] IOTC, 'Resolution 10/12 On the conservation of Thresher sharks (family Alopiidae) caught in association with fisheries in the IOTC area of competence' (2010).

[104] IOTC, Report of the Fourteenth Session of the Indian Ocean Tuna Commission, 2010, IOTC-2010-S14-R[E], paras 49–52.

[105] See also Scott (n 18) 179–181; Cronin and others (n 5).

Table 2 TACs and harvest strategies adopted by t-RFMOs for commercially exploited sharks

t-RFMO	TACs	Harvest Strategies (including HCRs)
IATTC	no (but partial catch limits for silky sharks)	no
ICCAT	yes (for shortfin mako and blue shark)	no (but elements of an HCR in North Atlantic shortfin mako rebuilding programme & need for HCRs recognized for North and South Atlantic blue shark)
IOTC	no (but possibility has been recognized)	no
WCPFC	no	no

Table 3 CMMs adopted by t-RFMOs for management of sharks as bycatch

t-RFMO	General 'Bycatch' CMMs on Sharks Caught Incidentally in t-RFMO Fisheries
IATTC	Resolution C-25–08 Conservation Measures for the Protection and Sustainable Management of Sharks (2025)[a]
ICCAT	Recommendation 04–10 concerning the Conservation of Sharks Caught in Association with Fisheries Managed by ICCAT (2010)[a]
IOTC	Resolution 25/08 On the Conservation of Sharks Caught in Association with Fisheries Managed by IOTC (2025)[a]
WCPFC	Conservation and Management Measure 2024–05 for Sharks (2024)[a]

[a]https://www.iattc.org/GetAttachment/bd512089-6032-433e-825f-cb05d2463e6d/C-25-08_Sharks-amends-and-replaces-Res-C-24-05.pdf

[a]https://www.iccat.int/Documents/Recs/compendiopdf-e/2004-10-e.pdf. Additionally, ICCAT has a number of more modern CMMs that address individual species, such as porbeagle and thresher sharks

[a]https://iotc.org/cmm/resolution-2508-conservation-sharks-caught-association-fisheries-managed-iotc

[a]https://cmm.wcpfc.int/measure/cmm-2024-05

based [CMMs]"[106] suitable for (secondary) target stocks pursuant to Article 5(a) to (c) UNFSA.[107] Such CMMs, which should be complemented by traditional measures intended to reduce incidental catches (and related mortality) of sharks, should include precautionary reference points, harvest strategies,[108] catch limits[109] and retention limits. This general view was recently reiterated, from a science-perspective, by *Worm and others*.[110] The following two sections examine the regulatory progress of the respective t-RFMOs in this regard.

[106] UN GA Res 77/118 (n 45) para 32.

[107] Rosello, Schatz and van der Marel (n 18) 14–15.

[108] Compare CCRF (n 42) para 7.5.3. See, for example, Mikihiko Kai and Hiroki Yokoi, 'Evaluation of Harvest Strategies for Pelagic Sharks Taking Ecological Characteristics Into Consideration: An Example for North Pacific Blue Shark' (2017) 74(6) Can J Fish Aquat Sci 933.

[109] Osch (n 81) 425. This applies even if sharks are considered non-target species, see FAO Bycatch Guidelines (n 41) paras 7.3(iv) and 7.7.

[110] Worm and others (3) 229.

5.1 Stock assessments and catch and retention limits

As a starting point, ICCAT, IOTC and WCPFC have scientific processes in place to conduct stock assessments of at least some key (often commercially exploited) shark species, while IATTC does not conduct such assessments for sharks.[111] However, there are differences in data quality between t-RFMOs and stock assessments must often be conducted on the basis of poor data and with considerable uncertainty, or cannot be conducted at all. On the basis of the available data and stock assessments, some t-RFMOs have imposed catch limits – with or without setting a total allowable catch (TAC) and allocating this TAC to each Contracting Party and Cooperating Non-Contracting Party (CPC) – or have prohibited or otherwise imposed limits on the retention of certain shark species caught in association with fisheries under their mandate, including commercially exploited shark species.

At the lower end of the spectrum of such measures, WCPFC's only shark CMM does not contain any reference to retention or catch limits for commercially exploited sharks.[112] By contrast, IATTC has introduced catch limits for silky sharks applicable to longline vessels of "a maximum of 20% of the total catch by fishing trip in weight" without, however, establishing a TAC or retention limit.[113] Rather, surface longline vessels in mixed fisheries exceeding the catch limit are subject to a prohibition of the use of steel leaders during a period of three consecutive months each year.[114] IATTC has no similar measures in place for other commercially exploited sharks such as the blue shark. Similarly, IOTC has not yet established any catch limits for commercially exploited sharks but has recognized its competence to regulate commercially exploited shark stocks via total retention allowances and TACs. For instance, in 2018, IOTC adopted a CMM pursuant to which IOTC is tasked to consider CMMs for blue sharks, which could include a "catch limit for each CPC".[115] This CMM has since been replaced with a more comprehensive CMM adopted in 2025 that explicitly mentions the possibility of "candidate limit, threshold and target reference points" and "total allowable catches" for sharks caught in association with IOTC fisheries, and "prioritising sharks caught for commercial purposes".[116] Specifically for blue shark, the CMM envisages work towards a TAC, allocated catch limits, the development of a management strategy evaluation framework, a potential harvest control rule (HCR), and associated candidate limit, target and threshold reference points.[117] A separate CMM adopted by IOTC in 2025 to reduce mako shark mortality does not envisage target stock management but

[111] For blue shark see, for example, IATTC, Stock Assessment Report 24: Status of the Tuna and Billfish Stocks in ICCAT, Report for Biennial Period 2024–2025 (n 10) 184–195; Report of the 27th Session of the IOTC Scientific Committee (n 9) 149–151; WCPFC Scientific Committee, Southwest Pacific Blue Shark (*Prionace glauca*): Stock Status and Management Advice (2023), https://www.wcpfc.int/doc/14/south-pacific-blue-shark.

[112] Cf. WCPFC, Conservation and Management Measure 2024–05 for Sharks (2024), https://cmm.wcpfc.int/measure/cmm-2024-05.

[113] IATTC, 'Resolution C-25–09: Conservation Measures for Shark Species, with Special Emphasis on the Silky Shark (*Carcharhinus falciformis*), for the Years 2026–2028' (2025) paras 3 and 4.

[114] ibid para 7.

[115] IOTC, 'Resolution 18/02 On Management Measures for the Conservation of Blue Shark Caught in Association with IOTC Fisheries' (2018) para 8.

[116] IOTC Resolution 25/08 On the Conservation of Sharks Caught in Association with Fisheries Managed by IOTC (2025), https://iotc.org/cmm/resolution-2508-conservation-sharks-caught-association-fisheries-managed-iotc, para 41(d) and (e).

[117] ibid paras 26 and 27.

prohibits the retention of mako sharks unless the fish is already dead at haulback and the vessel "has an observer or a functioning electronic monitoring system (EMS) on board to verify the condition of the sharks".[118] The explanatory memorandum of the EU's proposal for this CMM claimed, without basis in the advice of the IOTC Scientific Committee, that because "shortfin mako is primarily caught as bycatch, implementing catch limits may be impractical and could lead to unintended increases in mortality."[119]

The only t-RFMO with TACs for some commercially exploited sharks in place is ICCAT. It has established (qualified) retention prohibitions for North Atlantic shortfin mako caught in association with ICCAT fisheries for 2022 and 2023. However, according to the CMM, retention may generally be possible again from 2024 onwards if total fishing mortality remains below the agreed level that projects stock rebuilding within a defined time frame and with an agreed probability.[120] For South Atlantic shortfin mako, ICCAT has introduced "maximum retention allowances" for each CPC, which amount to a total retention allowance.[121] Moreover, ICCAT has established a global TAC for South Atlantic blue shark and a TAC combined with an allocation of quotas to individual CPCs for North Atlantic blue shark.[122]

However, for incidentally caught species, neither TACs nor allocated catch limits automatically translate to a closure of the respective mixed fisheries once catches have reached the limit.[123] Rather, what is decisive is the legal consequence provided in the applicable CMM in case catch limits are reached. At ICCAT, exceeding maximum retention allowances and catch limits may result in a reduction of future allocations and catch limits – or in a prohibition of retention to repay overages.[124] Like complete retention bans, such measures limit retention – but not necessarily *mortality* – of the relevant shark species because the mixed fishery is not closed when the catch limit is reached.[125] In other words, such measures do not transform commercially exploited sharks into "choke species".[126]

[118] IOTC, 'Resolution 25/09 On the conservation of shortfin and longfin mako sharks caught in association with IOTC fisheries' (2025), paras 2 and 3.

[119] European Union, Proposal on the conservation of shortfin mako sharks caught in association with IOTC fisheries (EU), IOTC-2025-S29-PropQ_Rev1, https://iotc.org/documents/Com/29/PropQ_E, 1.

[120] ICCAT, 'Recommendation 21–09 on the Conservation of the North Atlantic Stock of Shortfin Mako Caught in Association with ICCAT Fisheries' (2021) (ICCAT Recommendation 21–09) paras 3–5 and Annex I.

[121] ICCAT 'Recommendation 22–11 on the Conservation of the South Atlantic Stock of Shortfin Mako Caught in Association with ICCAT Fisheries' (2022) (ICCAT Recommendation 22–11) paras 3, 6 and 8.

[122] ICCAT, 'Recommendation 23–11 to Replace Recommendation 19–08 on Management Measures for the Conservation of South Atlantic Blue Shark Caught in Association with ICCAT Fisheries' (2023) (ICCAT Recommendation 23–11) para 2; ICCAT, 'Recommendation 23–10 to Replace Recommendation 19–07 on Management Measures for the Conservation of the North Atlantic Blue Shark Caught in Association with ICCAT Fisheries (as amended by Recommendations 21–10)' (2019/2021) (ICCAT Recommendation 23–10) paras 2–3.

[123] Rosello, Schatz and van der Marel (n 18) 23.

[124] See, eg, ICCAT Recommendation 22–11 (n 121) para 12.

[125] On the limited effect of retention bans on shark mortality, see further Leonardo Manir Feitosa and others, 'Retention Bans Are Beneficial but Insufficient to Stop Shark Overfishing' (2025) 26(3) Fish and Fisheries 473–487.

[126] Rosello, Schatz and van der Marel (n 18) 23. For an explanation of the concept of a "choke species", see House of Lords, 'Fisheries: Implementation and Enforcement of the EU Landing Obligation' (26th Report of Session 2017–19, 8 February 2019) https://publications.parliament.uk/pa/ld201719/ldselect/ldeucom/276/27607.htm.

5.2 Harvest strategies

At the time of writing, none of the t-RFMOs have developed and adopted comprehensive harvest strategies for commercially targeted sharks that include HCRs, allocated total mortality limits, rebuilding plans and management strategy evaluations (MSEs) as commonly adopted by t-RFMOs for other commercially exploited species.[127] Some elements of harvest strategies are, however, present in ICCAT's rebuilding programme (with a total mortality limit and a pre-agreed probability for stock rebuilding by 2070) for North Atlantic shortfin mako[128] and ICCAT's management plan (with total mortality and a pre-agreed probability for rebuilding if the stock is overfished) for South Atlantic shortfin mako.[129]

Moreover, ICCAT has taken first steps in the direction of actual HCRs for sharks. ICCAT defines HCRs as "decision rules that aim to achieve the target reference point and avoid the limit reference point by specifying pre-agreed management actions when [the threshold, target or limit] are breached."[130] For both North Atlantic and South Atlantic blue shark, ICCAT has adopted CMMs mandating its Standing Committee Research and Statistics (SCRS) to "provide, if possible, options of HCR with the associated limit, target and threshold reference points for the management of this species in the ICCAT Convention area" in the light of the results of the relevant stock assessments.[131] That said, no proposals for harvest strategies including HCRs have so far been adopted by, or submitted to, ICCAT – despite calls by non-governmental organizations (NGOs) to this end.[132] Instead, ICCAT's most recent CMMs on blue sharks state: "Following up on the task given in [the previous CMMs], the SCRS shall inform the Commission, by 2025 on the feasibility, cost, options and tentative roadmap for developing an MSE framework (including inter alia HCR with the associated limit, target and threshold reference points) for the management of this stock in the ICCAT Convention area."[133]

6 Conclusion

The conservation of commercially exploited sharks has proven to be challenging for all t-RFMOs. While the situation can be improved if *robust* CMMs are adopted and implemented,[134] recent studies have shown that the mortality of sharks, including some commercially exploited species

[127] For a brief explanation of harvest strategies, see, e.g., Pew, 'Two Tools Can Help Make Ecosystem-Based Fisheries Management a Global Reality' (Issue Brief, 14 September 2023) https://pew.org/3ECxD4C>; HARVESTSTRATEGIES.ORG, 'What are Harvest Strategies?', 2023, https://harveststrategies.org/what-are-harvest-strategies/.

[128] ibid paras 1 and 4.

[129] ICCAT Recommendation 22–11 (n 121) paras 1–2 and 5.

[130] ICCAT, 'Recommendation 15–07 On the Development of Harvest Control Rules and of Management Strategy Evaluation' (2015) para 1(e).

[131] ICCAT, 'Recommendation 19–07 on Management Measures for the Conservation of the North Atlantic Blue Shark Caught in Association with ICCAT' (2019) (no longer in force) para 8; ICCAT, 'Recommendation 19–08 on Management Measures for the Conservation of South Atlantic Blue Shark Caught in Association with ICCAT Fisheries' (2019) (no longer in force) para 8.

[132] ICCAT, 'Report for Biennial Period, 2022–23' (2022) Vol 1 pt I, 77–79.

[133] ICCAT Recommendation 23–10 (n 122) para 11; ICCAT Recommendation 23–11 (n 122) para 10.

[134] Nathan Pacoureau and others, 'Conservation successes and challenges for wide-ranging sharks and rays' (2023) 120(5)(e2216891120) Proceedings of the National Academy of Sciences of the United States of America 1–10.

such as the shortfin mako, remains too high or has even increased despite growing regulation.[135] This suggests that more robust measures are needed – including at the level of t-RFMOs. This article has shown that, in certain t-RFMO-managed fisheries, commercially exploited sharks such as blue shark – which form a large part of the economic value of catches of some tuna fisheries – require management by t-RFMOs as (secondary) target stocks rather than as non-target species or "bycatch" (in those tuna and billfish fisheries where they are retained for commercial reasons). For the avoidance of any doubt, the proposal to classify certain commercially exploited sharks as (secondary) target stocks serves the purpose of stabilizing mortality of these species at sustainable levels, and does not in any way support the opening or expansion of targeted fisheries for or retention of incidentally caught species of sharks that are threatened, endangered and/or protected (such as oceanic whitetip shark).

The above conclusion follows primarily from an interpretation of Article 5 UNFSA that classifies shark species as "target stocks" if they are de facto targeted for their high economic value in mixed tuna fisheries. Measures appropriate for target stock management include precautionary reference points, harvest strategies (including HCRs), TACs and retention limits. Als argued elsewhere, such measures would simultaneously help ensure compliance with requirements of States under CITES with respect to elasmobranchs listed in Appendix II that require, among other things, an NDF for such species to be traded internationally.[136] Importantly, in order to achieve the reductions in mortality required to keep these fisheries within sustainable limits under adopted TACs, the management of commercially exploited sharks as (secondary) target stocks (including retention limits) is not sufficient by itself,[137] but must be complemented by measures intended to reduce incidental catches of sharks, such as changes in fishing patterns (such as spatial closures in known pupping grounds or temporal closures) or gear modifications (such as prohibitions of wire leaders and shark lines, which also benefit other species that are not commercially targeted and/or the retention of which is prohibited).[138] In other words, traditional "by-catch" management measures and target stock management should be complementary for species that are caught incidentally in tuna and billfish fisheries.

This article has also shown, on the basis of international practice, that States have entrusted t-RFMOs with a sufficiently broad competence to manage – as (secondary) target stocks – commercially exploited sharks that are caught incidentally in tuna fisheries managed by the t-RFMO (IATTC, ICCAT, IOTC and WCPFC) and in one case even when they are the *primary* target stock (WCPFC). That said, to further enhance shark governance in t-RFMOs, both IOTC and IATTC should follow the examples of ICCAT and WCFPC by amending their constitutive treaties to include the competence to regulate sharks also as *primary* target species, and CPCs should increase resource allocation to t-RFMOs' shark-related workstreams. In this respect, ICCAT should increase its efforts to persuade its members to become parties to the 2019 ICCAT Convention amendment (which expands ICCAT's competence to include *primary* shark fisheries) to expedite its entry into force.[139]

[135] Worm and others (n 3) 229.

[136] Schatz and Kachelriess (n 67) 17 and 38.

[137] Cf. Feitosa and others (n 125).

[138] Keith Bigelow and Felipe Carvalho, 'Review of potential mitigation measures to reduce fishing-related mortality on silky and oceanic whitetip sharks', WCPFC Scientific Committee, 17th Regular Session, WCPFC-SC17-2021/EB-WP-01, https://meetings.wcpfc.int/node/12598.

[139] Protocol amending the ICCAT Convention (n 89).

Finally, despite sufficiently broad t-RFMO competences, our analysis of t-RFMO practice shows that t-RFMOs have not yet adequately fulfilled their responsibility to regulate commercially exploited sharks through effective CMMs, including precautionary reference points, harvest strategies (including, but not limited to, HCRs), TACs and retention limits. While all four selected t-RFMOs have adopted CMMs containing measures which are generally suitable for non-target shark species, measures going beyond traditional by-catch management are limited. Most t-RFMOs conduct stock assessments of some key shark species, although there are considerable shortcomings and differences in availability and quality of data. Moreover, only ICCAT has gone as far as setting TACs for some commercially exploited shark stocks that must be classified as (secondary) target stocks. However, even ICCAT has not yet adopted comprehensive harvest strategies with HCRs for these sharks despite having acknowledged the need to do so. Overall, there is a clear trend towards recognition that commercially exploited sharks require species-specific management like that adopted for other target stocks. So far, however, progress remains slow in the framework of most t-RFMOs.

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