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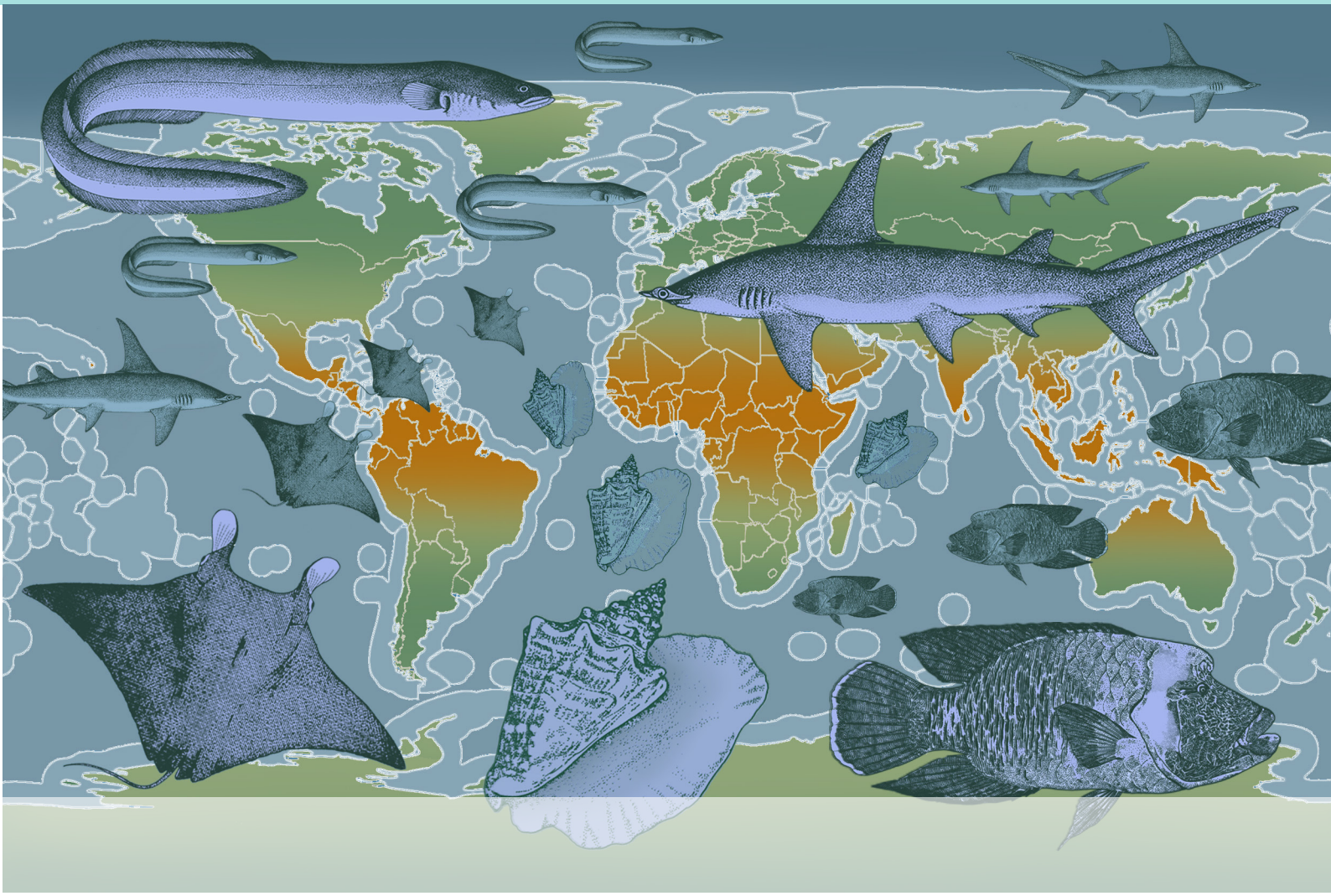

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by

Alyson Pavitt
UN Environment Programme World Conservation Monitoring Centre (UNEP-WCMC)
Cambridge, United Kingdom of Great Britain and Northern Ireland

Kelly Malsch
UN Environment Programme World Conservation Monitoring Centre (UNEP-WCMC)
Cambridge, United Kingdom of Great Britain and Northern Ireland

Emily King
Independent
Cambridge, United Kingdom of Great Britain and Northern Ireland

Audrey Chevalier
C&Cie Consulting
Cayenne, France

Daniel Kachelriess
Independent
Vienna, Austria

Stefania Vannuccini
FAO
Rome, Italy

and

Kim Friedman
FAO
Rome, Italy

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Preparation of this document

The FAO–CITES MoU signed in 2006 sets out that the organizations will communicate and exchange information regularly general information of common interest and areas of concern where there is a role for the other to play. This includes cooperation to facilitate capacity building in developing countries and countries with economies in transition on issues relating to commercially exploited aquatic species listed in CITES Appendices and addressing technical and legal issues relating to the listing and implementation of such listings. A foundational activity of CITES, is the collation and reporting of data on trade of CITES-listed species. This information provides a clear signal on the operation of the Convention, providing insights on what species are being traded, when, how much and how often; information needed to assist in management and conservation of vulnerable aquatic species. The conceptualisation of this report originated between staff of FAO (Mr Kim Friedman), the CITES Secretariat (Mr Daniel Kachelriess) and UNEP-WCMC (Ms Kelly Malsch), taking advice from a range of species and trade experts listed in the acknowledgements. UNEP-WCMC were contracted to analyse relevant CITES data and to draft the report. A range of taxonomic experts also provided expert assessment on how well CITES trade records reflected the situation on the ground. To conclude, the authors offer their insights on the strength, and potential for improvement, of reporting of CITES-listed species in trade. This reports communicates the available CITES marine trade data for marine species and encourages improvements to trade data collection and reporting mechanisms, where needed. Financial support for this work was provided by the Government of Japan (Japan Trust Fund TFJP110614387) and the European Union (FAO-CITES UN to UN Agreement EP/INT/334/UEP).

Abstract

Fish and fish products are amongst the most highly traded food items in the world today, with most of the world's countries reporting some fish trade.[1] This assessment of commercial trade in CITES-listed marine species occurs within a broader context of globalization and a more general rapid expansion of the international trade in fish and fish products. It summarizes ten years (2007–2016) of trade in a subset of commercially exploited marine taxa listed in CITES Appendix II. We examine both CITES trade data reporting processes (including information on the practical elements of reporting by CITES Parties) and analyse CITES trade records. The analysis shows how, for Appendix II CITES-listed marine species, the overall number of direct export transactions reported by CITES Parties has increased sevenfold during 1990–2016 and how trade for each CITES-listed marine species sub-group has changed through time. An assessment is made, with assistance from species and trade experts, on the strengths and challenges of collating and reporting on trade in CITES-listed marine species. Additional datasets of relevance to marine species trade are highlighted, and recommendations for further refining and improving CITES trade reporting for marine species are provided.

[1] FAO define fish as "a collective term, [which] includes molluscs, crustaceans and any aquatic animal which is harvested" (FAO Fisheries and Aquaculture Department, FAO, 2014).

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Contributors

Primary authors

Aly Pavitt (UNEP-WCMC)
Kelly Malsch (UNEP-WCMC)
Emily King (Independent)
Audrey Chevalier (FAO)
Daniel Kachelriess (Independent)
Stefania Vannuccini (FAO)
Kim Friedman (FAO)

Taxonomic expert assessment advice provided by:

Julia Lawson (sharks and rays)
Sonja Fordham (shark and rays)
Andy Bruckner (corals)
Florian Stein (eels)
Sarah Foster (seahorses)
Yvonne Sadovy de Mitcheson (humphead wrasse)
Jeff Kinch (giant clams)
Robert Glazer (queen conch)
Richard Appeldoorn (queen conch)

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This concept and delivery of this report has also benefited from ideas, review and additional contributions by colleagues at FAO; UNEP-WCMC (notably Claire McLardy and Oliver Tallowin); also Mr Glenn Sant; Mr Matthew Gollock and Ms Vicki Crook.

Executive summary

This report presents an overview of the international trade in commercially exploited CITES-listed marine taxa, focusing primarily on the 10 year period 2007–2016.[2] It includes an analysis of the relative quantities and trends of Appendix II CITES-listed marine taxa in international trade,[3] supplemented by expert input, and a summary of the CITES trade data reporting process (including information on the practical elements of reporting by CITES Parties). To the extent feasible, the CITES trade data were cross-compared with other trade data sources, providing a record against which improvements in reporting of commercially exploited CITES-listed marine taxa can be measured, and improvements in reporting of future trade can be assessed.

By enhancing our understanding of how the CITES trade data are currently being reported and how that process can be improved in the future, this report ultimately aims to support better reporting and improved understanding of trade in CITES-listed species, ultimately achieving the shared interest of FAO and CITES in making fisheries productive and sustainable.

Under the provisions of CITES, Parties are required to submit annual trade reports by 31 October for the preceding year. This report found that whilst the vast majority (over 90 percent) of CITES Parties reported trade data for the years 2011–2015,[4] less than half of these submitted their reports by the annual submission deadline.

For Appendix II CITES-listed marine species, the overall number of direct export transactions reported by CITES Parties increased sevenfold over the 1990–2016 period. Of these direct export transactions, approximately 97 percent were accounted for by one group: corals. As fish and fish products[5] are some of the most traded food items in the world today, most of the world's countries report some fish trade. This assessment of trade in CITES-listed species occurs within a broader context of globalization and a more general rapid expansion of the international trade in fish and fish products. Additionally, the number of CITES Parties and the number of CITES-listed species (including marine species) has increased over time. These factors must also be considered when interpreting trends in reported trade.

Based on reported units, the largest quantities of commercially exploited CITES-listed marine species reportedly traded during 2007–2016 again primarily consisted of live and raw Scleractinia corals, queen conch (*Strombus gigas*) meat and shells, live European eels (*Anguilla anguilla*) and eel meat, and live seahorses and seahorse bodies. Key exporters and importers of these marine products included: China, Viet Nam, Thailand, Morocco, Indonesia and Fiji (exporters); and Hong Kong SAR, the Republic of Korea and the United States of America (importers; Figure 1).

[2] Unless otherwise noted, only species listings up to and including the Seventeenth meeting of the Conference of the Parties (Johannesburg, South Africa 2016) are considered in the report.

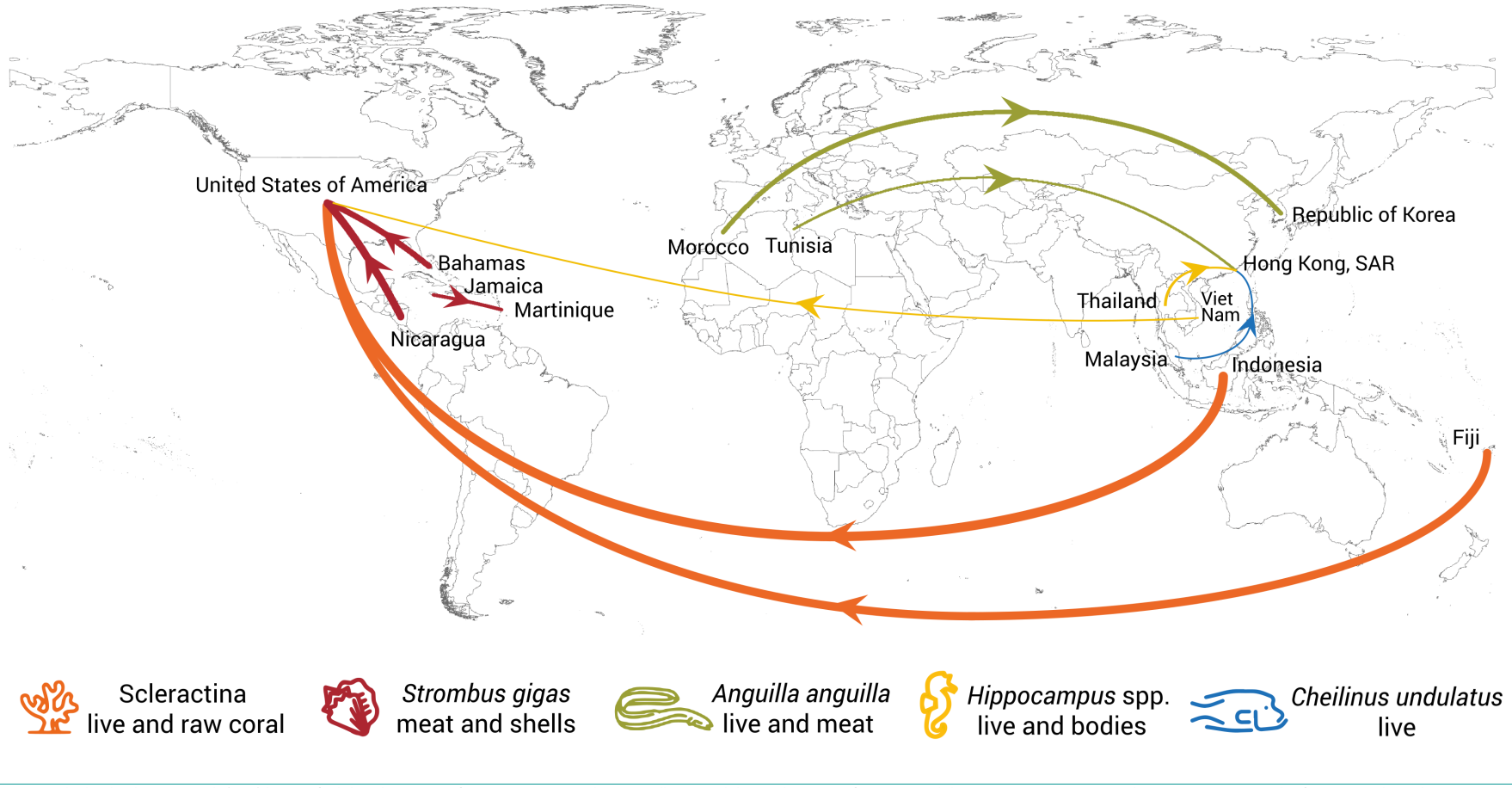
[3] Based on CITES trade data accessed from the CITES Trade Database on 2 October 2018. The CITES Trade Database is managed by UNEP-WCMC on behalf of the CITES Secretariat and contains records of trade in CITES-listed taxa as reported by CITES Parties in their annual reports to the Convention.

[4] At the time of writing (30 November 2018).

[5] FAO define fish as "a collective term, [which] includes molluscs, crustaceans and any aquatic animal which is harvested" (FAO Fisheries and Aquaculture Department, FAO, 2014).

FIGURE 1

Main trade routes for the key terms in trade for the case study species, as reported by exporters for 2007–2016. Lines are weighted according to quantity



FAO Marine and Inland Fisheries Branch (NFIF) has verified that the map conform to UN maps and accepts all responsibility in the event of reputational damage to FAO or FAO Member Countries as a result of inaccurate boundaries.

As part of this analysis, case studies of Appendix II-listed species from seven marine taxa were considered in depth: sharks and rays (Elasmobranchii spp.), corals (Anthozoa spp. and Hydrozoa spp.), European eel (*Anguilla anguilla*), seahorses (*Hippocampus* spp.), humphead wrasse, also known as Napoleon fish (*Cheilinus undulatus*), giant clams (Tridacnidae spp.) and queen conch (*Strombus gigas*) (Figure 1). Key findings from these case studies include:

- **Sharks**[6] were primarily exported as wild-sourced fins and meat, accounting for an estimated[7] 47 thousand sharks, primarily *Sphyrna lewini*. The major exporters of shark products included Mexico, Peru and China; major importers included China, Hong Kong SAR and the Republic of Korea. Very few rays (*Manta* spp. and *Mobula* spp.) were reported in trade, and two commercially exploited taxa, silky, and thresher sharks (*Carcharhinus falciformis* and *Alopias* spp.) listed in 2016, only entered into force in 2017.
- **Coral** was almost all exported as wild-sourced live and raw corals, totalling 19.8 million pieces of live coral and 24 million kg of raw coral, and predominantly from Scleractinia species, primarily exported by Indonesia and Fiji to the United States of America.
- **European eel** was mainly exported as wild-sourced live eels or meat, accounting for an estimated 6.7 million adult or 3.9 billion glass (juvenile) eels.[8] Major exporters included Morocco and Tunisia, and major importers included the Republic of Korea and China, Hong Kong SAR.
- **Seahorses** were predominantly exported as captive born (Source "F", Table G.1) live seahorses or as wild-sourced bodies, that accounted for an estimated[9] 16 million individuals. The trade in seahorse bodies was dominated by *Hippocampus trimaculatus, H. spinosissimus* and *H. kelloggi*, while *H. kuda* accounted for the majority of live trade. Major exporters of seahorses included Thailand (bodies) and Viet Nam (live), and major importers included China, Hong Kong SAR (bodies) and the United States of America (live).
- **Humphead wrasse** (Napoleon fish) was almost all exported as wild-sourced live individuals, totalling over 92 000 animals and exported from Malaysia and Indonesia to China, Hong Kong SAR.
- **Giant clams** were predominantly exported as wild-sourced live clams and shells, accounting for an estimated 720 612 individuals. Major reporting exporters included Viet Nam, France, Cambodia and Fiji, and major importers included the United States of America, Viet Nam and China.
- **Queen conch** was predominantly exported as wild-sourced meat and shells, totalling 15 million kg of meat and 2 million shells, exported from Nicaragua, Belize and the Bahamas to the United States of America.

Analysis of the CITES trade data offered an opportunity to look at the common strengths, challenges and opportunities across the seven marine taxa examined. Recommendations, including on the reporting of trade data, are more comprehensively outlined in Chapters 6 and 7. These include actions to (i) fill the gaps where data on trade in CITES-listed species are known to be missing, (ii) improve the timeliness of CITES trade reporting, (iii) enable accurate, consistent and precise reporting and tracking of listed commodities across the value and supply chains, (iv) increase communication and dissemination of trade trends in CITES-listed marine species, and (v) cross-reference and, where possible, harmonise CITES trade data with other datasets.

[6] The term "shark" is taken to include all species of sharks, rays and chimaeras (class Elasmobranchii).
[7] See Annex B for conversion factors applied to estimate the number of individuals from shark fins and meat.
[8] See Annex B for conversion factors applied to estimate the number of adult and glass (juvenile) eels from live eels and eel meat reported by weight.
[9] See Annex B for conversion factors applied to estimate the number of individuals from seahorse bodies reported by weight.

Part 1. Introduction

In addition to coastal States managing marine renewable resources in their own exclusive economic zones (EEZs), countries are also part of regional fisheries management arrangements and multilateral environmental agreements that support management and conservation of exploited transboundary and high sea fish populations, as well as trade in species when they cross international borders. Management is practiced through multiple, sometimes overlapping, institutions, policies, and agreements. For example, States have obligations to conserve stocks under governance measures formulated for the conservation of natural resources and international instruments they are Party to, including for example, the United Nations Convention on the Law of the Sea (UNCLOS); the Straddling Fish Stocks Agreement (UNFA); the Agreement on Port State Measures (PSMA); Regional Fisheries Management Organizations (RFMOs); the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES); the Convention on Migratory Species (CMS); bilateral agreements between adjoining States; and biodiversity conservation frameworks (the Convention on Biological Diversity (CBD's) Aichi Target 6 and the Post -2020 Global Biodiversity Framework).

Ensuring achievement of the various mandates of such initiatives benefits from monitoring the delivery and success of management and compliance processes. As such analysis of the collection, storage and use of information coming from these management and compliance processes offers an opportunity to support adaptive management requirements where appropriate and to provide platforms for further synergies and cooperation between States.

In this document we focus on the trade in marine species listed under CITES (i.e. marine species in which trade is regulated or controlled through listing under a specific CITES Appendix or Appendices),[10] and the process by which that trade is reported.

CITES entered into force in 1975 with the aim of ensuring that the international trade in plants and animals is sustainable and does not threaten the survival of the species in the wild. The mission of FAO is to help eliminate hunger, food insecurity and malnutrition, which includes the objective to enhance fisheries productivity whilst ensuring their sustainability. As such, the FAO works in-cooperation with CITES to improve the management and conservation of vulnerable aquatic species, to ensure that the international trade of species is legal, sustainable and traceable, and does not threaten their long-term survival in the wild.

The work reported in this document is carried out under a 2006 Memorandum of Understanding (MoU) between FAO and CITES that articulates a vision for strengthening cooperation in achieving common goals.[11] Under this MoU, FAO and CITES cooperate to facilitate capacity building in developing countries and countries with economies in transition on issues relating to trade in commercially exploited marine species listed in the CITES Appendices. This report intends to support this cooperation, and the CITES and FAO objectives of ensuring sustainable fisheries. It aims to do this by identifying examples of good practice in

[10] Unless otherwise specified, "marine species" will be used in this report to refer to commercially exploited aquatic species listed under CITES (FAO define fish as "a collective term, [which] includes molluscs, crustaceans and any aquatic animal which is harvested" (FAO Fisheries and Aquaculture Department, FAO, 2014)).

[11] cites.org/sites/default/files/eng/disc/sec/FAO-CITES-e.pdf

monitoring trade of marine species under CITES listing, and in supporting action for potential improvements in trade data collection and reporting. It is hoped the information presented here further strengthens sustainable management and conservation of threatened and near-threatened marine species listed in CITES Appendix II, through:

- helping FAO Members, the full range of relevant government officials of CITES Parties, policymakers and other stakeholders better **understand the process of reporting trade data to CITES**;
- informing on **spatial and temporal patterns in trade of commercially exploited marine species** listed in Appendix II of CITES;
- offering expert opinion on spatial and temporal patterns in trade, to **highlight the utility of CITES trade data**; and
- providing **recommendations to improve the reporting and interpretation of CITES trade data**, so that monitoring of trade in listed species is conducted effectively and helps to inform on the productivity and sustainability of fisheries.

A clearer picture of trade in CITES Appendix II marine species is needed to ensure that it is legal, doesn't threaten survival of the species in the wild, and to respond to specific requests from both the Committee on Fisheries at FAO and of CITES Conference of Parties. As more marine species are listed in CITES,[12] the volume of international trade in marine species reported to CITES is likely to increase. This reinforces the need for strong collaboration; a broad understanding of the strengths and weaknesses of the available data; and an understanding of how information derived from trade reporting can support decision making processes.

The report begins with an explanation of the process established by the CITES Parties to govern reporting of trade data to CITES, and considerations for interpreting this dataset. An analysis of the history of listing of marine species in the CITES Appendices then follows.

Case studies then provides an overview of trade in seven commercially exploited CITES Appendix II-listed marine taxa: sharks and rays (Elasmobranchii spp.), coral (Anthozoa and Hydrozoa spp.), European eel (*Anguilla anguilla*), seahorses (*Hippocampus* spp.), humphead wrasse (*Cheilinus undulatus*), giant clams (Tridacnidae spp.) and queen conch (*Strombus gigas*). This includes an overview of management under CITES, a summary of the patterns and trends in their reported trade during 2007–2016[13] and expert assessment of the threat from trade. While sturgeon (Acipenseridae spp.) also comprise an important part of CITES-listed trade in marine species,[14] they have recently been examined in other analyses (e.g. Harris and Shiraishi, 2018) and will not be considered here. Similarly, seabirds, marine mammals and reptiles (e.g. sea turtles) are also excluded from this analysis. Further details on the taxa and data included within the case studies are available in Annex A.

[12] For example, 5 species (*Holothuria (Microthele) fuscogilva, H. (M.) nobilis, H. (M.) whitmaei, Isurus oxyrinchus* and *I. paucus*), one genus (*Glaugostegus* spp.) and one family (Rhinidae) were listed in CITES Appendix II following the most recent CITES CoP in 2019 (CoP18).

[13] Based on CITES trade data accessed from the CITES Trade Database on 2 October 2018.

[14] While sturgeon and eels are anadromous (i.e. migrate between sea and freshwater), they are considered marine for the purpose of this report.

Part 2. The CITES reporting process

CITES is a multilateral agreement governing the international trade in species for which unrestricted trade may endanger or threaten the survival of the species in the wild. These species may be listed within any of the three Appendices of the Convention which determine under what conditions they can be internationally traded (Articles III–V of the Convention text). CITES' definition of international trade also includes "Introduction from the sea (IFS)" which is defined in the Convention (Article I, paragraph e) as "transportation into a State of specimens of any species which were taken in the marine environment not under the jurisdiction of any State" (see Box 1). Commercial international trade in wild specimens of Appendix I species is prohibited, and all Appendix I trade requires both an import and an export permit, while international trade in Appendix II species is permitted with an accompanying export (or re-export) permit. There are currently over 39 000 species of plants and animals listed in the three CITES Appendices (see Species+[15] and the CITES Checklist[16] for details).

BOX 1

"Introduction from the Sea"

Under the text of the Convention, "Introduction from the Sea" of Appendix I and II species (i.e. "transportation into a State of specimens of any species which were taken in the marine environment not under the jurisdiction of any State") requires issuance of a certificate from the Management Authority of the State of Introduction, with more stringent conditions for the granting of this certificate for Appendix I species (Article III, paragraph 5 and Article VI, paragraphs 6 and 7).

Following subsequent discussions on applying this provision, CITES Resolution Conf. 14.6 (Rev. CoP16) was adopted, which provided further clarification that:

- "The marine environment not under the jurisdiction of any State" means areas beyond national jurisdiction ("high seas"), as reflected in the United Nations Convention on the Law of the Sea.
- When a vessel of one country introduces species into a different country from the high seas, "Introduction from the Sea" is implemented by using normal CITES documentation for on import/export for Appendix I and II species.

The Resolution also provided provisions for one Party to make use of the "Introduction from the Sea" regulations via a chartered vessel registered in a different State, as long as there is written arrangement between the two States and the CITES Secretariat is informed in advance of the arrangement. Under Decisions 18.157 – 18.158, the provisions for chartering in Resolution Conf. 14.6 (Rev. CoP16) will be reviewed at the 19th Conference of the Parties in 2022.

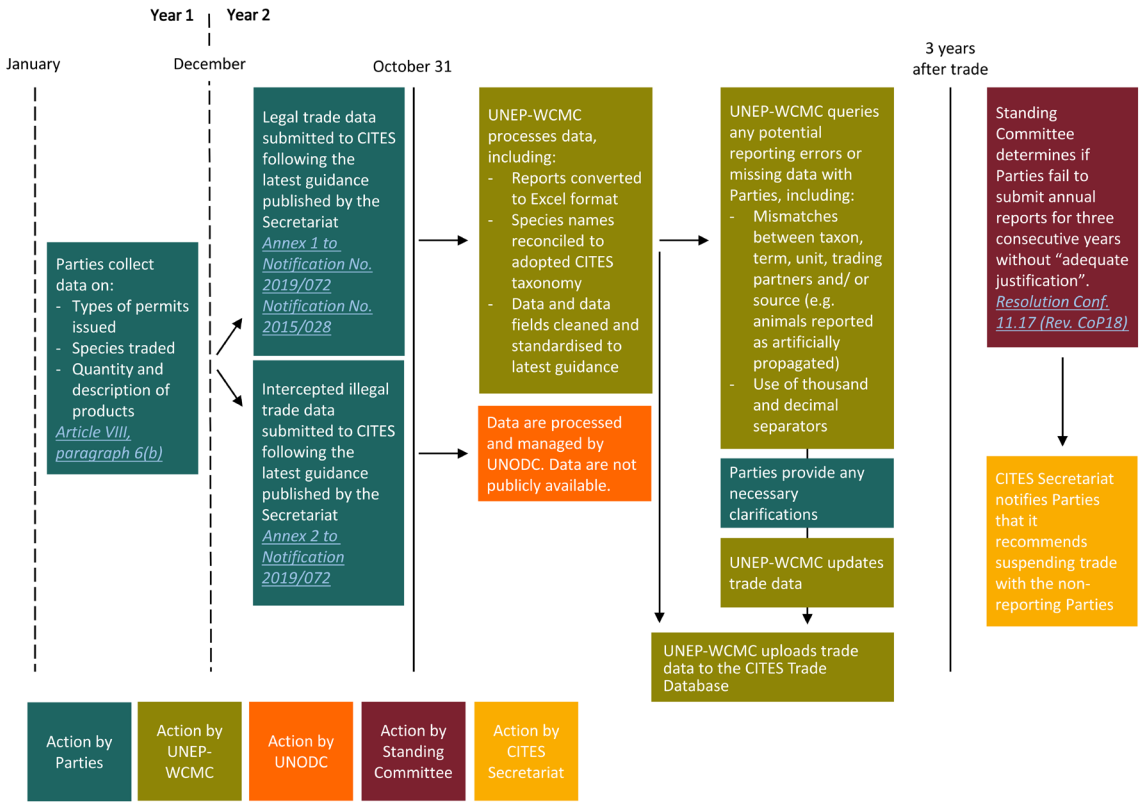
[15] speciesplus.net

[16] checklist.cites.org

As part of their commitment to implementing CITES, Parties are required to submit annual reports of trade in CITES-listed species which has occurred into or out of their jurisdiction in a calendar year (Article VIII, paragraph 7), by the 31 October of the following calendar year (as established in Resolution Conf. 11.17 (Rev. CoP18)). This includes introductions from the sea. Starting in 2017, Parties are also required to submit an annual report of intercepted illegal trade (Paragraph 3 of Resolution Conf. 11.17 (Rev. CoP18)); this information should also be submitted by 31 October of the following calendar year. CITES legal trade data submitted by Parties in their annual trade reports are collated in the CITES Trade Database,[17] a publicly accessible online database managed on behalf of the CITES Secretariat by UNEP-WCMC. The process for the submission of annual report data by Parties, and for the subsequent processing, upload and maintenance of that data in the CITES Trade Database by UNEP-WCMC, is detailed in Figure 2.1.

FIGURE 2.1

Flowchart showing the annual data submission process for the data reported by Parties, as well as the processing of data for upload into the CITES Trade Database by UNEP-WCMC



[17] trade.cites.org

Part 3. Reporting to CITES

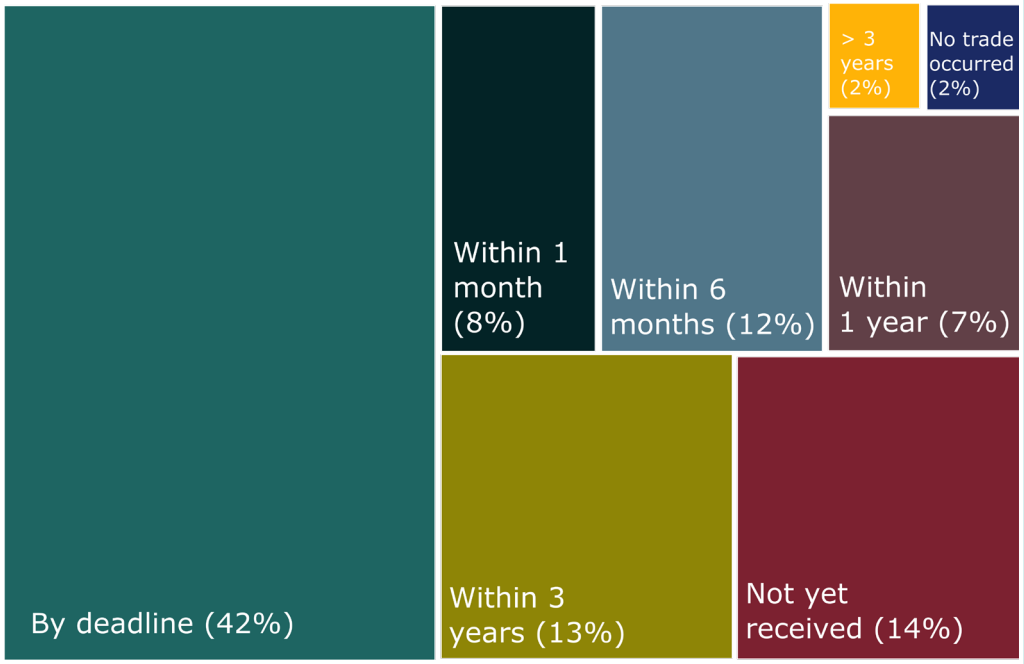
As stipulated in Resolution Conf. 11.17 (Rev. CoP18), Parties are required to submit annual reports of trade by 31 October of the following year (Figure 2.1).[18] This means that the CITES trade data does not usually become available until at least ten months after previous year's trade has occurred. Some Parties, however, do not submit on time, with some only submitting months or years after the deadline has passed. Subsequently, there may be a long time lag before the trade data for any given year is considered near complete. As CITES Standing Committee recommendations to suspend trade can only be imposed after three years of lapsed data submission, this has implications for when Parties submit annual reports, with late batch submissions of reports slowing or avoiding potential sanctions.

3.1 SUBMISSION OF CITES ANNUAL REPORTS

The submission status of Parties for the most recent seven years is available on the CITES website (available here). Based on this, 90 percent of the Parties expected to report had submitted their data for the period 2011–2015 (Figure 3.1.1). However, only 75 percent of the expected Parties had submitted annual reports for 2016. At the time of writing (30 November 2018), 20 percent of Parties had reported their data for 2017.

FIGURE 3.1.1

Timeliness of annual report submission by Parties, for the trading years 2011–2016. Parties within their first year of the Convention entering into force are not required to submit an annual report and are omitted



Source: CITES website (Available from: cites.org/sites/default/files/eng/reports/annual/annual_reports-130818.pdf. Accessed 28 September 2018).

[18] They are required by the Convention and if Parties do not submit reports for 3 years in a row, they could potentially face trade bans. See https://cites.org/eng/imp/reporting_requirements/annual_report

Of the Parties that had submitted their 2011–2017 annual reports to CITES, between 39 percent and 48 percent had submitted their annual reports before the October 31 deadline in the corresponding year of submission (Table 3.1.1). Within one year of the deadline passing, 82 percent of Parties had submitted their data.

TABLE 3.1.1
Timeliness of annual report submission by Parties for 2011–2016.[a]

Reporting bracket	2011		2012		2013		2014		2015		2016		2017		
	#	%	#	%	#	%	#	%	#	%	#	%	#	%	*Total*
By the deadline	71	41	67	39	69	40	80	45	81	46	86	48	77	43	**457**
1 month (Nov.)	15	9	13	8	14	8	14	8	18	10	16	9	15	8	**93**
6 months (April)	24	14	27	16	20	12	41	23	20	11	18	10			**150**
1 year	11	6	16	9	9	5	12	7	19	11	22	8			**83**
Up to 3 years	26	15	37	22	50	29	25	14	27	15	3	2			**162**
3+ years	15	9	1	1	3	2	0	0							**19**
Not yet received	10	6	10	6	8	5	6	3	13	7	34	19	89	49	**170**
No trade occurred	3		3		2		3		4		3		2		**20**
Total Parties required to report	**177**		**177**		**178**		**182**		**182**		**182**		**183**		

Source: CITES website (Available from: cites.org/sites/default/files/eng/reports/annual/annual_reports-130818.pdf. Accessed 28 September 2018).

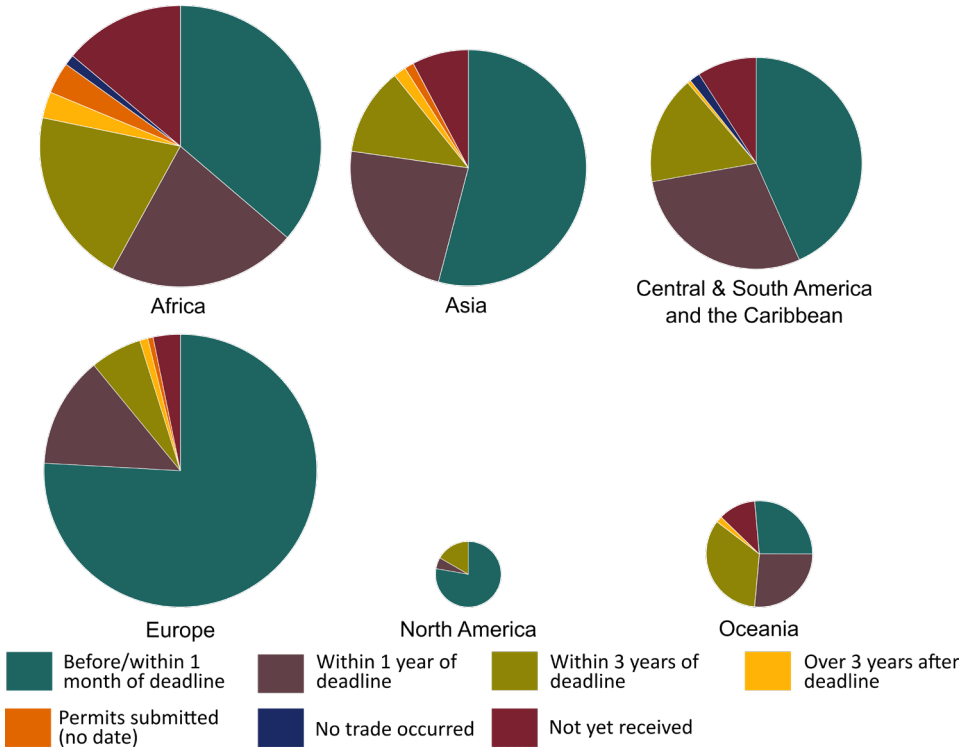
[a] Parties in their first year of the Convention entering into force are not required to submit an annual report, and so were omitted. The European Union (a CITES Party since 2015) was also omitted because all 28 European Union Member States submit annual reports separately.

When examining the timeliness of reporting by CITES region in the 2011–2017 period, Oceania and Africa had the largest proportion of Parties who had not submitted annual reports (see Figure 3.1.2; a list of CITES Parties by region can be found in Annex C). Europe and North America had the largest proportion of Parties submitting by one month after the deadline. The 28 Parties that are also Member States of the European Union have an earlier internal deadline for submission of the 15 June, which means that trade reports from European Union Parties members are submitted before the October 31 deadline.[19]

[19] As established in the European Union Wildlife Trade Regulations (Council Regulation (EC) No 338/97, Article 15, paragraph 4(a)).

FIGURE 3.1.2

Timeliness of annual report submission by Parties according to CITES region for 2011–2016, where the size of the charts is proportional to the number of Parties within each region. Parties within their first year of the Convention entering into force are not required to submit an annual report and so are omitted. A list of Parties by CITES region can be found in Annex C



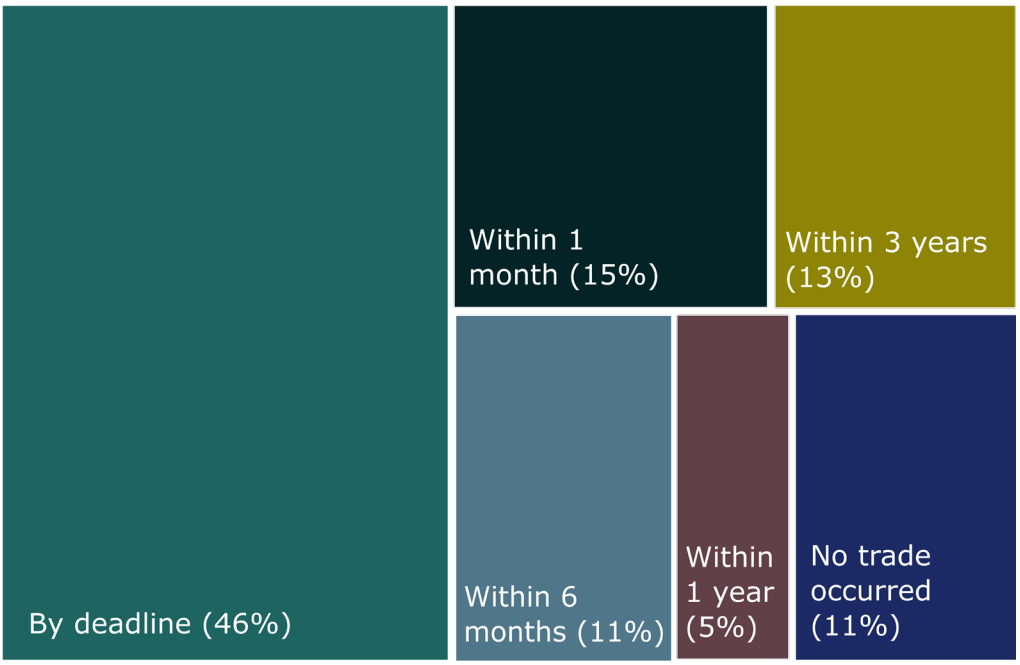
Source: CITES website (Available from: cites.org/sites/default/files/eng/reports/annual/annual_reports-130818.pdf. Accessed 28 September 2018).

3.2 ANNUAL REPORTING BY KEY COUNTRIES FOR INTERNATIONAL TRADE IN CITES-LISTED MARINE SPECIES

Of the 26 countries with the most imports and exports of CITES-listed marine species identified from the case studies – referred to here as "key marine traders" – an average of approximately 48 percent submitted their annual report data before the October 31 deadline each year between 2011 and 2017.[20] Over 75 percent had submitted by one year after the deadline (Figure 3.2.1). A full list of these reporters and their reporting dates can be found in Annex D.

[20] 18 exporters, 6 importers and 2 both. Although Taiwan, Province of China has been reported as a key importer, they do not submit annual reports to CITES, and so were excluded from the dataset.

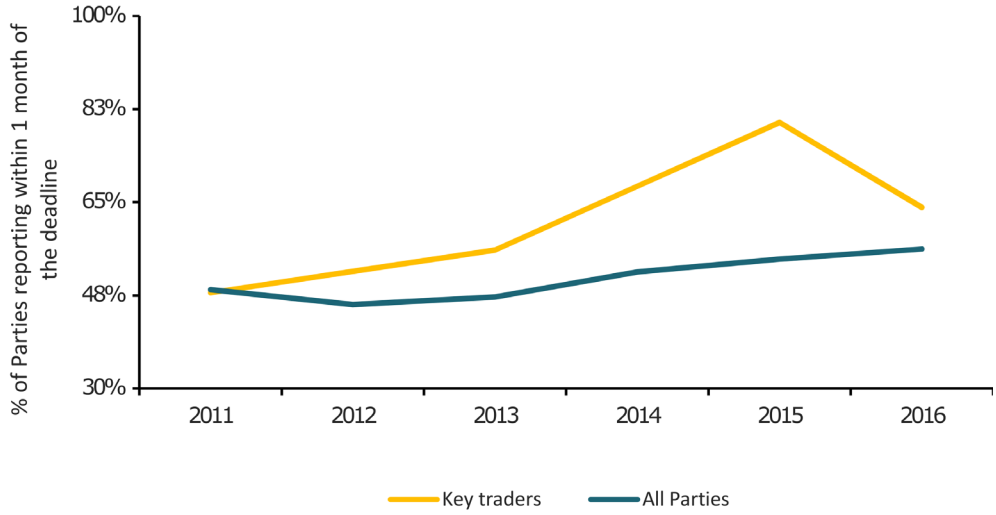
FIGURE 3.2.1
Timeliness of annual report submission by the 26 key marine traders for 2011–2016



Source: CITES website (Available from: cites.org/sites/default/files/eng/reports/annual/annual_reports-130818.pdf. Accessed 28 September 2018).

Compared to the global reporting patterns, more of the key marine traders reported before the October 31 deadline or one month after (Figure 3.2.2), although a higher proportion of key marine traders had not reported for some of the years 2011–2017 (mainly Fiji and the Solomon Islands; see Annex D).

FIGURE 3.2.2
Proportion of Parties submitting annual reports within 1 month of the 31 October deadline for all Parties and the key traders of marine species for 2011–2016



Source: CITES website (Available from: cites.org/sites/default/files/eng/reports/annual/annual_reports-130818.pdf. Accessed 28 September 2018).

3.3 APPENDIX II IMPORTS

Article IV of the CITES Convention stipulates that export permits are required for trade in products of Appendix II-listed species, whereas Appendix I-listed species require both an import and an export permit (as specified in Article III). Therefore, Parties are not required to report on imports of Appendix II species under the text of the Convention, although the "*Guidelines for the preparation and submission of annual reports*" (Annex 1 to Notification No. 2019/072) state in the "General principles" section that "Annual reports must contain information on imports, exports, re-exports and introductions from the sea of specimens of all species included in Appendices I, II and III".

This apparent inconsistency in reporting requirements is reflected in the 40 Parties which have not reported imports of Appendix II-listed species for the years 2007–2016 (see Annex E for the list of Parties). All other Parties had reported Appendix II imports for at least one year in the 2007–2016 period. In this ten-year period, 58 Parties reported Appendix II imports every year in the ten-year period, including the United States of America, as well as 27 of the 28 European Union Member States (Romania did not report any Appendix II imports in 2012), China, Japan and nine other major CITES importers.

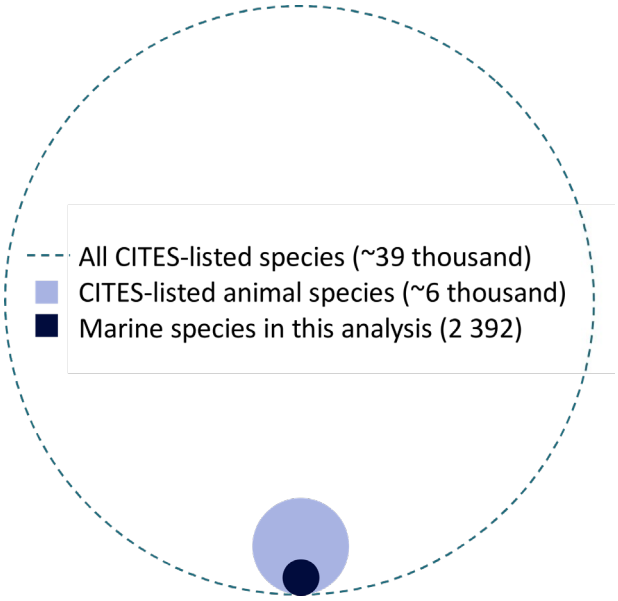
Of the key marine importers identified in Section 3.2, three Parties did not report any imports of the present study's focal Appendix II species. These were Nicaragua, Palau and the Solomon Islands. Three other Parties reported Appendix II imports for five years or less over the period covered by this report. These were Canada, Fiji and Indonesia.

Part 4. Overview of trade in CITES-listed marine taxa

This chapter provides a general overview of international trade in CITES-listed commercially exploited marine animals as reported in the CITES Trade Database.[21] More detailed insights are provided in the case studies in Part 5.

Of the approximately 39 thousand species currently listed in the CITES Appendices, 2 392 were considered to be marine species, of which 2 176 Appendix II-listed marine species were included in this analysis (6 percent of all CITES species, or 36 percent of all listed animal species; see Figure 4.1). Marine mammals, birds and reptiles were excluded from this analysis. Of the marine animal species listed in CITES, corals (Anthozoa and Hydrozoa species) are currently the dominant group by number of species (Figure 4.2).

FIGURE 4.1
The total number of CITES-listed marine species, compared to the total number of CITES-listed species

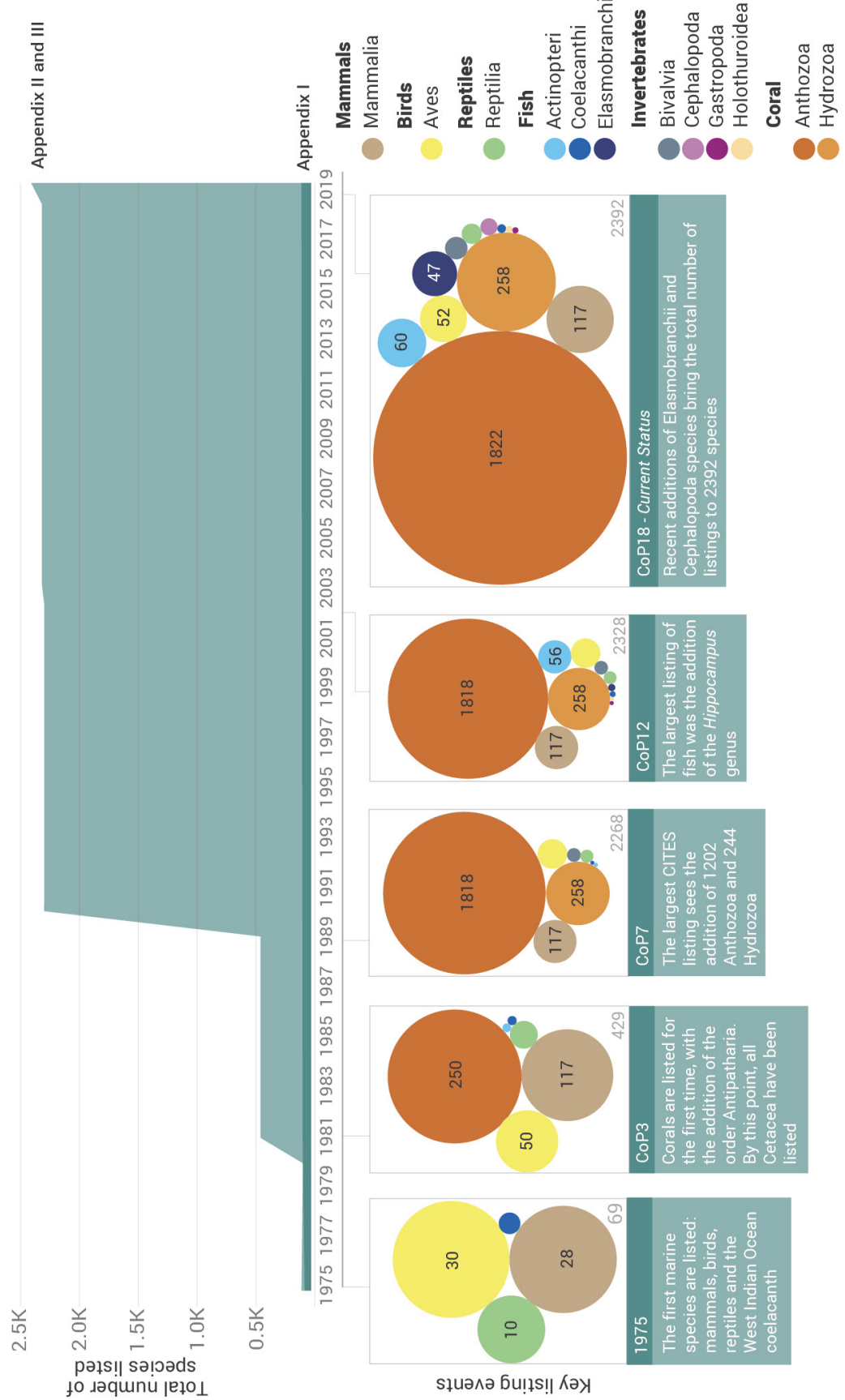


Source: Species+ (Available from: speciesplus.net, managed by UNEP-WCMC. Accessed 8 June 2020).

[21] Mammals, birds and reptiles were excluded from these analyses.

FIGURE 4.2

The number of marine species listed in CITES over time, with the key listing events and number of species listed by taxonomic group detailed



Source: Species+ (Available from: speciesplus.net, managed by UNEP-WCMC. Accessed 8 June 2020).

4.1 HISTORY OF MARINE SPECIES' CITES LISTING

The original CITES Appendices listed five marine species in 1975. These are the shortnose and Atlantic sturgeons (*Acipenser brevirostrum* and *A. oxyrinchus*) in Appendix I; and the lake sturgeon (*A. fulvescens*), European sea sturgeon (*A. sturio*)[22] and the West Indian Ocean coelacanth (*Latimeria chalumnae*) in Appendix II (Figure 4.1.1). The next major listing of marine taxa was the addition of 250 species in the coral order Antipatharia in 1981 at CoP3, followed by 17 genera of corals in the order Scleractinia and families Helioporidae, Tubiporidae and Milleporidae (totalling 352 species) and all species of giant clams (Tridacnidae spp.) in 1985 (following CoP5). The first shark (whale shark, *Rhincodon typus*) was listed in Appendix II in 2003 at CoP12 (Figure 4.1.1). Seahorses (*Hippocampus* spp.) were also listed at CoP12 but this was subject to an 18-month implementation delay after CoP12 and so came into effect in 2004. The majority of the currently listed sharks and rays followed at CoP16 and CoP17.

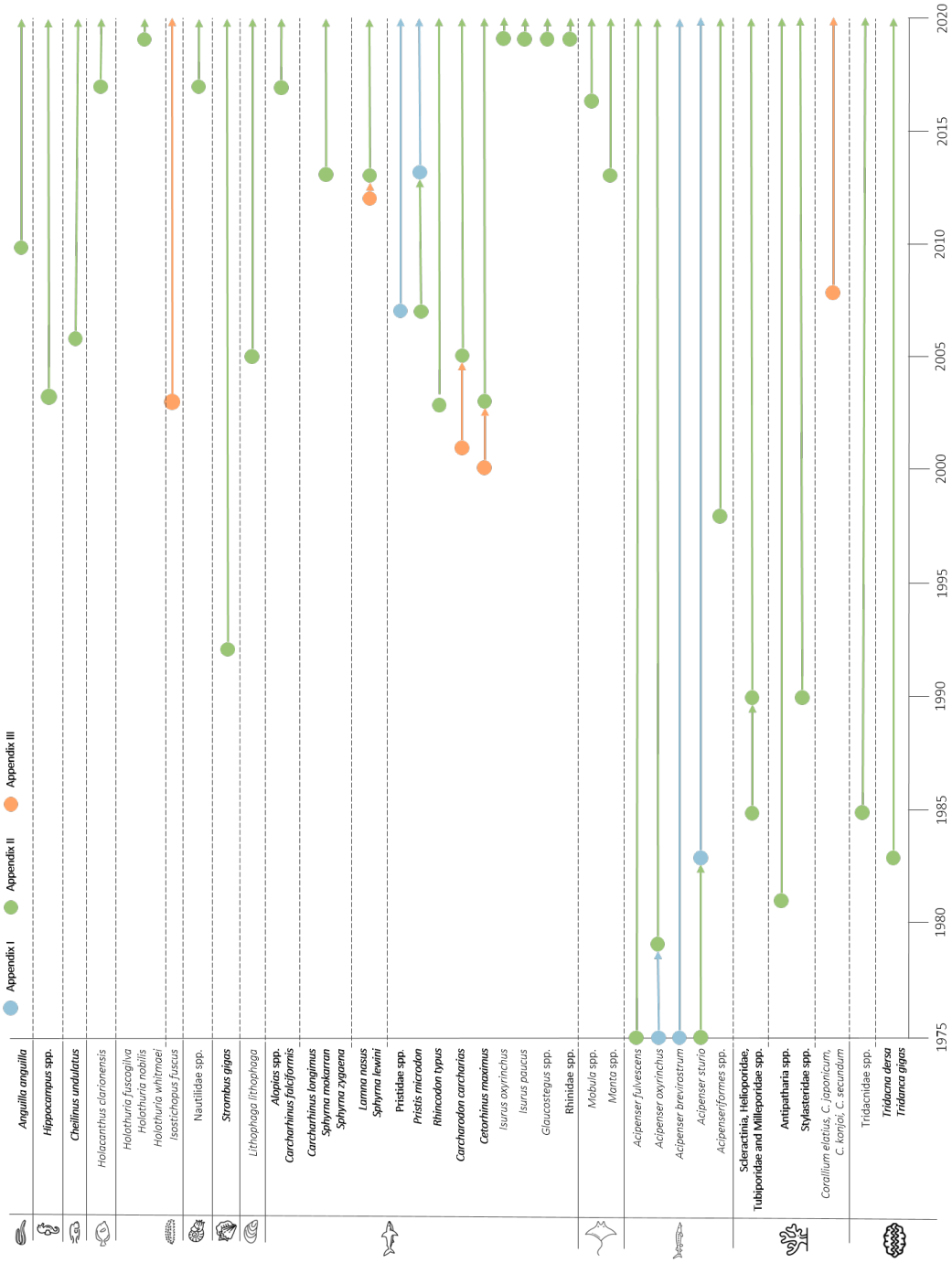
A number of marine species proposals have been put forward for consideration of CITES Parties but have not been listed. For example: the Atlantic bluefin tuna (*Thunnus thynnus* at CoP8 and CoP15), the Patagonian and Antarctic toothfish (*Dissostichus eleginoides* and *D. mawsonii* at CoP12), Banggai cardinalfish (*Pterapogon kauderni* at CoP14 and CoP17), spiny dogfish (*Squalus acanthias* at CoP14 and CoP15) and the Caribbean and smoothtail spiny lobsters (*Panulirus argus* and *P. laevicauda* at CoP14).

Also, a number of proposals for listing marine species were unsuccessful when first proposed, but were listed following proposals at subsequent CoPs including: the oceanic whitetip shark (*Carcharhinus longimanus*) (rejected at CoP15 and adopted at CoP16), the porbeagle (*Lamna nasus*) (rejected at CoP14 and CoP15 and adopted at CoP16), the humphead wrasse (*Cheilinus undulatus*) (rejected at CoP12 and adopted at CoP13), the whale shark (*Rhincodon typus*) (rejected at CoP11 and adopted at CoP12), and the great white shark (*Carcharodon carcharias*) (rejected at CoP11 and adopted at CoP13).

[22] While sturgeon and eels are anadromous (i.e. migrate between sea and freshwater), they are considered marine for the purpose of this report.

FIGURE 4.1.1

The history of the listing / implementation of listing of non-mammal, birds and reptile marine species in the CITES Appendices, by date of implementation. Case study taxa are shown in bold



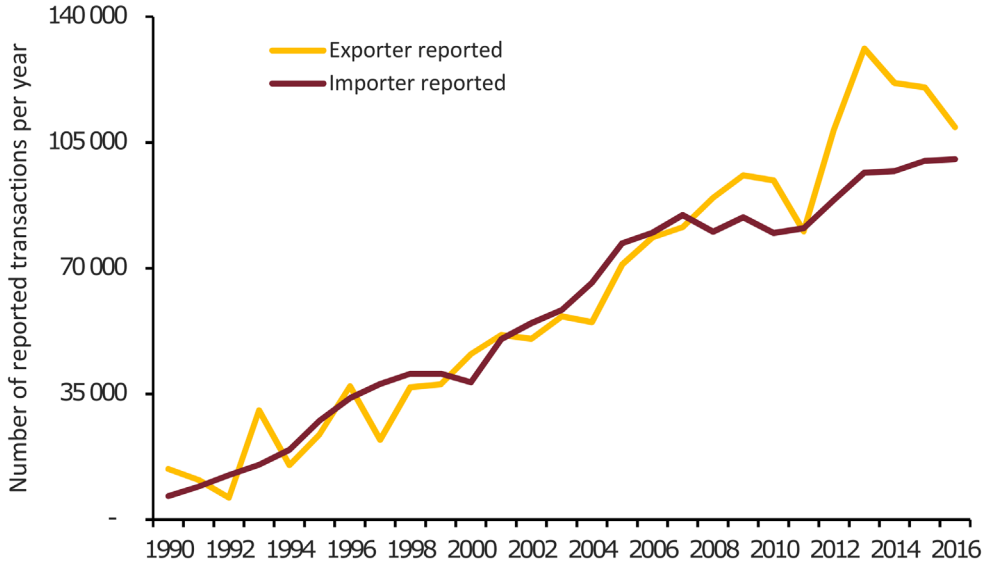
Source: Species+ (speciesplus.net, managed by UNEP-WCMC. Accessed 8 June 2020).

4.2 OVERVIEW OF TRADE IN MARINE SPECIES

From 1990 to 2016, exporting Parties reported approximately 1.6 million direct export transactions in marine animals (excluding mammals, birds and reptiles), 97 percent of which were in corals. Nearly one million of these transactions occurred during the period 2007 to 2016. From 1990 to 2016, the number of transactions increased more than seven-fold (from approximately 14 000 in 1990 to approximately 98 000 in 2016) (Figure 4.2.1), an increase driven largely by the greater number of coral transactions reported.

FIGURE 4.2.1

Reported number of direct transactions of Appendix II commercially exploited marine species for 1990–2016. See Box 2 for details on why reported transactions by exporters (yellow line) and importers (red line) may differ



Source: CITES Trade Database (Available from: trade.cites.org managed by UNEP-WCMC on behalf of the CITES Secretariat. Accessed 2 October 2018).

BOX 2

Differences between importer–and exporter-reported trade

Non-reporting of Appendix II imports by Parties may lead to differences in the total reported quantities of species and products in trade between what exporters and importers are reporting. However, differences between importer- and exporter-reported figures may be due to other causes (see Robinson and Sinovas, 2018):

- The inconstant use of trade terms by importers and exporters;
- export permits being issued at the end of the calendar year and not reported as imports until the following year;
- one Party submitting a report based on trade that occurred and the other based on permits that were issued (e.g. a permit may be issued to export 500 individuals, but only 400 are ultimately exported);
- mortality during transport of live animals.

Differences may also arise due to importers and exporters reporting trade at different taxonomic levels, or due to discrepancies between the reported trading partner. For example, Parties may report exports to China, but the corresponding imports are reported by China, Hong Kong SAR, which have different country codes and therefore report separately (Sinovas *et al.*, 2017).

It is important to factor in such considerations when analysing CITES trade data to ensure conclusions drawn from such analyses are as accurate as possible.

The number of CITES Parties and the number of CITES-listed marine taxa has also increased over time, which may in part account for the increasing number of transactions reported. This increase in transactions over time has a practical impact on the reporting and administration burden on Parties.

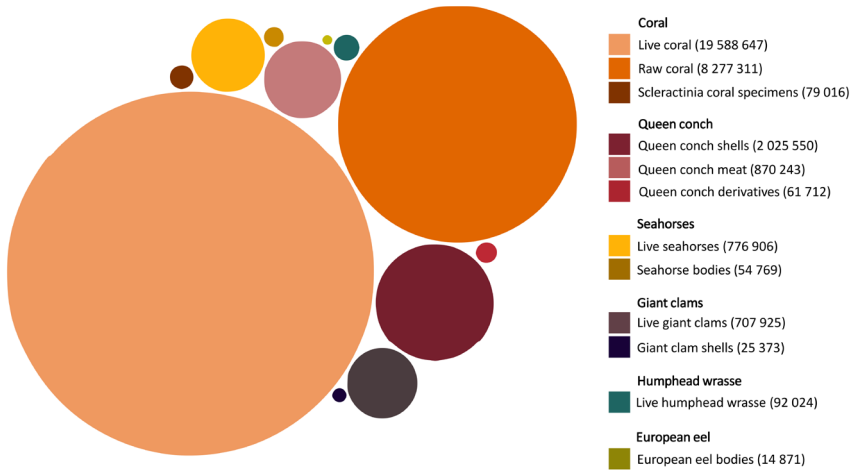
The apparent decline in the number of transactions reported by exporters in years such as 2011 and 2016 may be due to non-reporting by large traders for those years. At the time this information was accessed,[23] for example, according to data on Parties reporting to CITES, annual reports were still outstanding for Thailand for 2011 and Fiji for 2016.

CITES trade may be reported in different units of measure, these are not always comparable and so cannot be directly combined. When attempting to visualize the CITES trade data for marine species, some trade records were reported in number of items (i.e. individual animals or pieces), while others were reported by weight (e.g. kg). Without conversion factors specific to the species/specimen concerned, it is not straightforward to convert one into the other. The following trade summary, therefore, provides trade by number of items (Figure 4.2.2) and by weight (Figure 4.2.3) separately in the unit reported by the exporter.

Direct exports by number of items comprised approximately 32.6 million items in 2007–2016. Of this, approximately 85 percent of items traded were live and raw corals, followed by queen conch shells and meat (when combined, make up almost 9 percent) (Figure 4.2.2).

FIGURE 4.2.2

Main taxa/term combinations directly exported as number of items (as opposed to being reported as weight) for 2007–2016. Data as reported by exporters. Trade below 10 000 units is not shown (plotted data represents over 99 percent of trade reported by number of items)



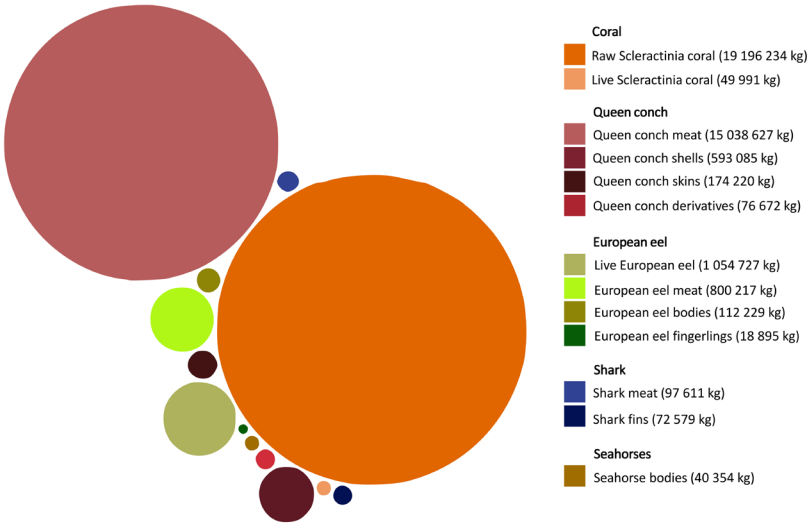
Source: CITES Trade Database (Available from: trade.cites.org, managed by UNEP-WCMC on behalf of the CITES Secretariat. Accessed 2 October 2018).

[23] Accessed 2 October 2018.

The direct exports of marine taxa reported by weight accounted for a total of 37.3 million kg in the period 2007 to 2016. As with trade by number of items, corals (primarily raw) comprised the largest proportion of the trade reported by weight (approximately 52 percent); queen conch meat comprised 40 percent of total weight and European eel products made up eight percent (Figure 4.2.3).

FIGURE 4.2.3

Main taxa/term combinations directly exported by weight (as opposed to reported by items) for 2007–2016. Data as reported by exporters. Trade below 10 000 kg is not shown (plotted data represents over 99 percent of trade reported by weight)

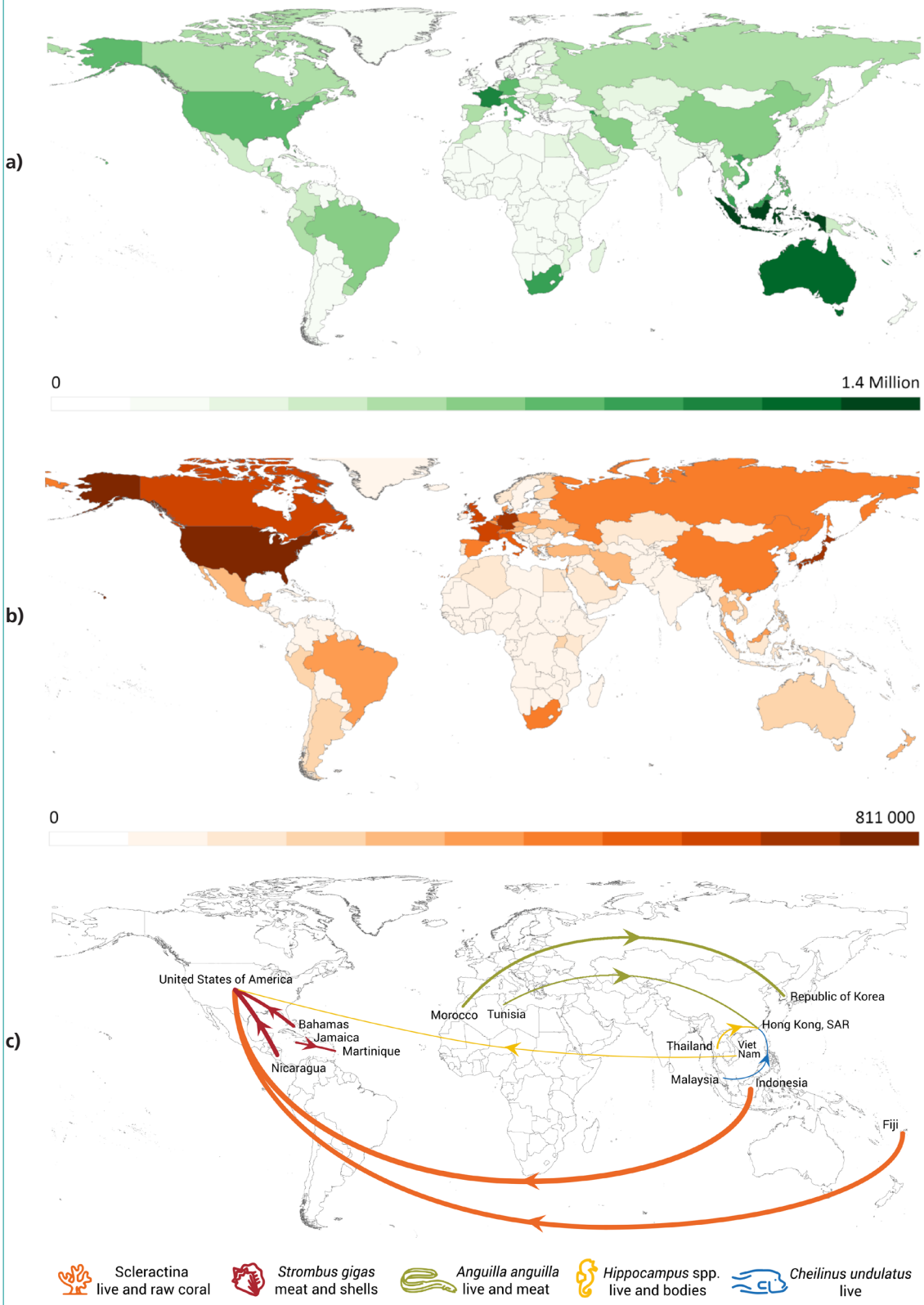


Source: CITES Trade Database (Available from: trade.cites.org, managed by UNEP-WCMC on behalf of the CITES Secretariat. Accessed 2 October 2018).

There were several dominant trade routes for the marine products covered in the case studies in Part 5 (Figure 4.2.4). The Unites States of America was identified as a major importer of marine products – notably coral, live seahorses, giant clams and queen conch. The largest global exporters of marine products included Indonesia, which primarily exported corals and seahorses, Thailand, primarily seahorse bodies, and Viet Nam, which mainly exported giant clams.

FIGURE 4.2.4

Main (a) exporters and (b) importers of case study species by number of direct transactions, and (c) trade routes for the dominant marine products in trade (lines weighted by quantity) for 2007–2016. All based on exporter-reported data



Source: CITES Trade Database (Available from: trade.cites.org, managed by UNEP-WCMC on behalf of the CITES Secretariat. Accessed 2 October 2018).

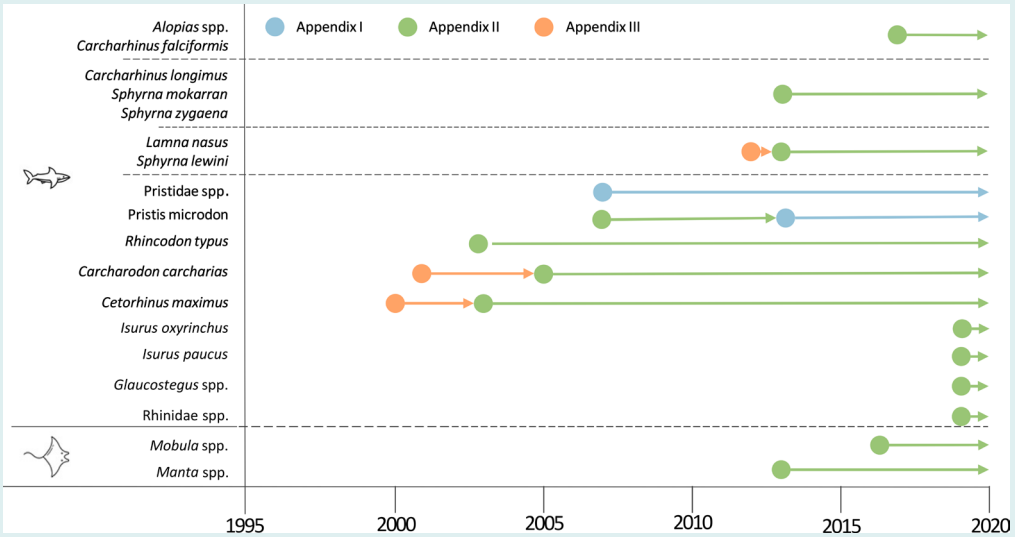
Part 5. Case studies

This chapter presents detailed analyses of 2007–2016 CITES trade in Appendix II taxa from seven key commercially exploited marine taxa: sharks and rays (Elasmobranchii spp.), coral (Anthozoa and Hydrozoa spp.), European eel (*Anguilla anguilla*), seahorses (*Hippocampus* spp.), humphead wrasse (*Cheilinus undulatus*), giant clams (Tridacnidae spp.) and queen conch (*Strombus gigas*). The analyses predominantly draw on data on Appendix II listed taxa from the CITES Trade Database for the period 2007 to 2016 to assess patterns or trends in the trade data found there. Where possible, conversion factors have been applied to estimate the number of individuals from trade reported by weight. Conversion factors are detailed in Annex B.

Throughout this section an overview of the CITES context and CITES trade data is provided (based on the official CITES trade data) for each case study taxa, followed by in-depth assessments provided by species experts of the strengths, issues and potential areas for improvement in relation to CITES trade data and reporting. Recommendations put forward as part of these expert assessments also feed into the overarching recommendations of the report (Part 7).

5.1 SHARKS AND RAYS – ELASMOBRANCHII SPECIES

Appendix listing: 6 species Appendix I; 41 species Appendix II



IUCN Red List status: 43 assessed[1] (>2003): 26 VU, 8 EN, 3 CR[2]
IUCN population trend: 35 species ↓[2]
Distribution: Global, tropical and temperate waters (rays mainly coastally restricted)[2]
Main threats: Targeted fishing and bycatch (Dulvy *et al*., 2014)
Main taxa in trade: *Sphyrna* spp.
Main commodities in trade: Fins; meat
Estimated number of individuals in trade 2007–2016 [based on CITES trade]: 46 919

[1] Under IUCN taxonomy, *Pristis pristis* and *P. microdon* are considered the same species and were assessed together. Three species recognized under CITES taxonomy (*Rhynchobatus immaculatus, R. palpebratus* and *R. mauritaniensis*), are not covered by any assessments in the Red List.
[2] IUCN Red List of Threatened Species (Available from: www.iucnredlist.org. Accessed 25 September 2018).

CITES context

All CITES-listed sharks and rays (termed shark[24]) were originally proposed for CITES listing based on either population declines related to demand for products for trade (including fins, meat, teeth and gill plates), or included in listing proposals for "look-alike" reasons[25] (see Annex A for links to the CITES proposals).

CITES Resolution Conf. 12.6 (Rev. CoP18) concerns the conservation and management of sharks, and includes *inter alia*, for Parties to improve the collection of catch and trade data, and to expand customs classifications to disaggregate the reporting of shark trade by specific commodities and different levels of processing. This Resolution further calls for improved coordination between national CITES and fisheries focal points and put a strong emphasis on collaboration with fisheries organizations.

In addition, Decisions 18.218-18.225 concern, among other things, the collation of national shark and ray conservation and management activities, and identifies the need to understand apparent mismatch in trade reported to the CITES Trade Database and

[24] The term "shark" is taken to include all species of sharks, rays and chimaeras (class Elasmobranchii).
[25] Species that do not appear to be directly threatened by trade may also be listed in CITES Appendices if they are difficult to distinguish from similar species (or the products of similar species) that are threatened by trade (Resolution Conf. 9.24 (Rev. CoP17) Annex 2b, Criterion A).

catch data. Decision 18.224 also directs the Standing Committee to develop guidance on the making of legal acquisition findings for introductions from the sea.

CITES quotas:
Malaysia published national voluntary zero quotas for *Manta alfredi*, *M. birostris*, *Sphyrna lewini* and *S. mokarran* for Sabah in 2015–2017. Indonesia first set quotas for sharks in 2020, publishing quotas for 34 000 fins from wild-sourced *Carcharhinus falciformis*, 725 fins from wild-sourced *Sphyrna lewini* and 130 fins from wild-sourced *Sphyrna mokarran*.[26] The Philippines has a ban on imports and exports (zero quotas) of CITES-listed species sharks and rays while they develop capacity to handle CITES provisions for these species (CITES Notif. No. 2010/038) There were also zero quotas previously in place for Myanmar and Thailand (Friedman *et al.*, 2018).

CITES suspensions:
At the time of writing,[27] there were no CITES trade suspensions for Elasmobranchii species.

CITES trade summary 2007–2016

The majority of direct exports of shark species over the 2007–2016 period[28] consisted of shark fins and shark meat (Table 5.1.1; Annex F), almost exclusively wild-sourced for commercial purposes. A small quantity of pre-Convention shark fins and meat was also exported directly. Re-exports of shark products mainly consisted of fins of unknown origin exported from Singapore in 2016. Direct exports of ray products consisted almost entirely of scientific and educational specimens, aside from one export of 1 000 kg of *Manta* species derivatives exported from Sri Lanka to China, Hong Kong SAR for commercial purposes. Approximately 36 percent of exporter-reported elasmobranch trade transactions were reported by weight and approximately 64 percent by number of items.

TABLE 5.1.1
Main shark commodities in trade for 2007–2016, as reported in direct trade by exporters[a]

Commodity	Quantity	Estimated number of individuals[1]	Main taxa	Main exporters	Main importers
Fins	3 942 fins 72 566 kg	44 637	*Sphyrna* spp. (*S. lewini*, *S. mokarran*, *S. zygaena*)	Mexico (57 106 kg) El Salvador (7 039 kg) Peru (2 432 fins)	China (22 781 kg) China, Hong Kong SAR (20 386 kg and 3 184 fins)
Meat	97 611 kg	2 282	Basking shark (*Cetorhinus maximus*)	Norway (700 kg)	China (700 kg)
			Porbeagle (*Lamna nasus*)	Norway (1 859 kg) Canada (82 kg)	Denmark (1 733 kg) Germany (126 kg) United States of America (82 kg)
			Scalloped hammerhead (*Sphyrna lewini*)	China (94 970 kg)	Republic of Korea (94 970 kg)

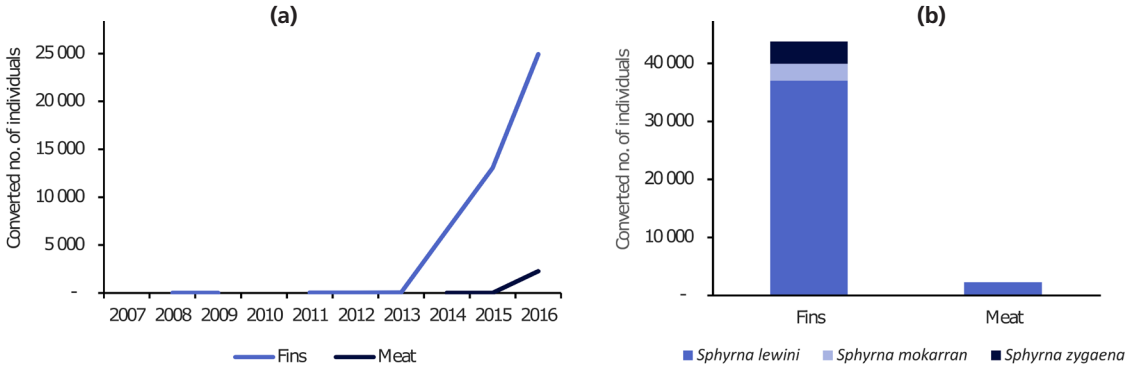
Source: CITES Trade Database (Available from: trade.cites.org, managed by UNEP-WCMC on behalf of the CITES Secretariat. Accessed 2 October 2018).
[a] All fields except "estimated number of individuals" present data in the exporter-reported unit.
[1] Conversion factors (see Annex B) were applied to the CITES trade data 2007–2016 to estimate the number of individuals that trade in shark fins and meat might represent.

[26] Unless quotas are determined by the CITES CoP or Scientific Committee (e.g. as part of RST), they are national voluntary quotas published by CITES as a service to CITES Parties – they do not have any official standing and countries are responsible to monitor and/or enforce them if they want to. There is no automatic consequence for going above a national voluntary export quota. See speciesplus.net, managed by UNEP-WCMC. Accessed 25 September 2018.

[27] Accessed 3 July 2020.

[28] Very little trade occurred prior to 2007.

FIGURE 5.1.1
Direct exports of shark fins and meat converted to number of individuals for 2007–2016 (a) over time and (b) by species, as reported by exporters. Only hammerhead species (*Sphyrna* spp.) are shown in (b) due to the relatively low quantities of the other species. Source I* is excluded.



Source: CITES Trade Database (Available from: trade.cites.org, managed by UNEP-WCMC on behalf of the CITES Secretariat. Accessed 2 October 2018).
* Source I (confiscated and seized specimens) represents subsequent legal trade of previously confiscated specimens.

Using conversion factors to estimate the number of individuals from weight, it was estimated that during 2007–2016 trade in shark fins and meat accounted for a take of 46 919 individual sharks: 44 637 traded in fins and 2 282 traded as meat (Table 5.1.1). Hammerheads (*Sphyrna* spp.) where the main shark species reported in international trade, accounting for 46 081 individuals. *Sphyrna lewini* made up 85 percent of the estimated number of individuals reported in trade as fins and meat (Figure 5.1.1). This trade was predominantly reported by exporters. A small number of individuals of basking shark (*Cetorhinus maximus*) and porbeagle (*Lamna nasus*) were also estimated in trade 2007–2016, based on reported trade in meat.

Expert assessment of sharks and rays trade reporting by Julia Lawson, University of California, Santa Barbara, with input from Sonja Fordham

Overview

Ms Lawson scored the general legality of the trade in sharks as low to moderate (scored 2 on a scale from 1–5, with 1 being low, and 5 being high). Ms Lawson scored the overall spatial and temporal accuracy of the shark and rays trade records as low for the spatial reporting of trade (1) but moderate (2) for the reporting of trade over time.

Main strengths of the CITES trade data and reporting process for sharks and rays

- The CITES Trade Database allows for the recording of a relatively wide range of commodities in trade (Annex 1 to Notification No. 2019/072). All commodity terms (bodies, bone pieces, bones, carvings, derivatives, fins, large leather products, skin, skin pieces, skulls, live, meat, specimens, tails and teeth) have records over the 2007 to 2016 period; however, the bulk of the records were for fins and meat.
- Provided that data on legal trade in CITES-listed sharks are accurate, these data provide an indication of CITES Parties' capacity to implement CITES provisions for CITES-listed shark species. In order for an export permit to be issued for an Appendix II listed species, relevant authorities from the country of export must assess both the sustainability (by conducting an NDF)[29] and legality (by conducting a "legal acquisition finding")[30] of the take of the specimen in line with to CITES provisions. Understanding the implementation abilities of CITES

[29] NDF: Non-Detriment Finding (see Resolution Conf. 16.7 (Rev. CoP17)).
[30] See Resolution Conf. 18.7 on Legal acquisition finding.

Parties may be especially useful for some species listed since CoP16, which are frequently taken in commercial fisheries.

- The CITES Trade Database may also be used to evaluate Parties' compliance with other international measures, e.g. no-retention measures put in place by RFMOs or dictated/mandated by the Convention on the Conservation of Migratory Species of Wild Animals (CMS) Appendix I listings.
- The CITES Trade Database can be used to confirm aspects of the geography of the trade. For instance, the two leading shark fin importers according to FAO analyses (China and China, Hong Kong SAR; Dent and Clarke 2015) were the two main shark fin importers according to the CITES Trade Database.

Main issues in the reporting of CITES trade data for sharks and rays

- As reflected in the CITES Secretariat's report to CITES CoP18 (CoP18 Doc. 68.2), the CITES Animals Committee appreciated that since 2000 the trade in CITES-listed shark products recorded in the CITES Trade Database appears to be lower than what may have been expected from available knowledge on catches of the species concerned. The Committee noted further that this could be the result of delayed reporting by some Parties or stockpiling of CITES-listed shark products pending an NDF, and that the matter warranted further investigation. This mismatch may also, in part, be due to lack of reporting of "Introduction from the Sea" landings (SC70 Doc. 34). CoP18 consequently asked the Secretariat to investigate this apparent mismatch using available catch records for listed species (Decision 18.221).
- It can be challenging to distinguish CITES-listed shark and ray species from other species in trade due to identification (taxonomic) similarities, further contributing to the gap between reported and expected CITES-listed shark products. While training materials are available to fishery inspectors and customs authorities,[31] CITES Parties vary in their capacity to engage with such materials. Additionally, in some instances, CITES-listed shark products (i.e. mobulid bone powder, shark liver oil) cannot be identified to species level without access to complex technologies. In other instances, products are shipped in amalgamated forms, which makes reporting and or completing compliance of certificates to the species level challenging.
- Reported data within the CITES Trade Database does not reflect the diversity of CITES Parties involved in trade adequately, given that the greatest quantities reported were from a single exporting country (Mexico). Numerous scientific studies (e.g. Dent and Clarke, 2015) reveal that a far wider range of exporting Parties should be recorded in the CITES trade data. Mexico's relative success in reporting trade in hammerhead sharks, possibly due to the coastal and artisanal nature of fisheries capturing Smooth hammerhead and Scalloped hammerhead (Furlong-Estrada *et al.* 2017), suggests that CITES reporting processes are in place (note: no Introductions from the Sea were reported by Mexico in the 2007–2016 period). Mexico's domestic CITES data collation and reporting process can provide a knowledge-sharing opportunity for CITES Parties that are catching sharks and rays in domestic waters for export.

[31] A range of shark and ray identification materials exist in a variety of formats and languages and can be searched through this online database: http://www.cites.org/eng/prog/shark/resources.php

- Reported data within the CITES Trade Database also does not adequately reflect the diversity of listed sharks in trade, given that the greatest quantities reported were highly skewed to a single genus (*Sphyrna* spp.). In particular, the lack of trade reports for solitary pelagic species, such as oceanic whitetip shark, highlight the challenges associated with implementing "Introduction from the Sea". The CITES Secretariat reported at SC70 in its report on "Introduction from the Sea" (document SC70 Doc. 34) that "not many Parties have legislation or regulations in place for the different scenarios outlined under Resolution Conf. 14.6 (Rev. CoP16) on Introduction from the Sea, and that the practical experience in implementing these provisions is still very limited, particularly in view of the small number of commercial trade transactions reported". Numerous scientific studies (e.g. Dent and Clarke, 2015) and other data sources (e.g. observer records from RFMOs, FAO catch data, market surveys) reveal that a far wider taxonomic range of species exports should be recorded in the CITES trade data. While a bias in reporting may exist, it is also possible that the CITES Trade Database accurately captures the dominance of hammerhead sharks in the fin trade, and solitary pelagic species like oceanic whitetip shark are simply increasingly rare in capture production (IATTC, 2018). Trade reporting may also reflect that Parties are effectively implementing – or want to appear as though they are effectively implementing – the tuna RFMO bans on oceanic whitetip retention.[32] There are fewer RFMO measures for hammerheads, and they are less stringent and less consistent across the globe.
- As the CITES Animals Committee recently acknowledged, inconsistencies between volumes of CITES-listed shark species reported in the CITES Trade Database and volumes of CITES-listed shark species landed and reported (i.e. FAO statistics) should be investigated, especially in instances where international export is known or suspected. The vast majority of shark commodities entering trade are sourced from Southeast Asia, especially Indonesia, Japan and Taiwan Province of China, in addition to Spain (Dent and Clarke, 2015). The largest importers differ by commodity type, with shark meat being imported mainly by South America and Europe and shark fin being imported mainly by East and Southeast Asia (Dent and Clarke, 2015). Up to 2016 the CITES Trade Database does not appear to capture the spatial distribution of the trade from exporting countries (where there is an obligation for reporting) accurately, but does seem to show the spatial distribution of shark fin importing countries (where reporting is voluntary). An ongoing assessment of CITES Party fisheries that include CITES-listed sharks destined for trade (Dent and Clark, 2015) can allow for trade data to be cross-checked against FAO capture production records and other available information. While an absence of CITES-listed shark exports from CITES Parties may accurately reflect a true absence or an effective reduction in fishing or trade, it can also inaccurately represent changes if:
    i. trade was suspended or banned because no NDF had been developed (but fishing and stockpiling continue)
    ii. consumption or use has shifted to domestic markets, or
    iii. trade is continuing without being reported.
- The utility of the CITES Trade Database is threatened by poor standardization across reporting categories, as well as limited flexibility with conversion factors. At present, CITES Parties report international trade in CITES-listed sharks variably as: i) number of specimens, ii) weight, or iii) other categories; this makes comparisons challenging, and CITES CoP18 sought to address this issue in its revisions to the shark Resolution. The CITES Animals Committee

[32] Oceanic whitetip is subject to prohibitions on retention, transhipment, storage, and landing by all four major tuna regional fishery management organizations: the International Commission for the Conservation of Atlantic Tunas (2010), the Inter-American Tropical Tuna Commission (2011), the Western and Central Pacific Fisheries Commission (2012), and the Indian Ocean Tuna Commission (2013).

(AC30) Recommendation eight encouraged Parties to use weight and product form rather than number of items in their annual legal and illegal trade reports. Establishing an agreed and accurate set of conversion factors is also critical to enable comparison across different terms and units of measure. Conversion factors for number and weight of reported fins are available, but these can vary both within and between species and individuals, and at different stages of processing. Establishing accurate conversion factors is critical as by far the majority of sharks in trade were reported to CITES as fins and were converted to individuals using conversion factors.

- The CITES trade data capture some of the diversity in shark products (i.e. bone and skin pieces, skulls, tails, etc.). However, some notable products are either underreported (e.g. manta ray gill plates and meat (Acebes, 2013; O'Malley *et al.*, 2016)), or are not currently covered by CITES trade terms explicitly (e.g. cartilage pieces, shark livers and liver oil (squalene) (Dent and Clarke, 2015)). Targeted fisheries and incidental landings of manta and devil rays in Indonesia, Sri Lanka and the Philippines are driven almost exclusively by demand for gill plates (Alava *et al.*, 2002; Acebes, 2013; Fernando and Stevens, 2011; Croll *et al.*, 2015). Catches were reported to FAO in the 2007–2016 period for these species by Indonesia (41 164 tonnes) and Sri Lanka (3 470 tonnes). No trade in gill plates has been reported by CITES Parties, though Sri Lanka did report an export of 1 000 kg of *Manta* spp. derivatives, which may have included gill plates. In addition to issues with export countries, a report by Wu (2016) found inconsistencies between the trade volumes in the CITES Trade Database and the national customs data for each of the three leading import and re-export countries: China, Hong Kong SAR and Taiwan Province of China.

Recommendations to improve the CITES trade data and reporting process for sharks and rays

- The CITES Standing Committee should consider adopting new CITES term codes for specific commodities (fresh, unprocessed dried, processed dried, unprocessed frozen and processed frozen — as well as different grades of dried), as well as species-specific codes. Ideally, term codes for reporting different types of fins would also be included (e.g. for dorsal, caudal and pectoral fins). This is captured in Resolution Conf. 12.6 (Rev. CoP18).
- CITES Parties should follow guidance from the CITES Animals Committee to use preferred reporting units (i.e. weight rather than number of fins) to facilitate trade monitoring.
- Standardized species-specific conversion factors should be agreed upon and implemented by CITES Parties, to improve the accuracy of estimated numbers of whole individuals in trade (Dent and Clarke, 2015).
- CITES Parties, with guidance from the CITES Secretariat, should spearhead multinational initiatives with RFMOs and CMS,[33] as well as related national authorities (i.e. customs offices). These initiatives could improve the reporting of CITES-listed shark and rays and promote compliance with catch and data collection requirements.
- The CITES Secretariat and Parties should increase interactions with RFMOs with a view to streamlining the implementation of various shark and ray conservation commitments. Such initiatives should address, as a matter of priority, ongoing international trade in globally prohibited oceanic whitetip sharks and the continued overfishing of North Atlantic shortfin mako sharks.

[33] CMS has no trade-related database, but encourages increased cooperation over the management of migratory species, and this could be linked to studies that assist monitoring of trade.

- The CITES Secretariat should work to develop and promote certification systems for fishers, traders, distributors and retailers as a means of adding value to sustainable CITES-listed shark and ray products. There has been cooperation between CITES and UNCTAD (United Nations Conference on Trade and Development) along on these lines with Blue BioTrade, and a project on queen conch on the horizon.[34]
- CITES Parties could also adopt regionally or nationally agreed additions to accepted Harmonized System codes under the Harmonized Commodity Description and Coding System of the World Customs Organization (WCO) to enable more direct cross-referencing with the CITES trade data.[35] FAO contributed successfully to the HS code development for sharks and rays and skate in 2017,[36] but their bid to expand the coverage of codes for shark fins cured forms (i.e. dried, salted or in brine, etc.) was not accepted. However, the WCO recommended the implementation of specific commodity codes for shark fins and ray and skate meat in 2012, and this decision was implemented by Canada, China, France, Japan, the Republic of Korea and the United States (Dent and Clarke, 2015).

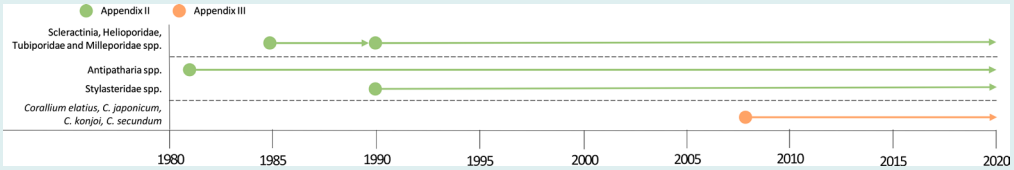
[34] https://unctad.org/en/pages/PublicationWebflyer.aspx?publicationid=2272

[35] The "Harmonized System" or simply "HS" is a multipurpose international product nomenclature that classifies commodity groups; each is identified by a 6-digit code, arranged in a legal and logical structure that is supported by well-defined rules.

[36] https://unstats.un.org/unsd/classifications/expertgroup/egm2015/ac289-15.PDF

5.2 CORALS – ANTHOZOA AND HYDROZOA SPECIES

Appendix listing: 2076 species Appendix II; 4 species Appendix III



IUCN Red List status: 857 assessed[1] (>2007): 202 VU, 26 EN, 7 CR[2]
IUCN population trend: 394 species ↓[2]
Distribution: Mainly shallow, tropical waters, esp. the coral triangle (Veron *et al*., 2015)
Main threats: Climate change, pollution, unsustainable fishing (Burke *et al*., 2011; Carpenter *et al*., 2008), trade (Tissot *et al*., 2010; Tsounis *et al*., 2010)
Main taxa in trade: *Scleractinia* spp.
Main commodities in trade: Live coral; raw coral
Estimated number of live corals in trade 2007–2016 [based on reported CITES trade data]: 19.8 million

[1] Due to differing taxonomies used by the IUCN and CITES, 63 Scleractinia and two Milleporidae species have assessments on the Red List which are not recognized as species under CITES. Additionally, 790 Scleractinia species listed in CITES have either not been assessed for the Red List or do not directly reconcile to IUCN taxonomy. As all Scleractinia and Milleporidae species are listed in CITES, all assessments for Scleractinia and Milleporidae species were included in these figures. Source: IUCN Red List of Threatened Species. Available from: www.iucnredlist.org. Accessed 25 September 2018.
[2] IUCN Red List of Threatened Species. Available from: www.iucnredlist.org. Accessed 25 September 2018.

CITES context

Whilst trade is not considered the main threat to most coral species (Carpenter *et al.*, 2008; Burke *et al.*, 2011), Anthozoa and Hydrozoa were originally proposed for CITES listing due to declining populations associated with collection for trade as curios, jewellery and live for aquaria. The difficulty in distinguishing between different coral species once in trade was also considered important (see Annex A for links to the CITES proposals).

CITES Resolution Conf. 11.10 (Rev. CoP15) concerns the trade in Scleractinia (stony corals), noting that the provisions of the Convention with regard to corals have been difficult to enforce. The Resolution includes, *inter alia*, recommendations to adopt standard working definitions of coral terms (i.e. coral sand, coral fragments, coral rock, dead coral and live coral). Under these definitions, dead and live coral should be identifiable to the genus or species level. Decisions 17.192 (Rev. CoP18)-17.193 (Rev. CoP18) specifically concern the sustainable harvest and use of precious corals (order Antipatharia and family Coralliidae).

CITES quotas:

Indonesia have set quotas every year since 1997, Fiji set quotas in each year between 2003–2020 (except for 2006) and Malaysia set quotas every year since 2014. Quotas published by these three Parties for 2016 (the last year covered by the CITES trade data included in this report) covered encompass 110 different coral taxa. Cuba also published quotas for 20 000 kg of live Scleractinia in each year for 2015–2017 and 2019.

CITES suspensions:

At the time of writing[37], exports of *Plerogyra simplex* and *P. sinuosa* from Fiji are were currently subject to a suspension, due to the Review of Significant Trade

[37] Accessed 3 July 2020.

process (Notification No. 2020/006). The Management Authority of Jordan has also notified Parties that it maintains stricter domestic measures for the import and export of corals, which is prohibited with the exception of trade for scientific purposes (Notification No. 2003/049).

CITES trade summary 2007–2016

The majority of direct exports in coral products over 2007–2016 consisted of live and raw[38] wild-sourced corals, reported by both weight and number and traded for commercial purposes (Table 5.2.1; Annex F). Re-exports of coral products were also mainly composed of wild-sourced live raw coral originating in Indonesia, Tonga and Fiji, which were largely imported for commercial purposes by Canada and Mexico via the United States of America for commercial purposes, and by the United States of America and Singapore from Malaysia.

TABLE 5.2.1
Main coral commodities in direct trade for 2007–2016, as reported by exporters

Commodity	Quantity	Main taxa	Main exporters	Main importers
Live corals	19 832 647 pieces	*Acropora* spp. (3 863 804 pieces)	Indonesia (13 699 217 pieces)	United States of America (9 497 833 pieces)
Raw corals	24 006 734 kg	*Scleractinia* spp. (23 123 842 kg)	Fiji (12 063 150 kg)	United States of America (13 421 483 kg)

Source: CITES Trade Database (Available from: trade.cites.org managed by UNEP-WCMC on behalf of the CITES Secretariat. Accessed 2 October 2018).

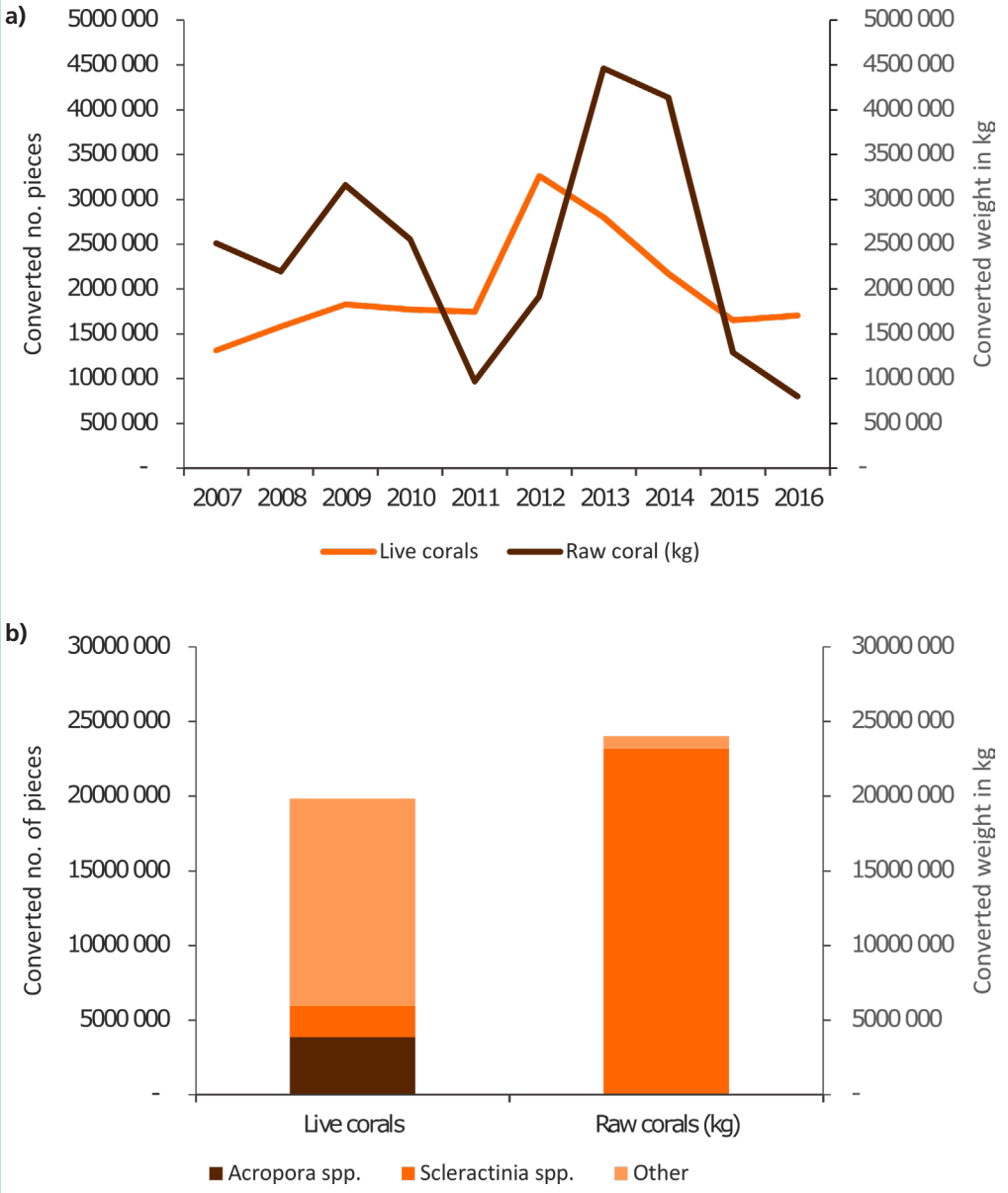
Indonesia and Fiji were the main exporters of coral products 2007–2016 (Table 5.2.1); the apparent reduction in raw coral exports in 2015 and 2016 (Figure 5.2.1a) may be due to the non-submission of annual reports by Fiji for those years.[39] Additionally, while raw corals were nearly all traded as Scleractinia spp., live corals in trade were much more taxonomically diverse (Figure 5.2.1b), with trade reported in 445 taxa.

[38] Raw coral is defined in Resolution Conf. 11.10 (Rev. CoP15) as raw or unworked coral, coral rock and live rock and substrate.

[39] At the time of data download (2 October 2018) Fiji had not submitted their annual reports for 2015 and 2016.

FIGURE 5.2.1

Direct exports of live and raw coral converted to preferred units for 2007–2016 (a) over time and (b) by taxonomic group, as reported by exporters. Source I is excluded



Source: CITES Trade Database (Available from: trade.cites.org, managed by UNEP-WCMC on behalf of the CITES Secretariat. Accessed 2 October 2018).

Expert assessment of coral trade reporting by Andy Bruckner, Director of Coral Reef Conservation Protection and Restoration at NOAA

Overview

Scoring from 1–5, with 1 being low, and 5 being high, the general legality of the coral trade was scored by Mr Bruckner as high (4). Mr Bruckner noted that the overall spatial and temporal accuracy of the CITES Trade Database data for corals was moderate (3).

Main strengths of the CITES trade data and reporting process for corals

- In relation to taxonomic identification and reporting on species in trade, Mr Bruckner found that the trade data provided a fair indication of the diversity of corals in trade (to genus level). While he noted complexities in identifying many corals to species level, he highlighted that CITES Notification 2013/035 provides a reasonable list of taxa that can be identified to species level and those that can be reported to genus. The notification indicates taxa that should be reported to species level when possible; for several of the larger exporters, export quotas appear to reflect trade at the species level that facilitates the making of accurate Non-Detriment Findings. For commercial transactions, the primary definition for units are "piece" for live coral and weight (in kg) for raw coral. The majority of trade is accurately depicted in these units, while other trade terms (e.g. scientific specimens) are reflected using alternative units.
- Mr Bruckner noted that the CITES Trade Database provides relatively reliable data on the spatial distribution of the trade for both exporting and importing countries, with the most accurate data from countries that are Parties to CITES. The vast majority of the Scleractinian coral commodities entering trade are sourced from the Asian Pacific, especially Australia, Fiji and Indonesia, while the United States of America is the largest importer.
- The data on trade for CITES-listed stony corals also provides a valuable indication of the variation in volumes of coral traded through time. This follows recent changes in demand for curios and aquarium specimens, including decreases in raw coral for curios, increases in both volume and species diversity for home aquaria, and lower levels of trade associated with the global financial crisis from 2008 to 2010.
- The CITES trade dataset also records shifts in production systems, reflecting the increased relative abundance of nursery-reared corals in trade over time.

Main issues in the reporting of CITES trade data for corals

- For many Scleractinian coral taxa the existing reporting to species level is most likely inaccurate, as microscopic examination of skeletal features is often required to identify to species (e.g. *Acropora* which consists of over 150 species many of which look similar to even the trained eye). There are exceptions, given that some of the more distinctive taxa and genera are more easily identified (see Notification 2013/035), however this is true of relatively few species.
- An important limitation of reporting trade at higher taxonomic levels (e.g. genus) is that certain speciose taxa contain both rare and common species, where rare species command a higher value and may be more likely to be over-exploited. In such cases, the relative levels of trade in common versus rare species cannot be monitored through the trade data when reporting is done at the genus level. Furthermore, making a positive determination on a Non-Detriment Finding at genus level could potentially compromise the sustainability of rare species within that genus. At a

higher taxonomy level, the name "Madrepora" is both formerly used to describe all Scleractinia, but also a genus of deepwater corals. Given the rarity of the genus *Madrepora*, a more in-depth analysis of trade reported by this name is required to understand what it refers to.

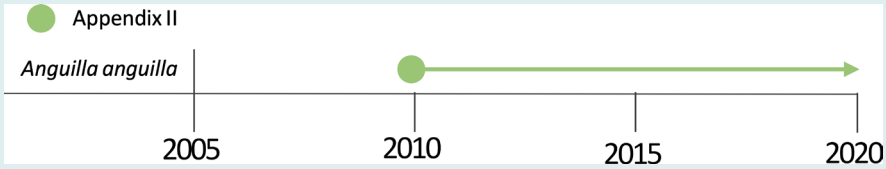
- For commodities traded for commercial purposes, the trade terms "live" and "raw coral" reported by weight or number of pieces are often used inconsistently, even within the same country. For example, Fiji mainly reports the export of Scleractinia (live rock) as live coral by weight, whereas the importers are more likely to report their imports as raw coral by weight. There is also a lot of Scleractinia reported by piece, both live and raw, whereas all of this material should be reported as raw coral by weight. A similar approach is evident with Australian corals, where Australia reported the export of less live coral and more raw coral than reported by the corresponding importing Parties. Australia's exports of live coral were 25 percent of reported imports by weight and 50 percent by number of items, while their exports of raw coral were 15 times higher than reported imports by importing Parties.
- Trade reported by importers and exporters may also differ, making trade levels difficult to interpret. For example, a number of countries in the Indo-Pacific (e.g. Australia, Solomon Islands and Tonga) have reported exporting considerably smaller quantities of coral, compared to reported imports from those countries. In the context of corals, one of the main sources of this mismatch is the lack of reported exports from non-CITES Parties such as Haiti (e.g. CITES Parties have reported the import of approximately 580 000 kg corals, mainly as Scleractinia, and 94 467 raw coral pieces from Haiti). Mismatches may also arise from: the non-reporting of Appendix II imports (this appears especially true for Fiji and Indonesia); differences between Parties in reporting the amount permitted versus the actual amount exported; and differences in the reporting of trade term (e.g. live vs raw corals) and source (e.g. wild vs maricultured).
- Some trade is also reported without an origin or exporting country, making it difficult to trace. For example, Israel reported importing an unusually large amount of live coral by number of pieces, reported only as Scleractinia from "various" or "unknown" exporters during 2010 (3 009 216 pieces).
- A growing proportion of the live coral in trade consists of second or later generation colonies raised in nurseries from small fragments originally removed from wild colonies. While most coral nurseries continue to replenish nursery stock with new wild colonies, exports of in situ nursery-reared coral is much less destructive to reefs. The source of this material is currently reported inconsistently: it is primarily reported as wild-sourced (e.g. by Fiji); however it has variously been reported as ranched (source R), first-generation captive-sourced (source F), or captive-bred (mainly in imports reported by the United States of America). Ultimately none of these codes are correct according to the official CITES source definitions (CITES, 1997). A very small proportion (< 0.1 percent) of the existing coral trade is also raised in land-based captive facilities from eggs/sperm, but it is unclear how this is reported by CITES Parties.

Recommendations to improve the CITES trade data and reporting process for corals

- Upgrade the training of customs agents in coral identification for both importing and exporting countries, along with the development of updated identification guides and tools.
- Focused training, including on standardized reporting, is needed for countries that have recently begun exporting corals, including origin countries that are not Parties to CITES (e.g. Haiti), countries that are recent signatories of CITES (e.g. Tonga) and countries that report commodities using unusual units and sources (e.g. Brazil).
- Trade should be reported using the recommended unit of measure (i.e. live coral by number of pieces and raw coral by weight) as per the "*Guidelines for the preparation and submission of annual reports*" (Annex 1 to Notification No. 2019/072).
- The development of a new standardized source code for live coral reared in *in situ* nurseries (along with a marking system to verify the corals are nursery-grown) is critical, as the specific conditions do not meet any of the current source codes. Further standardization and guidance on the correct source code for land-reared coral is also needed. The official definitions of CITES source codes within Resolution 12.3 (Rev CoP18) will need to be updated accordingly.
- In line with current guidelines on annual report submission (Annex 1 to Notification No. 2019/072), trade reported as "Scleractinia" (e.g. "live rock") should always be reported as raw coral by weight. Trade in Scleractinia spp. (live rock) should be considered separately from trade in Scleractinia reported to the genus or species level when conducting analyses or NDFs (Non-Detriment Findings), as the implications of their trade on coral reef ecosystems are vastly different.
- Ideally, raw coral would be reported as both pieces and weight, but this may be impractical. Alternatively, an analysis of the weight of specimens (both raw and live) for different taxa should be undertaken in order to develop new conversion factors; indeed, the data outlined in Green and Shirley (1999) reflect a trade that was very different 20 years ago, and they are especially inaccurate for raw corals.

5.3 EUROPEAN EEL – *Anguilla anguilla*

Appendix listing: Appendix II (listed in 2007, and came into force 13 March 2009)



IUCN Red List status: CR (2013) (Jacoby and Gollock, 2014)
IUCN population trend: ↓
Distribution: Coastal waters, rivers and lakes of Europe and throughout the Mediterranean, thought to spawn in the Sargasso Sea (Schmidt, 1909; Dekker, 2003a)
Main threats: Barriers to migration, habitat loss, climate change, disease and overexploitation (Dekker 2003b). Traded globally for food and aquaculture (Jacoby and Gollock, 2014; Ringuet, Muto and Raymakers, 2002)
Main commodities in trade: Live eels; meat
Estimated number of individuals in trade 2007–2016 [based on reported CITES trade data]: 6.7 million–3.9 billion

CITES context

European eel was originally proposed for CITES listing due to declining stock levels driven by local and international demand for meat, exacerbated by low juvenile recruitment levels (see Annex A for links to the CITES proposal).

In the context of the Review of Significant Trade process, the 30th meeting of the Animals Committee categorized Algeria, Morocco and Tunisia (the three countries included in the process for European eel at AC29) as "action is needed," and recommendations were directed to the countries to *inter alia*, establish conservative export quotas, including zero quotas for glass eels (AC30. Comm. 11 (Rev. by Sec.)).

In addition, Decisions 18.197-18.202 encouraged further cooperation and data sharing between range States, and directed the Animals Committee to provide recommendations to ensure sustainable trade in *A. anguilla*. The Eel Working Group of the Animals Committee recommended, *inter alia*, that the guidelines for annual reporting be updated to clarify that glass eels (up to 12cm) should be reported under the code for fingerlings and that all trade in live eels and meat be reported in kg (AC30 Com. 5 (Rev. by Sec.)). This recommendation was endorsed by SC70 (SC70 SR), and further details can be found in CoP18 Doc. 63.

CITES quotas:

All European Union Member States have published zero quotas for exports of European eels since 2010 (Croatia set a zero quota in 2015 following accession to the European Union in 2013), and this quota is reviewed by the European Union on an annual basis. The European Union also has Stricter Domestic Measures in place for the species by not permitting any imports from outside of the European Union from either wild or ranched sourced. Turkey also published a zero quota each year for 2014 to 2016, but published quotas of 70 000 kg in 2017 and 2018, 73 000 kg in 2019 and 100 000 kg in 2020. Tunisia published a quota of 135 000 kg of wild-taken eel each year for 2010 to 2018, 90 000 kg in 2019 and 2020, as well as a zero export quota for glass eels in 2020. Morocco published zero quota for glass eels in 2019 and 2020, as well as quotas of 500 000 kg of adult eels raised in aquaculture based on a harvest of 2 tonnes of glass eels and 5 500 of adult wild-sourced eels in 2019 and 2020. National laws prohibit to export live glass eels from Turkey, Tunisia and Morocco.

CITES suspensions:
At the time of writing[40] there were no CITES trade suspensions for European eel.

CITES trade summary 2009–2016

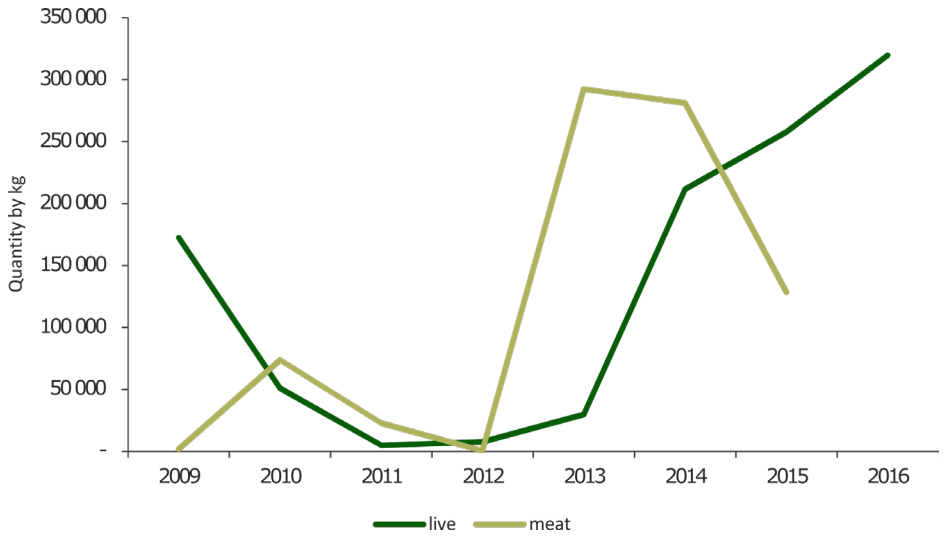
The majority of direct exports in European eel products over the period 2009[41]–2016 consisted of wild-sourced live eels and eel meat exported for commercial purposes (Table 5.3.1; Annex F). Re-exports of European eel products mainly consisted of pre-Convention and wild-sourced eel meat originating in France, Morocco, Spain and unknown countries imported by Japan from China.

TABLE 5.3.1
Main European eel commodities in direct trade for 2009–2016, as reported by exporters[a]

Commodity	Quantity	Estimated number of individuals	Main exporters	Main importers
Live eels	1.05 million kg 4 423 eels	3.9 – 3 888 million[1]	Morocco (0.72 million kg)	Republic of Korea (0.74 million kg)
Eel meat	0.8 million kg	2.8 million[2]	Tunisia (0.41 million kg)	China, Hong Kong SAR (0.36 million kg)

Source: CITES Trade Database (Available from: trade.cites.org, managed by UNEP-WCMC on behalf of the CITES Secretariat. Accessed 2 October 2018).
[a] All fields except "estimated number of individuals" present data in the exporter-reported unit. Source I was excluded.
[1] As trade in eel products is not differentiated by life stage in CITES term codes, conversion factors for juvenile or "glass" (higher estimate) and adult (lower estimate) eels were applied separately to trade in live eels reported in weight in order to estimate the potential range of individual animals in trade, using conversion factors detailed in Annex B. Expert input estimated the number of individuals to range between 3.2–4 771 million based on the following assumptions: (1) adult, grown live eel weight = 500g (max. eel weight produced in Moroccan farms, pers. comm. Stein 2019), (2) Number of glass eels per kg = 3,000. Both values are rough estimates that include uncertainty as they can vary greatly (e.g. based on origin of glass eels, farming duration, market demand). The maximum estimate of 4 771 million eels (total weight converted into glass eel equivalent) is unrealistic and indicates that reported live trade in European eel includes a large number of grown eels. It also highlights the difficulty in use of information when weight data for glass and other eel life stages reported in combination.
[2] In order to enable meaningful comparisons, meat reported in weight was converted to number of individuals using the conversion factor detailed in Annex B.

FIGURE 5.3.1
Direct exports of live eels and meat by weight over time for 2009–2016, as reported by exporters



Source: CITES Trade Database (Available from: trade.cites.org, managed by UNEP-WCMC on behalf of the CITES Secretariat. Accessed 2 October 2018).

Over the eight-year period, reported exports of live eels fell from most Parties (Figure 5.3.1), with the exception of Morocco, whose exports increased markedly from 2013 onwards.

[40] Accessed 3 July 2020.
[41] Trade data are available from 2009 when *Anguilla anguilla* was first CITES listed.

Expert assessment of European eel trade reporting by Florian Stein, Director of Scientific Operations, Sustainable Eel Group (SEG).

Overview

Scoring from 1–5, with 1 being low, and 5 being high, Mr Stein scored the general legality of the European eel trade as low (1). He scored the overall spatial and temporal accuracy of the CITES Trade Database data for European eel trade as moderate (2).

Main strengths of the CITES trade data and reporting process for European eels

- While the European eel *A. anguilla* is just one of 16 species in the family Anguillidae, it is the only one currently listed in CITES, and therefore the only *Anguilla* that Parties are obligated to report in trade. It is therefore assumed that all *Anguilla* trade reported to CITES is in European eel.
- There are a range of CITES term codes already in place to describe eel commodities in trade, along with recommendations from the Animals Committee and CITES Standing Committee (CoP18 Doc. 63) on how these should be applied in a standardized manner.
- The spatial and temporal understanding of trade should have simplified as of 2013, which was the first full calendar year when all exports of European eel were no longer permitted from the European Union (see Musing *et al.*, 2018: Table 10 for details). This allows researchers with an interest to follow the last exports of European sourced eel, for example in imports to China.
- Following trade data since the CITES listing and the associated European Union ban, there has been a notable shift in European eel trade from European Union Member States to non-European Union Member States. Knowing the source (e.g. wild or captive-sourced) and country of origin reveals where there is an increase in exploitation, which can in turn alert managers to where increased support for conservation may be required.

Main issues in the reporting of CITES trade data for European eels

- There are a number of European eel lookalike taxa (both *Anguilla* and related species), which adds complexity and uncertainty to the reporting, tracking and monitoring of compliance in the trade of European eel (see Musing *et al.*, 2018). This may result in the misidentification or mislabelling of products, leading to the wrong species being reported to CITES as European eel or, conversely, to European eel products being traded illegally, as another species, and not reported to CITES.
- The CITES Trade Database only captures trade reported to CITES and may not capture the whole picture of trade. European eels are not adequately recorded in trade and customs data, and/or inadequately reported to CITES. In national customs data and publicly accessible trade statistics (e.g. EUROSTAT, UNComtrade), where trade is reported as HS codes, eel commodities are usually not differentiated by *Anguilla* species. For example, EUROPOL estimates that about 100 tonnes (equating to approximately 300 million fish) were annually harvested and traded illegally during the 2017/2018 fishing season (SC70 Inf. 45).[42] There are further inconsistencies between trade in European eel as reported to CITES and national customs data.

[42] https://www.europol.europa.eu/newsroom/news/glass-eel-traffickers-earned-more-eur-37-million-illegal-exports-to-asia

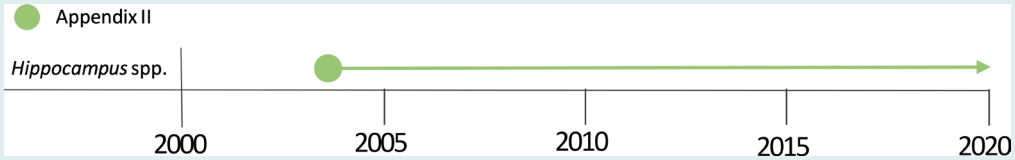
- CITES trade term codes and units are inconsistently applied, particularly across life stages and commodities (live juvenile fish, live fish, dead entire fish, fresh and processed fillets), which differ significantly in weight. For example, misreporting one processed filet (weighing on average 285 g) as a live glass eel (weighing about 0.3 g), would mean that one individual fish could be interpreted as 950 individual fish. Musing *et al.* (2018) concluded that the analysis of various customs datasets allows for a better understanding of international trade in European eels, not all of which was captured in CITES trade data. The application of recommendations from the Animals Committee (AC30 Com. 5 (Rev. by Sec.)) and CITES Standing Committee (CoP18 Doc. 63) are critical in ensuring correct reporting and interpretation of trade data.
- Musing *et al.* (2018) highlighted significant discrepancies between CITES exporter and importer data in trade in meat and bodies (2009–2016). Their study noted the total quantity reported as 20 times greater for bodies. Inconsistencies in reporting appear between European and Asian CITES and customs records, as well as between North African and Asian records (Musing *et al.*, 2018).
- Considerable quantities of European eel are harvested for domestic consumption, making full traceability more complex. Transparency is particularly poor with regards to the free movement of European eel products within the European Union, which are not reported to CITES (European glass eels are harvested in France, Spain, Portugal and the United Kingdom of Great Britain and Northern Ireland, and legally traded within the European free market for consumption, aquaculture and restocking purpose). The CITES trade data does not therefore provide full traceability, although Member States have been obliged to identify the origin and ensure traceability of all live eels imported or exported from their territory under European Union legislation (Article 12 of EU Council Regulation (EC) No 1100/2007). Implementing full traceability for the intra-European supply chain is one of the goals of developing industry standards (e.g. the Sustainable Eel Group Standard: Sustainable Eel Group, 2018).

Recommendations to improve the CITES trade data and reporting process for European eels

- Mechanisms to facilitate traceable trade in European eel (*A. anguilla*), from glass eels all the way to exports of market-sized products, still require development. This would help prevent illegally harvested and/or traded specimens entering or travelling along the supply chain: a requirement that is relevant to CITES but is directly applicable to European Union Parties (European Union Council Regulation (EC) No 1100/2007 (see SC70 Inf. 45)).
- CITES Parties should use preferred CITES term codes and units as detailed in Annex 1 to Notification No. 2019/072, and adopt any further recommendations detailed in AC30 Com. 5 (Rev. by Sec.) to improve differentiation in traded eel commodities.
- Standardized conversion factors should be agreed upon to allow estimates of the number of live individuals in trade based on the trade reported by weight.
- Further recommendations can be found in the conclusions of Musing *et al.* (2018), including the need for improved national, regional and international cooperation to address the challenges relating to the traceability of European eel in trade.

5.4 SEAHORSES – *Hippocampus* spp.

Appendix listing: **42 species Appendix II following CoP18**



IUCN Red List status: 42 assessed[1] (>2012): 12 VU, 2 EN[2]
IUCN population trend: 17 species ↓[2]
Distribution: Shallow temperate and tropical waters; highest levels of species diversity in the Indo-Pacific region (Foster and Vincent, 2004)
Main threats: Overfishing (primarily bycatch), traded dried for traditional medicine and souvenirs, live for aquariums (Vincent, Foster and Koldewey, 2011)
Main taxa in trade: *Hippocampus trimaculatus*, *H. spinosissimus* and *H. kelloggi* (bodies); *H. kuda*, *H. reidi* and *H. comes* (live)
Main commodities in trade: Seahorse bodies; live seahorses
Estimated number of individuals in trade 2007–2016 [based on reported CITES trade data]: 16 million

[1] The IUCN taxonomy recognizes the species *H. casscsio*, which is not covered by the CITES taxonomy, and *H. lichtensteinii* recognized under CITES taxonomy is not covered by any assessments in the Red List. As all *Hippocampus* species are listed in CITES, all Red List assessments for the genus were included in these figures. *Source*: IUCN Red List of Threatened Species (Available from: www.iucnredlist.org. Accessed 25 September 2018).
[2] IUCN Red List of Threatened Species (Available from: www.iucnredlist.org. Accessed 25 September 2018).

CITES context

The genus *Hippocampus* was originally proposed for CITES listing due to population declines in several species (*H. comes*, *H. spinosissimus, H. barbouri, H. reidi, H. erectus*, and *H. ingens*) in fished areas associated with demand for international trade; the rest of the genus was listed for "lookalike" reasons[43] (see Annex A for links to the CITES proposal).

Decisions 18.228-18.233 adopted at CoP18 identify the need to better understand patterns in seahorse trade, particularly following the Review of Significant Trade of *Hippocampus* spp. and *inter alia* direct the Animals Committee to make recommendations to ensure the trade in seahorses is sustainable and legal. At CoP18 Parties also noted challenges in implementing the Appendix II CITES listing for seahorses, including challenges with making Non-Detriment Findings (NDFs), monitoring trade and enforcing established trade controls. Ongoing work on seahorses under CITES is also detailed in CoP18 Doc. 72.

***CITES quotas*:**

Indonesia published quotas for live specimens of six seahorse species in 2006–2008 and for live *H. barbouri* in 2016 and 2017. Malaysia published zero quotas at the genus level for Sabah each year 2014 to 2017 (meaning these species should not be traded), while Viet Nam published quotas for three species in 2011 and 2012 and for *H. comes* in 2013.

[43] Species that do not appear to be directly threatened by trade may also be listed in CITES Appendices if they are difficult to distinguish from similar species (or the products of similar species) that are threatened by trade (Resolution Conf. 9.24 (Rev. CoP17) Annex 2b, Criterion A).

***CITES suspensions*:**
At the time of writing[44] there were CITES suspensions in place for *H. algiricus* from Guinea and Senegal on the basis of the Review of Significant Trade process, (Notification No. 2020/006), and the SC agreed to remove a suspension for *H. kuda* from Viet Nam at SC70 in 2018 (SC70 SR).

CITES trade summary 2007–2016

The majority of direct exports of seahorse products reported over the 2007–2016 period were in commercially traded captive-born live seahorses (source F; see Table G.1 for full source code description) and wild-sourced bodies (Table 5.4.1, Annex F). Reported re-exports of seahorse products were in lower quantities than direct exports, and mainly consisted of live seahorses originating in Australia re-exported from Singapore to the United Kingdom of Great Britain and Northern Ireland, and seahorse bodies originating in China and re-exported via China, Hong Kong SAR to the United States of America.

During the period 2007–2016, the estimated trade in live seahorses and bodies amounted to approximately 16 million individual seahorses harvested (see Annex B for conversion factors used): approximately 1 million traded as live seahorses and approximately 15 million traded as bodies (Table 5.4.1). While Thailand was the main reported exporter of seahorse bodies, reported exports of bodies from Thailand fell overall since the listing of *Hippocampus* species came into force. The main species in trade differed for bodies (dry seahorses) and live seahorses, with flat-faced seahorse (*H. trimaculatus*) and hedgehog seahorse (*H. spinosissimus*) dominating reported trade in bodies, and yellow seahorse (*H. kuda*) dominating reported trade in live seahorses (Figure 5.4.1 b).

TABLE 5.4.1
Main seahorse commodities in direct trade for 2007–2016, as reported by exporters[a]

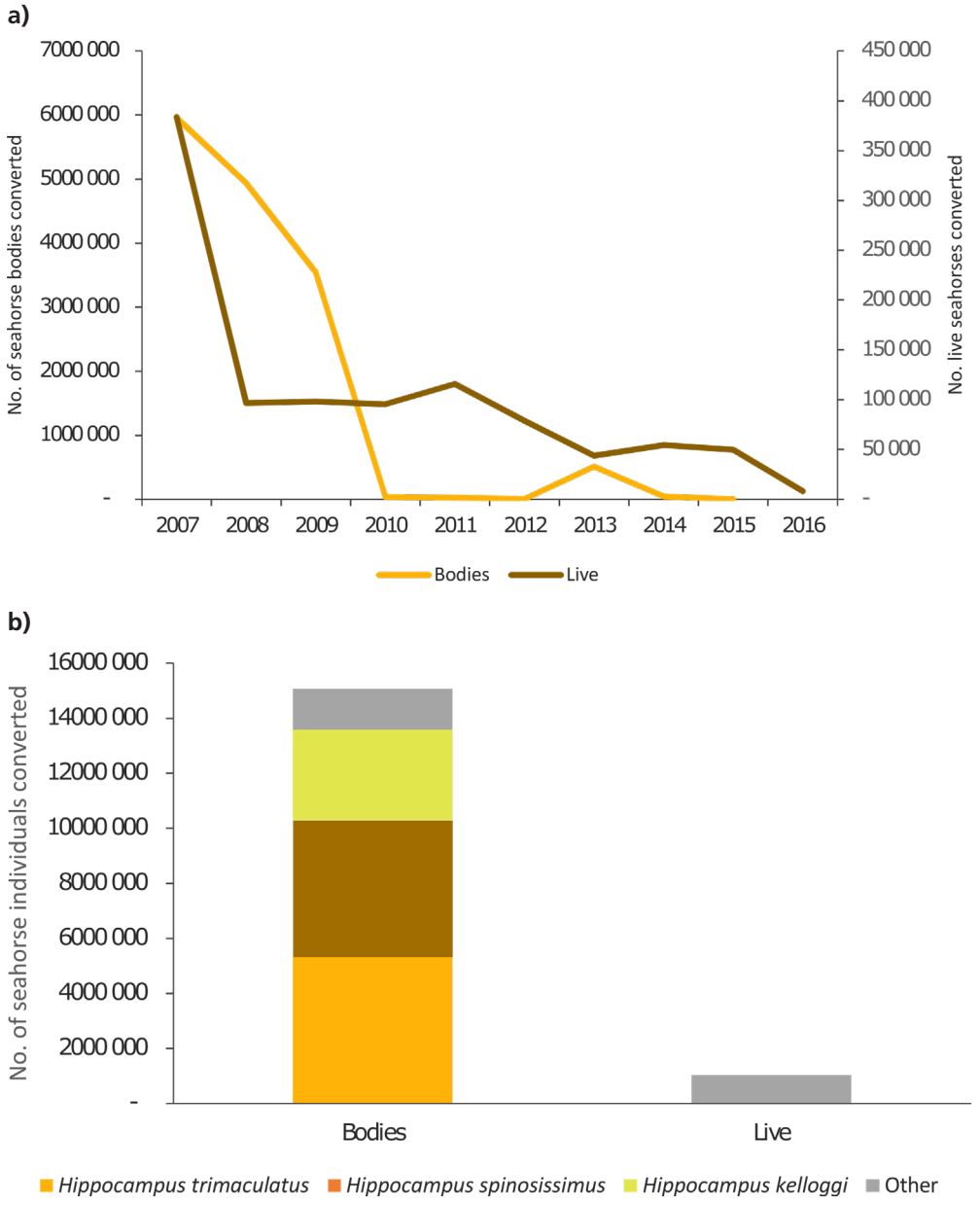
Commodity	Quantity	Estimated number of individuals	Main taxa	Main exporters	Main importers
Live seahorses	776 906 individuals 669 kg	1 024 777	*H. kuda* (384 673 individuals), *H. reidi* (177 512 individuals), *H. comes* (143 499 individuals)	Viet Nam (465 694 individuals)	United States of America (374 938 individuals)
Seahorse bodies	54 769 individuals 40 354 kg	15 056 256	Reported by weight[b]: *H. trimaculatus* (14 292 kg), *H. spinosissimus* (13 347 kg), *H. kelloggi* (8 837 kg)	Reported by weight[c]: Thailand (38 479 kg) Senegal (1 080 kg) Reported by number of individuals: Viet Nam (26 940 individuals)	Reported by weight[d]: China, Hong Kong SAR (30 368 kg) Taiwan, Province of China (5 798 kg) Reported by number of individuals: United States of America (26 603 individuals)

Source: CITES Trade Database (Available from: trade.cites.org, managed by UNEP-WCMC on behalf of the CITES Secretariat. Accessed 2 October 2018).
[a] All fields except "estimated number of individuals" present data in the exporter-reported unit. Source I was excluded.
[b] Using conversion factors (see Annex B), trade in the main taxa by weight translated to: *H. trimaculatus* (~5.3 million individuals), *H. spinosissimus* (~4.9 million individuals), *H. kelloggi* (~3.3 million individuals).
[c] Using conversion factors (see Annex B), trade from the main exporters by weight translated to: Thailand (~14.3 million individuals) and Senegal (~0.4 million individuals).
[d] Using conversion factors (see Annex B), trade to the main importers by weight translated to: China, Hong Kong SAR (~11.3 million individuals) and Taiwan, Province of China (~2.2 million individuals).

[44] Accessed 3 July 2020.

FIGURE 5.4.1

Direct exports of live seahorses and seahorse bodies converted to number of individuals* for 2007–2016 (a) over time and (b) by species, as reported by exporters



Source: CITES Trade Database (Available from: trade.cites.org, managed by UNEP-WCMC on behalf of the CITES Secretariat. Accessed 2 October 2018).

* In order to enable meaningful comparisons, data reported in weight was converted to number of individuals, using the conversion factor detailed in Annex B.

Expert assessment of seahorse trade reporting by Sarah Foster, Research Associate, Project Seahorse, University of British Columbia; Focal Point for Global Trade, IUCN SSC Seahorse, Pipefish and Seadragon Specialist Group.

Overview

Scoring from 1–5, with 1 being low and 5 being high, Foster scored the general legality of present-day trade in seahorses as low (1). She noted that the overall spatial and temporal accuracy of the CITES Trade Database data for seahorse trade was moderate (3) through 2008, but low (1) thereafter.

Main strengths of the CITES trade data and reporting process for seahorses

The CITES Trade Database offers a vital tool for the conservation of these patchily distributed, cryptic fishes, particularly in light of their huge global distribution and the fact that the movement of seahorses in trade predominantly crosses international borders. According to Foster *et al.* (2016), CITES trade data are a valuable resource, despite some imperfections, and the CITES Trade Database provides an unparalleled tool to probe legal trade in CITES-listed species, offering breadth of geographic coverage that allows many new insights into the species, volumes, and trade routes of seahorses in trade.

- The CITES Trade Database documents reported legal trade in listed seahorses and provides a good overview of the dominant species in trade. For example the CITES data shows that four Southeast Asian species (*H. kelloggi, H. kuda, H.* spinosissimus, and *H. trimaculatus*) dominated trade in seahorses following the CITES listing of *Hippocampus* spp.
- The data offer a historical reflection of the geography of trade, providing insights into the legal movements of seahorses between producer and consumer (as well as re-exporter) States.
- The data also reflects whether the seahorses traded were dried bodies or live, which has the potential to record shifts in trade.

Main issues in the reporting of CITES trade data for seahorses

Many of the seahorses being traded come from non-selective fishing (bycatch in global fisheries, including trawl fisheries), with products caught in small quantities and amassed from a broad range of sources before export. This complicates the ability for on-the-ground fishery data collection and controls, which makes trade data a critical tool to support management and conservation. There are many challenges in reporting and tracking trade in seahorses, and further clarification and standardization of reported CITES trade data is needed.

- On-the-ground capacity for species identification is limited for seahorses, and this impacts the abundance and quality of trade reporting. Expert experience suggests seahorses are not separated by species at extraction, and are unlikely to be separated for export; this means that large shipments, even when reported to CITES as a single species, are likely to contain a mix of species.
- Taxonomy in seahorses remains a challenge beyond the potential overuse of certain species names (e.g. *H. kuda*). Seahorse nomenclature is constantly under revision, yet CITES standard taxonomic references can only be updated once every three years at the CITES Conference of the Parties (CoP). Accepted CITES nomenclature does not therefore always align with the most up-to-date scientific taxonomy, meaning that trade may be reported as invalid names.

- The perceived discrepancies between domestic restrictions and the situation in domestic marketplaces suggest that exporting Parties are underreporting their seahorse exports (Foster *et al.*, 2016; 2019). This is exacerbated by the non-submission of CITES annual trade reports by seahorse exporters (e.g. Guinea, Sri Lanka and Togo).
- An observed lack of consistency between exporter- and importer-reported data means that reliance on the former alone might result in a distorted understanding of the dynamics of the seahorse trade. In the period 2007–2016 approximately 16 million seahorses were reported in trade by exporters, compared to 20 million reported by importers. While this may partly be the result of the import of seahorses from non-CITES Parties, several species were only reported in trade by one of the two trading partners. For example, trade in *H. reidi* and *H. erectus* bodies (equating to approximately 0.4 million individuals using the conversion factor in Annex B) was only reported by importers, and trade in live *H. procerus* and *H. capensis* (approximately 0.2 million live individuals) was only reported by exporters. Furthermore, exports of live seahorses or bodies from 11 countries/territories including China, Hong Kong SAR and the Philippines were only reported by the importing trading partners and not the exporter themselves.
- Units are a big challenge. In line with guidelines on the submission of annual reports (Annex 1 to Notification No. 2019/072), trade reported without a unit of measure is considered to be trade by number of items/individuals. However, sometimes units of measure are excluded erroneously, leading to under- or over-reporting of actual trade levels. For example, in one case – by checking back with the exporting country in support of Foster *et al.*, 2016 – trade reported as 19 000 was revised to 6.4 million individuals due to the unit of measure not being reported. On the other hand, checking back with exporting countries in support of Foster *et al.* (2016) revealed that a few of the larger volumes reported by number of item were not number of individuals but instead confirmed as number of capsules, each containing 1.4 mg of ground dried seahorse. In this case these trade records significantly overestimated the volume reported in trade. The clarification meant that the estimated export volume across these records was 15 not 30 000 individual seahorses. Expert experience suggests that in general live exports are counted as individuals because exporters do not weigh bags with seahorses and water.
- The report highlights "bodies" and "live" as the main forms of seahorse commodities in trade. A small number of seahorse shipments were also reported in other terms (derivatives, fingerlings, specimens, medicine, skeletons, extract, fins, powder, soup and trophies), although preferred units were not used consistently for these terms, and some of these terms may not be appropriate for seahorses (e.g. trophies).
- Spatial patterns of trade reported by CITES Parties may not provide a complete picture because they do not capture illegal trade. The CITES trade data suggests that the main source countries are in Southeast Asia and West Africa, and main consumers are in China, Hong Kong SAR; Taiwan Province of China; and mainland China. However, as discussed in Foster *et al.* (2016), spatial and temporal reporting of seahorse trades may not reflect real trade volumes and patterns due to any of the following: (i) mistakes in reporting, (ii) underreporting, (iii) restrictions on exploitation and/or trade, (iv) changes in capacity to supply, or (v) changes in actual supply. The declines in trade volumes observed, as reflected in the CITES Trade Database, can be explained by (iii) – the fact that major exporting Parties have either ceased issuing export permits, drastically reduced their permitted exports, or have had formal CITES suspensions.

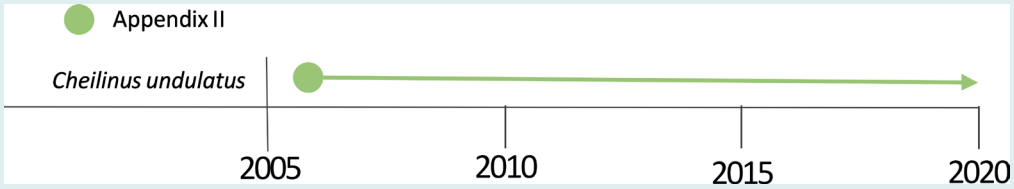
- There is evidence that the decline in legal exports attributed to recommendations from the inclusion of various seahorse species in the CITES Review of Significant Trade (RST) process has in fact not halted illegal exports (CoP18 Doc 72; Foster *et al.*, 2019). Fisheries surveys, trade surveys – or both – in source countries with CITES trade bans have revealed persistent illegal, unregulated and unreported (IUU) exportation of dried seahorses. Supporting this assumption, interviews with traders in import/market countries revealed that trade from source countries with export bans has continued (e.g. the Philippines and Thailand – but also Indonesia, India, Malaysia and Viet Nam; see Foster *et al.*, 2019). The difficulty of maintaining export bans to stem the trade in low-volume, high-value marine seafoods is a recognized "wicked" problem for compliance (Purcell, 2014).

Recommendations to improve the CITES trade data and reporting process for seahorses

- There is a critical need to improve species identification, in order to increase the capacity of local in-country staff to report trade to species level. Foster *et al.* (2016) noted that trade entries without species identity represented only a small percentage of total reported trade by volume; less encouraging, on the other hand, was the fact that entries at species level contained many entries that were potentially incorrect. Capacity for CITES Parties to strengthen their identification of seahorses to species level is needed to increase the taxonomic accuracy of trade reports. This also affects the capacity for compliance (surveillance, enforcement and prosecution).
- CITES Parties should be provided with taxa-specific guidance on terms and units to use to describe different seahorse commodities. For example, all live seahorse trade should be reported as number of individuals only – not in kg. All dried trade (i.e. trade reported as "bodies") should generally be reported by weight. In addition and where possible, trade reported in bodies without a unit should be verified to ensure the trade is indeed in individuals. This is particularly important for larger reported volumes that are not whole numbers (e.g. that include decimals) and those originating from Parties that have previously confirmed records reported without units as being in units of weight. The use of preferred units for reporting trade would help to estimate the number of individuals in trade more accurately.
- Where corrections to the CITES trade data are identified by CITES Parties (such as those noted above), they should be reported to the CITES Secretariat to ensure the official CITES trade data records are accurate.
- If CITES trade recording was digital, automated record validation could be developed to help eliminate common sources of errors. For example, entries of wild specimens could be automatically refused if the Party was not a range State for the particular species entered, the species was not in an official CITES taxonomic checklist, or if the entry lacked specified terms and/or units. Similarly, entries where units = "blank" (i.e. number of items) was used for a volume reported as a decimal number could also be refused.
- Development and standardization of up-to-date conversion factors should be agreed upon at the regional and species levels, instead of a single universal value being employed when converting weights to number of individuals.

5.5 HUMPHEAD WRASSE (NAPOLEON FISH), *Cheilinus undulatus*

Appendix listing: **Appendix II**



IUCN Red List status: EN (2004) (Russell B. (Grouper & Wrasse Specialist Group), 2004)
IUCN population trend: ↓
Distribution: Coral reefs and coastal habitats of the tropical Indo-Pacific (Sadovy *et al.*, 2003)
Main threats: Live reef fish food trade (Gillett, 2010; Russell B. (Grouper & Wrasse Specialist Group), 2004) and illegal, unregulated and unreported fishing (Sadovy, 2010; Wu & Sadovy de Mitcheson, 2016)
Main commodities in trade: Live fish
Estimated number of individuals in trade 2007–2016 [based on reported CITES trade data]: 92 024

CITES context

Humphead wrasse, also known as the Napoleon fish or wrasse, is one of only three marine coral reef fish taxa listed in the CITES Appendices. It was originally proposed for CITES listing due to large declines in populations that were subject to over-exploitation for the international live reef fish food trade; this was exacerbated by low rates of population replacement (see Annex A for links to the CITES proposal). A listing proposal for this species was rejected at CoP12, but a second was adopted at CoP13.

CITES Decision 18.209 directs, *inter alia*, the Secretariat to continue supporting major importers and exporters to ensure that trade in the humphead wrasse is sustainable and well-regulated. Former Decisions are reported on in CoP18 Doc. 67. Several positive steps have been taken. As of 2018, humphead wrasse is a Class II threatened species in mainland China, with progress in China, Hong Kong SAR, the major trade hub, that has resulted in increased numbers of prosecutions and substantially reduced numbers of fish in the retail sector in the city; a reduction of two thirds between 2015 and 2017 and ongoing.

***CITES quotas*:**

Indonesia has published an annual quota for live *Cheilinus undulatus* every year since the listing came into force (2006–2020) except for 2017 (when the quota was "in prep.").[45] Starting at 8 000 live individuals in 2006, Indonesia's annual quota has reduced over time to 1 800 live individuals in 2018 (the export of wild-sourced specimens continues to only be permitted by air (Notification No. 2018/022)). Indonesia's annual quota was 1 800 live wild-sourced and 15 000 live ranched individuals in 2019 and reduced to 6 500 live ranched individuals in 2020. Malaysia published an annual zero quota for export of the species from Sabah each year for 2010 to 2018 (with the exception of 2010, when a zero quota was issued for Peninsular Malaysia).

***CITES suspensions*:**

At the time of writing[46] there were no CITES trade suspensions for *Cheilinus undulatus*.

[45] speciesplus.net, managed by UNEP-WCMC. Accessed 25 September 2018.
[46] Accessed 3 July 2020.

CITES trade summary 2007–2016

Nearly all reported direct exports of humphead wrasse products over 2007–2016 consisted of wild-sourced live fish exported for commercial purposes (Table 5.5.1; Annex F); humphead wrasse was re-exported in very low quantities (24 live individuals and one scientific specimen, as reported by exporters).

Indonesia and Malaysia were the main reported exporters of live humphead wrasse over the period 2007–2016, although Malaysia's exports were 2007–2009 (Figure 5.5.1). With no humphead wrasse exports from Malaysia after 2009 (due to the zero export quota), the total number of reported live exports dropped sharply in 2010, and has continued to decline since (Figure 5.5.1).

TABLE 5.5.1
Main humphead wrasse commodities in direct trade for 2007–2016, as reported by exporters

Commodity	Quantity	Main exporters	Main importers
Live wrasse	92 024 individuals	Malaysia (65 090 individuals) Indonesia (26 496 individuals)	China, Hong Kong SAR (82 911 individuals)

Source: CITES Trade Database (Available from: trade.cites.org, managed by UNEP-WCMC on behalf of the CITES Secretariat. Accessed 2 October 2018).

FIGURE 5.5.1
Direct exports of live humphead wrasse (*Cheilinus undulatus*) for 2007–2016, as reported by exporter

Source: CITES Trade Database (Available from: trade.cites.org, managed by UNEP-WCMC on behalf of the CITES Secretariat. Accessed 2 October 2018).

Expert assessment of humphead wrasse trade reporting by Professor Yvonne Sadovy de Mitcheson, co-Chair of the IUCN (World Conservation Union Specialist Group on Groupers and Wrasses).

Overview

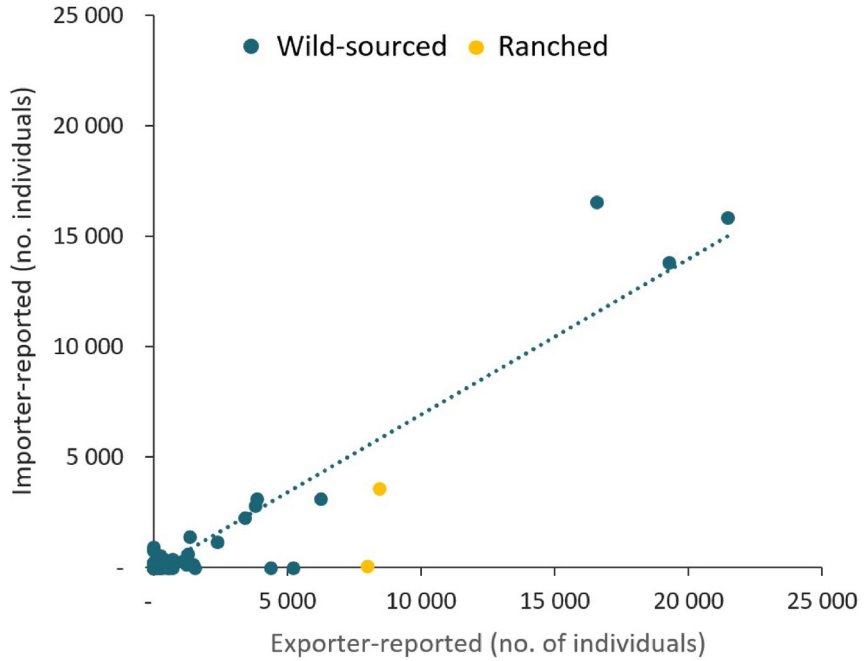
Scoring the general legality of humphead wrasse trade from 1–5, with 1 being low, and 5 being high, Prof. Sadovy de Mitcheson scored it as low to moderate (2.5). She attributed a similar score (2.5) to the overall spatial and temporal accuracy of records in the CITES Trade Database.

Main strengths of the CITES trade data and reporting process for humphead wrasse

- As a distinctive species that is easy to differentiate from other fishes the humphead wrasse is unlikely to be confused with any other species in trade.
- The trade data reflect where trade is occurring, with one notable exception (the Philippines). Gillett (2010) identified Indonesia as the main exporter of the species, followed by the Philippines, Australia and Malaysia, whereas more recently Hong Kong SAR (as major importer) and Indonesia (as major exporter) are the major reported importers/centres of trade.
- Nearly all legal trade in live humphead wrasse was reported in the recommended units: by number of individuals. In the case of the various forms of fish in trade, almost all of those in CITES records are live and for commercial sale, for food. Very small numbers of dead animals are reported and few live animals are traded for research, zoos and aquariums, which limits confusion in the data available.
- Between CITES listing in 2004 and 2017 humphead wrasse was only traded as wild-sourced. However, as of end 2017 it also began being traded as ranched. The number of wild-sourced fish traded (quota was < 2 000 annually) is much lower than that for ranched (c. 40 000 annually was the initial export quota for ranched fish), and individuals reported under both source codes are taken from the wild at different life-history stages. Scrutiny of the description of the source of trade can inform management about shifts in production practice through time.
- The trade data appear to reflect the changing trends in the trade of wild-sourced fish accurately, including the decline in exports from Malaysia following their introduction of a zero export quota in 2009, and the corresponding declining numbers of fish on sale in Hong Kong SAR.
- Over the last decade, trade data generally correlate well between Indonesia (exports) and China, Hong Kong SAR (imports), although exports were generally higher than imports reported; this could partly be the result of fish mortalities in transit, but also due to inconsistencies in reporting Appendix II imports (see Figure 5.5.2). Also, exported ranched fish (source R) are poorly reflected by import figures.
- Reporting of wild-sourced humphead wrasse trade to the CITES Trade Database has generally been improving, with the best match between CITES-reported imports and exports and independent counts of fish on sale in China, Hong Kong SAR in 2017. Mainland China imports were also reported in the same year. However, there is a greater discrepancy in reported trade levels for ranched animals, with importers reporting considerably fewer ranched individuals than exporters. Since both wild and ranched specimens come from the wild, uncontrolled fishing and trade in either type could be detrimental to the species – this is a matter of concern given the depleted state of the species in Indonesia because the export quota for ranched fish is not based on scientific data (Sadovy de Mitcheson *et al.*, 2019).

- Reporting by China, Hong Kong SAR (a major trade hub for the species) seems good, with illegal trade declining within China, Hong Kong SAR since 2016. This is almost certainly due to increased government enforcement efforts, in addition to increased numbers of prosecutions. In China, Hong Kong SAR additional controls of CITES-listed species under local legislation mean that inspections are required for importers and retailers that sell wild-caught live humphead wrasse. Retailers are issued licenses that are valid for a specified number of fish for five years and these local controls complement those of CITES, as well as increasing the ability to enforce CITES trade.

FIGURE 5.5.2
The annual number of live humphead wrasse (*Cheilinus undulatus*) reported in trade by exporters vs importers for each exporter-importer pair for 2006–2018



Source: CITES Trade Database (Available from: trade.cites.org, managed by UNEP-WCMC on behalf of the CITES Secretariat. Accessed 2 October 2018).

Main issues in the reporting of CITES trade data for humphead wrasse

- Although considered an easy species to identify, humphead wrasse can still present a challenge to customs staff unfamiliar with different fish (as opposed to terrestrial species). For example, its trade can be obscured when it is included within live food fish trade shipments with mixed species (shipping boxes labelled as "groupers" that include humphead wrasse mixed in among groupers).
- The nature of the shipping methods for wrasse transported by air or moved from live carrier (cargo) vessels to importer/wholesaler/vendors means fish are often sealed in temperature-controlled packaging that have time-sensitive transport schedules, or are part of large shipments of fish within a boat well, which may be impractical to inspect. This can discourage compliance officers from making intrusive assessments. Such impediments to live fish shipments can hinder both data collection and compliance checks.

- International trade of live humphead wrasse reported over time is probably an underestimate, as there is recorded illegal trade, which means that numbers in trade are somewhat higher than appears in the CITES Trade Database. For example the Philippines does not report any humphead wrasse exports in their CITES annual reports: since 2010 the Philippines have had a national trade ban on the export of CITES-listed aquatic species, so any export of humphead wrasse would be illegal. However, the Philippines continue to regularly export this species although it is illegal to do so (BFAR, 2017). Exports that once occurred from Malaysia were largely due to smuggling into the country from the Philippines. Despite the zero export quota from Malaysia, smuggling from the southern Philippines into eastern Malaysia has occurred (Fabinyi and Dalabajan, 2011). According to an independent report from the Philippines exports are also thought to occur from the Philippines to Taiwan Province of China, China, Hong Kong SAR and mainland China (BFAR, 2017).
- Reported trade in humphead wrasse to mainland China is considerably lower than the tens of thousands that have been noted for sale in Chinese trader surveys (Wu and Sadovy de Mitcheson 2016; Hau and Sadovy de Mitcheson, 2019) and related studies (Wu and Sadovy de Mitcheson, 2016)) with the source of fish unknown. This apparent under-reporting is present in both exports to China and imports reported by China, despite that fact that independent studies have shown mainland China to be a major consumer of humphead wrasse (under CITES, the reporting of imports of Appendix II species is optional). There were also very limited records of re-exports of humphead wrasse from Hong Kong SAR to mainland China, an activity which is also known to occur (Wu and Sadovy de Mitcheson 2016).
- Many fish observed on retail sale in China, Hong Kong SAR are undersize – including those originating from Indonesia and on CITES permits – i.e. below the legal 1 kg minimum size limit for export that applies to both wild-caught and ranched fish according to Indonesian national law.[47] Since Indonesia is currently the sole legal exporter this strongly suggests that many if not all of these fish are exported illegally (in terms of national law), which means they are not compliant with CITES legality provisions. From the import perspective of China, Hong Kong SAR, this minimum size limit needs to appear on the CITES Export Permit for customs enforcement for the government to be able to ensure compliance. Checking fish size at import is relatively easy for China, Hong Kong SAR authorities, so the inclusion of the size restriction on the export permit would be an easy addition to help to control fish to within legal size limits.
- While all wild-sourced fish must be exported from Indonesia by air, as of 2018 ranched fish can only be exported by sea (on live fish carrier or cargo vessels). Ranched fish are currently exported from an area in northwestern Indonesia where there is no convenient access to air transport. The poor oversight of these vessels, some of which have been associated with illegal trade in the species (Sadovy de Mitcheson *et al.*, 2017), the very large discrepancy between wild-sourced and ranched export quotas, and the inability to distinguish the two sources after export, opens the door to laundering of wild-sourced as ranched fish and has seriously undermined enforcement ability for this species, after import, in China, Hong Kong SAR. Moreover, poor accountability by vessels may account for the large disparities in recent trade records of fish reported as ranched. The destination country(ies) of most ranched fish is (are) not regularly reported in Hong Kong SAR annual reports to CITES.

[47] Indonesia has issued a notification to request support from importing countries to assist with compliance (https://www.cites.org/sites/default/files/notif/E-Notif-2018-022.pdf).

Recommendations to improve the CITES trade data and reporting process for humphead wrasse

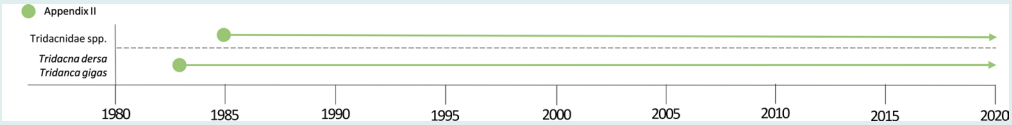
Several reasonable and feasible actions for improving trade reporting, including measures that would help to reduce illegal trade, are suggested below. As the quality of CITES trade data for the species seems high there are no specific reporting recommendations for this species. However, more work may be needed to strengthen compliance, and to understand and reconcile differences between CITES trade data and market-based observations.

- Training of customs officers to distinguish humphead wrasse from groupers and other reef fishes is needed to detect the species when occasionally mixed in with groupers (and labelled as such) in the live fish trade. This is especially true for inspections of boxes of live fish shipped by air, as well as for inspections of fish in live fish carrier vessels and offloaded at ports. Many Customs officers may be less familiar with fishes than they are with terrestrial animals and plants.
- Indonesia has been taking small post-larval fish from the wild to grow out (ranch) to market size in floating cages for many years. It is recognized that while this fishery and post-capture aquaculture offers livelihood opportunities to remote island communities, their impacts need to managed to ensure the species' long-term sustainability. Since the rearing of wild-caught post larval fish is likely to continue and may be transferable to other regions of the Asia Pacific, research is needed to determine the optimal management settings that can ensure the conservation or recovery of the species (as well capacity development and ongoing support for the extension of any developing findings). Indonesia has developed an NDF to support legal trade in ranched humphead wrasse, but it is not based on scientific study and acknowledges that there are still questions outstanding on the sustainability of the current export quota for ranched specimens. Ongoing research is still needed to establish a quota that ensures sustainable trade.
- While ranched and wild-sourced humphead wrasse have different quotas and different transport regulations (wild-sourced fish can only be exported by air; ranched fish only by sea), it is impossible to distinguish between the sources after leaving Indonesia. This has created a new enforcement challenge because vessel trade in the species can be more difficult to monitor and control compared to air cargo. Live carrier vessel trade and activities need stronger government oversight which could be facilitated by communication between CITES Management Authorities in export and import countries.
- The size restrictions of this species for export (1–3 kg), according to Indonesia's national law, could be added to the CITES Export Permit – this would enable importer countries to help enforce this size limit and would assist Indonesia. The size could be considered part of the NDF measures, as humphead wrasses are protogynous hermaphrodites (female-to-male sex change as they grow older); this size limit approach helps to protect juveniles and smaller females that are below 1kg and larger female and male fish above 3kg (Sadovy de Mitcheson, Suharti and Colin, 2019).
- Controls and inspections of humphead wrasse that are chilled or frozen (i.e. not alive) are minimal. Since this species is now considered economically valuable even when not alive (i.e. chilled/frozen), closer attention to the documentation of trade in non-live forms is necessary, especially through novel trade mechanisms, such as via the internet.

- A means to distinguish between ranched and wild-sourced fish is needed. Since neither source is tagged or otherwise marked, it is impossible to distinguish between them after they have left Indonesia, which has seriously hampered enforcement capability in Hong Kong SAR since 2018. Research and practical testing of means to distinguish between wild-sourced and ranched fish could involve tagging fish from one source prior to export. Experiments are underway to individually identify fish in trade through the use of facial recognition software being developed at the University of Hong Kong (Hau and Sadovy de Mitcheson, 2019). The development of improved traceability would preferably be linked to China, Hong Kong SAR Possession Licenses, which are currently valid for five years (and which are in addition to CITES requirements). Considering the relatively fast market turnover rate, an effective traceability system is needed to remove the opportunity to "launder" illegal fish among legal, CITES-permitted fish, and to misreport wild-sourced fish as ranched. Noting that the study of Hau and Sadovy de Mitcheson (2019) showed the typical turnaround of individual fish in the city is less than one month, the duration of possession licences could be significantly shortened.

5.6 GIANT CLAMS – TRIDACNIDAE SPECIES

Appendix listing: **11 species Appendix II**



IUCN Red List status: 9 assessed (1996): 4 VU, 4 CR, 1 LC [1]
IUCN population trend: Unknown[1]
Distribution: Tropical shallow waters and reefs (bin Othman, Goh and Todd, 2010; Neo *et al.*, 2017).
Main threats: Overexploitation for food, ornaments and live for aquariums (Kinch and Teitelbaum, 2010; bin Othman, Goh and Todd, 2010)
Main taxa in trade: *Tridacna maxima*, *T. crocea* (live); *T. gigas* (shells and meat)
Main commodities in trade: Live clams, shells
Estimated number of individuals in trade 2007–2016 [based on reported CITES trade data]: 720 612

[1] IUCN Red List of Threatened Species (Available from: www.iucnredlist.org. Accessed 25 September 2018).

CITES context

Giant clams were originally proposed for CITES listing in 1985 due to population declines associated with demand for meat for domestic consumption and international trade in their shells (see Annex A for links to the CITES proposals). With the rise of home aquaria, giant clams are also traded as live animals for the global aquarium trade.

Giant clams are particularly threatened by overexploitation because they are sessile broadcast spawners. Their inability to move as adults, and this method of reproduction means populations cannot reproduce successfully when the parent stock becomes too sparsely distributed, i.e. below a critical density (bin Othman, Goh and Todd, 2010; Kinch and Teitelbaum, 2010).

Coral reef habitat degradation and the projected impacts of climate change also impact on the sustainability of harvesting giant clams. Currently, there are no CITES Decisions, Notifications or Resolutions specific to Tridacnidae species.

CITES quotas:

Fiji, Madagascar, Mozambique, New Caledonia and the Solomon Islands published zero quotas for one or more of the following Tridacnidae species over the 2008 to 2017 period: *Hippopus hippopus, Tridacna crocea, T. derasa, T. gigas, T. maxima*[48], *T. noae* and *T. squamosa*. The Solomon Islands published a zero quota for *Tridacna* spp. for the period 2013 to 2015. Viet Nam published quotas for live *T. crocea, T. maxima, T. noae* and *T. squamosa* for the period 2009 to 2012, starting with 11 079 *T. crocea* and 1 949 of each of the other species in 2009, and falling to 5 500 and 1 050 respectively in 2012. Viet Nam also published a zero quota for *T. gigas* each year from 2009 to 2011.

CITES suspensions:

At the time of writing,[49] CITES trade suspensions were in place for the export of *Tridacna crocea, T. derasa, T. gigas, T. maxima, T. noae* and *T. squamosa* from the Solomon Islands as a result of the Review of Significant Trade process (Notification No. 2020/006).

[48] *Tridacna noae* was split from *T. maxima* following taxonomic changes adopted at CoP17; Species+ therefore displays quotas for this species as well as *T. maxima* where quotas were issued under *T. maxima.*

[49] Accessed 3 July 2020.

CITES trade summary 2007-2016

The majority of reported trade in giant clams over the study period consisted of live giant clams and shells. The main exporters during the study period were Viet Nam, France[50] and Cambodia (Table 5.6.1; Annex F). Re-exports of giant clam products mainly consisted of wild-sourced live boring clam (*T. crocea*) originating from Cambodia and re-exported from Viet Nam to various import countries, including the United States of America, Canada and South Africa for commercial purposes.

TABLE 5.6.1
Main giant clam commodities in direct trade for 2007–2016, as reported by exporters[a]

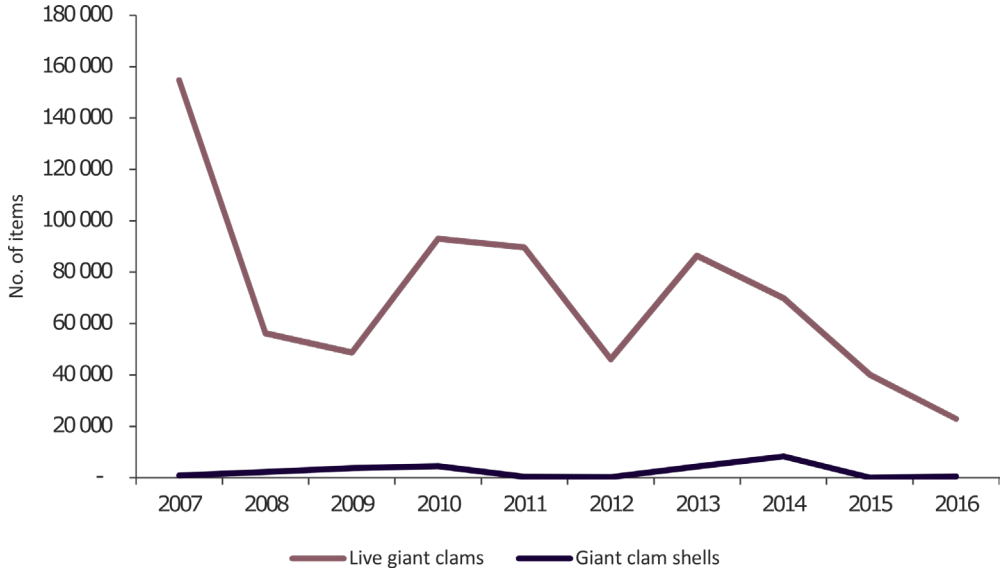
Commodity	Quantity	Estimated number of individuals	Main taxa	Main exporters	Main importers
Live giant clams	707 925 individuals 660 kg	707 925	*Tridacna maxima* (336 947 individuals) *T. crocea* (253 503 individuals)	Viet Nam (192 553 individuals) France[1] (149 886 individuals) Cambodia (126 000 individuals)	United States of America (279 460 individuals) Viet Nam (126 000 individuals)
Giant clam shells	25 373 shells 39 kg	12 687	*Tridacna gigas* (6 278 shells) *T. squamosa* (4 280 shells)	Fiji (9 726 shells) Palau (5 328 shells) Solomon Islands (5 031 shells)	United States of America (6 640 shells) China (6 537 shells)

Source: CITES Trade Database (Available from: trade.cites.org, managed by UNEP-WCMC on behalf of the CITES Secretariat. Accessed
2 October 2018).
[a] All fields except "estimated number of individuals" present data in the exporter-reported unit.
[1] Likely to be from French Polynesia, a French overseas territory. In their annual trade reports to CITES, France combine trade to/from their overseas territories with that of mainland France, so these cannot be differentiated between in the CITES trade data.

The reported trade in live giant clams and clam shells in 2007–2016 was estimated to equate to 720 612 individual giant clams (Table 5.6.1). Exports of live giant clams showed considerable fluctuation between 2007 and 2016with a noticeable decline from 2013 (Figure 5.6.1). The decline after this period could be partially attributed to Fiji, a main exporter of giant clam shells during the study period, who had not yet submitted annual reports for 2015 and 2016.

[50] Likely to be from French Polynesia, a French overseas territory. In their annual trade reports to CITES, France combine trade to/from their overseas territories with that of mainland France, so these cannot be differentiated between in the CITES trade data.

FIGURE 5.6.1
Direct exports of live giant clams and giant clam shells converted to number of individuals* for 2007–2016, as reported by exporters. Source I is excluded



Source: CITES Trade Database (Available from: trade.cites.org, managed by UNEP-WCMC on behalf of the CITES Secretariat. Accessed 2 October 2018).
* In order to enable meaningful comparisons, data reported in weight was converted to number of individuals, using the conversion factor detailed in Annex B.

Expert assessment of giant clams trade reporting by Jeff Kinch, Secretariat of the Pacific Community

Overview

The expert assessment found that the general legality of the trade in giant clams was ranked as moderate (scored 3 on a scale from 1–5, with 1 being low, and 5 being high); the overall spatial and temporal accuracy of the giant clam trade records was also moderate (3).

Main strengths of the CITES trade data and reporting process for giant clams

Giant clams have been listed in CITES Appendix II since 1985 and since that time there has been a high level of awareness that CITES trade controls are in place for these species.

- Regarding taxonomic identification and reporting on giant clam species in trade, the CITES Trade Database possesses a good level of documentation with regards to trade in giant clam commodities, particularly where live animals for the aquarium organism trade were concerned, although this is limited to reported trade from certain specific countries.
- As giant clams are quite distinct in shape and size, different trade terms are easily distinguishable and meet the needs of reporting different commodities in trade (i.e. traded as live animals, shells or meat).
- The data on trade in giant clam commodities also provides a valuable indication of the variation in volumes of giant clams traded through time.

Main issues in the reporting of CITES trade data for giant clams

Historically a number of countries have traded large numbers of giant clams, but many of these were/are not CITES Parties and so their trade may not have been reported. This may account for differences observed in the trade data between exporter and importer country.

For improvement in CITES reporting, several issues have been identified, including:

- A refined understanding of the taxonomy of giant clams which is now outdated as new clam species have been identified. It is now commonly accepted that there are 12 giant clam species recognized globally (Neo *et al.*, 2017).
- While the trade in live giant clams and their shells reported by weight was comparatively small, these data were excluded from estimates of the number of individuals in trade because no conversion factors were available. For live giant clams the aquarium organism trade demands certain size classes. A short research project could determine size and weight ratios for giant clams species that are traded. For the shell trade, obtaining size and weight ratios will be more difficult depending on the purpose of the giant clam shell. Smaller giant clam shells are sought after by the ornamental and handicraft trade, while larger giant clam shells are destined for the manufacture of paints and tiles (Neo *et al.*, 2017).
- While trade in giant clams has been reported in numerous terms (e.g. bodies, carvings, live, meat, powder, shells and specimens), it is not always clear what some (e.g. bodies) refer to. The term/unit/purpose combinations can also be confusing. Given the length of time that giant clams have been included in Appendix II of CITES, clarification is required to determine clearly what is being traded, and in what quantities. This includes powder (i.e. how many shells and what species have been utilized to make a specific quantity of powder) and giant clam commodities for the ornamental and handicraft trade (which includes shells of some of the most vulnerable species, e.g. *T. gigas*).
- Some spatial and temporal trade data are missing because many exporter countries are either non-CITES Parties or have only recently acceded to the Convention. As reporting of Appendix II imports is not a requirement under CITES (see Chapter 3.3), it is possible that there is significant trade in giant clam commodities which are not being reported by either the exporting or importing country.
- Even where exporting countries are CITES Parties, the reported trade data does not always accurately reflect known trade. For example, the shells of *T. gigas*, and large *T. maxima* are thought to be used for shell carving in southern China; however, the trade in larger giant clams to China to supply this, and the re-export of shell carvings from China, appear under-reported. Despite strong controls implemented by the Hainan provincial government in China in 2017, which have prohibited the removal of giant clams from the wild and their sale under most circumstances, trade is reportedly still ongoing (Global Times, 2019). This is partially driven by the high value of these products (Lee, 2016).

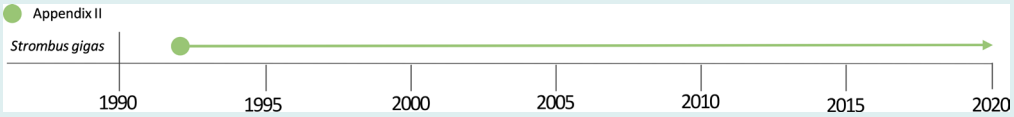
Recommendations to improve the CITES trade data and reporting process for giant clams

- A number of new giant clam species have been recently identified (by genetics or morphology), renamed, or have had their range extended (see Gilbert *et al.*, 2007; Neo *et al.*, 2017; Keyse *et al.*, 2018). In order for countries to identify species being exported from their waters both the taxonomy and distribution of giant clam species in trade needs updating. For example, recent evidence suggests that *T. noae* is a separate species rather than a synonym of *T. maxima* (Su, Hung, Kubo and Liu, 2014; Militz, Kinch and Southgate, 2017); historically this synonymisation will have led to a substantial overestimate of *T. maxima* in trade.
- Further guidance on distinguishing between species, particularly newer species, is also needed to support identification.

- A greater level of reporting of Appendix II imports by Parties would help to clarify the extent of trade in giant clams, including trade originating in countries not currently party to CITES.
- To help determine the real scale of trade, Parties should also report on trade in live giant clams and their shells in the preferred units (number of individuals/ items). To assist with this, the Animals Committee could request appropriate research to be conducted to identify standardized conversion factors for giant clams reported by weight in order to estimate the number of individuals in trade more effectively. This would require several size classes of giant clams to be analyzed.
- Further investigation is specifically required to determine the scale of trade in both giant clam adductor muscle and live giant clams being exported for the marine aquarium organism trade.
- With new routes for international trade in giant clams opening up (e.g. increases in online trade), compliance might need to be upgraded to ensure CITES trade records are being lodged along with such trade. For example, the Chinese web commerce site, "Alibaba" has two dozen pages dedicated to giant clam shell products, and the Chinese social media app "WeChat" offers the delivery of giant clam commodities to a range of locations (Lee, 2016; Global Times 2019).

5.7 QUEEN CONCH – *Strombus gigas*

Appendix listing: **Appendix II**



IUCN Red List status: Not assessed[1]
IUCN population trend: Not assessed[1]
Distribution: Coastal waters of the Caribbean (Prada *et al*., 2017)
Main threats: Overexploitation for meat and secondary products (e.g. shells and pearls) (Prada *et al.*, 2017; Theile, 2005)
Main commodities in trade: Meat; shells
Estimated number of individuals in trade 2007–2016 [based on CITES trade in shells]: 2 541 276

[1] IUCN Red List of Threatened Species (Available from: www.iucnredlist.org. Accessed 25 September 2018).

CITES context

Queen conch is primarily threatened by overharvesting for domestic and international trade in meat, shells and pearls (Prada *et al.*, 2017; Theile, 2005), and was originally proposed for CITES listing due to the pressure this places on populations (see Annex A for links to the CITES proposal).

Since being listed in Appendix II, queen conch was selected for the Review of Significant Trade process in 1995 and 2001, as a result of which may countries ceased to export legally. CITES Decisions 18.275-18.280, *inter alia*, direct range States to implement regional and national plans for queen conch management and continue developing national and regional conversion factors. A working group on queen conch was established in 2012, which held its second meeting in 2012 and its third meeting in 2018. Recommendations from that meeting included adoption of conversion factors at either national or regional levels, as well as reporting future catch figures as live weight equivalents. These are reported on in CoP18 Doc. 85. Further details can be found in CoP18 Inf. 91.

***CITES quotas*:**
The Bahamas, Colombia, Cuba, the Dominican Republic, Honduras, Jamaica, Nicaragua and Turks and Caicos have all published quotas for queen conch for various years over the period 1997 to 2020.[51] Quotas published by Colombia, Nicaragua, and the Turks and Caicos Islands covered meat, shells and pearls, while quotas from other Parties only covered meat. Honduras, Jamaica and Nicaragua were the only Parties to publish quotas in 2017 or 2018, while Nicaragua also published quotas in 2019 and 2020.

***CITES suspensions*:**
A CITES export suspension is currently in place[52] for exports of queen conch from Grenada and Haiti, on the basis of the Review of Significant Trade process (Notification No. 2020/006).

[51] speciesplus.net, managed by UNEP-WCMC. Accessed 25 September 2018.
[52] Accessed 3 July 2020.

CITES trade summary 2007-2016

The majority of direct exports in queen conch products in 2007–2016 consisted of wild-sourced meat and shells traded for commercial purposes (Table 5.7.1; Annex F). Smaller quantities of queen conch products were re-exported, and these mainly consisted of meat and shells for commercial purposes. These originated in Nicaragua and re-exported to Aruba, the Cayman Islands and Curaçao from the United States of America (103 296 kg total, wild-sourced).

While the top three exporters of queen conch meat over the entire listing period (1992–2016) were Jamaica, Honduras and Nicaragua (accounting for over 51 percent of total exports, or 17.7 million kg as reported by exporters), in the most recent decade the top exporters have shifted to Nicaragua, Belize and the Bahamas (Table 5.7.1). The quantity of queen conch meat directly exported fell over the period 2007–2016, while exports of shells rose overall (Figure 5.7.1).

TABLE 5.7.1
Main queen conch commodities in direct trade for 2007–2016, as reported by exporters[a]

Commodity	Quantity	Estimated number of individuals	Main exporters	Main importers
Queen conch meat	15 038 627 kg 870 243 items		Nicaragua (4 083 171 kg) Belize (3 220 290 kg) Bahamas (2 544 541 kg) Jamaica (2 434 200 kg)	United States of America (10 925 555 kg)
Queen conch shells	593 085 kg 2 025 550 shells	2 541 276	Bahamas (353 498 kg; 1 801 869 shells)	United States of America (263 834 kg; 1 402 992 shells)

Source: CITES Trade Database (Available from: trade.cites.org, managed by UNEP-WCMC on behalf of the CITES Secretariat. Accessed 2 October 2018).
[a] All fields except "estimated number of individuals" present data in the exporter-reported unit. Source I was excluded.

FIGURE 5.7.1
Direct exports of queen conch shells converted to number of individuals and meat (by weight) over time for 2007–2016, as reported by exporters. Source I was excluded

Source: CITES Trade Database (Available from: trade.cites.org, managed by UNEP-WCMC on behalf of the CITES Secretariat. Accessed 2 October 2018).

Expert assessment of queen conch trade reporting by Mr Robert Glazer (Florida Fish and Wildlife Conservation Commission), with input from OSPESCA states as well as Jamaica and Belize and Mr Richard Appeldoorn

Overview

Mr Glazer scored the general legality of the trade in queen conch as moderate (scored 3 on a scale from 1–5, with 1 being low, and 5 being high). Mr Glazer scored the overall spatial and temporal accuracy of the giant clam trade records slightly lower (2), highlighting the need for further effort by centralized and national CITES authorities to work together to ensure the quality of the data reported (i.e. that it is standardized and usable) in addition to ensuring that reporting was done and submitted in a timely manner.

Mr Glazer also noted that as queen conch have been listed in CITES Appendix II since the early 1990s there is a high level of awareness that CITES trade controls are required for international trade, and there are discussions to ensure trade data are made more accurate and comparable across range States. This is vital, as in most cases shells are not taken from the fishing ground owing to the logistical constraints (e.g. weight, space limitations on harvesting vessels) associated with collecting the shells and transporting them to shore, with most shells discarded at sea.

Main strengths of the CITES trade data and reporting process for queen conch

- The majority of trade is in meat, with most countries currently using an agreed conversion factor to reverse-calculate meat to live weight (with the shell included). The use of agreed conversion factors ensures that trade in comparable live weights of queen conch can be reported, and that weight estimates reflect the catch actually traded. In the queen conch regional plan the agreed processing grade: conversion factors are recommended (dirty meat = × 5.3, half clean= × 7.9 and clean = × 13.2, Prada *et al.*, 2017).
- In many countries including Jamaica (Smikle, personal communication, April 2019), Belize (Gongora, personal communication, April 2019) and Honduras and Nicaragua (Perez, personal communication, April 2019), capture data related to conch for export is very good because of the controls in place for commercial fishing.
- It is starting to become possible to link fishers' catches with products in international trade. For example, in Belize, catches from distinct areas and license fishers (and vessels) are logged by fishing trip. The Fisheries Department has information on volume harvested, area fished, time spent fishing and the date of delivery of conch products to fisheries cooperatives. Market-chain traceability is improving, although to date the final product is not necessarily packed for export by fishing area and dates fished.
- According to the CITES Trade Database a significant number of queen conch pearls are exported. Reports of pearl exports, which have been reported sporadically up to 2013 and every year since then, are a welcome indication of compliance, as low-volume, high-value products can be transported illegally between countries with relative ease.

Main issues in the reporting of CITES trade data for queen conch

- Comparing and cross-checking CITES trade data and FAO data reveals significant discrepancies between important regional sources of capture data. Discrepancies may occur as a result of countries using different definitions of processing grades, or different conversion factors for the levels of processed meat to live weight. Haiti is a key exporter of queen conch, and also not a Party to CITES: exports from Haiti would therefore only be captured through importer-reported data (a non-essential component of Appendix II reporting) in the CITES Trade Database.

- Although there is only one species of queen conch, *S. gigas*, more generalized conch trade data can include the meat from different species. The extent to which this is an issue in each country is not known. For example, the CITES Trade Database reports that Chile exported over six tonnes of Stromboid conchs (as dried/salted/brine product) that may originate from the Chilean abalone *Concholepas concholepas*, as Chile is outside the range of *S. gigas*.
- Trade in queen conch is reported using a number of different units including weight (kg, grams, lb), volume (cm^3), pairs, sets, cases, boxes and number of items. Furthermore, the trade term field has several products that are not well-defined or that likely mean the same thing for queen conch (e.g. "bodies" and "meat"). Finally, the standardized percentage of cleaned meat is often not reported. This lack of consistent data makes conversion to harvested individuals, and therefore comparative analysis of trade across range States, very difficult.
- Timing of trade records, when linked to catch allowances, might be compromised by stockpiling and deferred sales. Although this does not seem to be occurring either in Honduras or Nicaragua (Perez, personal communication, April 2019), in Jamaica, "the major producers do not continue to fish to stockpile product; however, unsold product may be held over more than one fishing season" (S. Smikle, personal communication, April 2019). In the case of Belize, queen conch meat is processed during the open fishing season, packed and maintained in cold storage until a required volume/quantity has been obtained, and then exported (Gongora, personal communication, April 2019).
- Trade data related to imports into the United States of America, the main market for queen conch are not well reported, which adds further uncertainty to the ability to trace products from harvest to markets (N.B. imports of Appendix II-listed species do not require reporting under CITES provisions). More generally, countries receiving queen conch products through international trade need to receive standardized and accurate certificates to facilitate their reporting.
- Poor compliance across i) surveillance, ii) enforcement and iii) prosecution is a recognized problem. In 2017, the CITES Secretariat recognized that enforcement and traceability were critical issues for regional queen conch sustainability and directed the Standing Committee to "review enforcement and traceability issues […] and make recommendations as appropriate" and highlighted its intention to make the resulting report available at the 70th meeting of the Standing Committee (CITES 2017a). The FAO queen conch management plan further recommends the licensing of all fishers, exporters and processors, together with coordinated patrolling and satellite-based VMS systems.
- The number of shells exported from Nicaragua is significant, however, given the remote locations of the fishing grounds and the belief that shells are not landed (M. Prada, personal communication, April 2019). CITES Trade Database records of shell landings are questionable and need further scrutiny.
- The Scientific and Technical Advisory Sub-group for queen conch (Queen Conch Working Group, Miami, 23–26 April, 2019) recognized inaccurate reporting of catches, because conch harvested for local consumption isn't reported as well as export trade. This can substantially impact sustainability assessments as artisanal fishing for local consumption can make up the largest proportion of harvested animals. For example, in the Bahamas, Talue-McManus and Hazel (2008) estimated the unreported landings for queen conch was as high as 86 percent of the total catch.
- Pearls are an important and high-value commodity; they are largely harvested for export but are difficult to quantify in international trade. It is believed that approximately 1 high-quality pearl is found per 10 000 harvested queen conch, with the most desirable high lustre pearls generally produced from sub-adult conch.

However, based on the recorded quantities of queen conch harvested, exports of queen conch pearls appear poorly reported. In addition, the targeting of juvenile conch for conch pearls could be an unwanted pressure on the fishery population.

Recommendations to improve the CITES trade data and reporting process for queen conch

- Regional conversion factors should be harmonized (Prada *et al.*, 2017) and, when possible, national conversion factors should be published to ensure standardized reporting. Reporting the level of processing of traded meat (i.e. "dirty", 50 percent clean, 85 percent clean, 100 percent clean) would also allow conversion factors to be applied more accurately.
- The guidance outlining preferred trade terms and their definitions when used to describe conch should be improved, including meat, bodies, claws, trimmings, and skin.
- Training of conch harvesters/processors/exporters is also needed to ensure the uniform reporting of trade, including in the application of conversion factors and the use of preferred terms and units. Further training and support is needed in the production and reporting of Non-Detriment Findings (NDFs).
- More research is needed to understand the expanding market for queen conch commodities, and the implications for wild populations. For example, the growing demand in China for queen conch opercula (reported as "claws") in traditional medicine. Little is known about this trade although it has been reported to occur in Jamaica (Appeldoorn and Baker, 2013) and Nicaragua, which exported 342 "claws" in 2015. Nicaragua has recently set an annual quota of 3.9 million opercula, and in 2018 exported 1 214 tonnes of opercula to China (Manuel Perez, personal communication, April 2019).
- Traceability of queen conch products along the value chain is a very powerful approach for addressing sustainability of queen conch stocks (Prada *et al.*, 2017).[53] The OSPESCA countries, including those that harvest queen conch (i.e. Belize, Dominican Republic, Honduras and Nicaragua) are developing a regional standard traceability system for seafood products (Manuel Pérez, personal communication, April 2019). Although this is being developed to address food safety and will be managed by the animal health authorities, it has support from the fishery sector and will provide data that can be used to trace conch products (e.g. landings, species, fishing gear, name of the boat, processors). OSPESCA expected the formal adoption of a traceability standard and its application by the end of 2019 for fisheries in general (Manuel Pérez, personal communication, April 2019).
- Parties should consider increasing the use of suitable novel technologies (e.g. such as satellite-based Vessel Monitoring Systems) to increase the transparency of fishing and trade. Such improvements could enhance compliance with the controls of fishing and trade of conch, but would require support and training for people along the value chain (e.g. customs officials, see Anonymous 2019).
- The FAO queen conch management plan further recommends the licensing of all fishers, exporters and processors because, the use of licenses can prove instrumental and essential" in the fight against illegal, unreported and unregulated (IUU) fishing (Prada *et al.* 2017). They also recommend coordinated patrolling as well as satellite-based VMS systems.

[53] See update of document in subsequent CITES CoPs.

Part 6. Alternative and complementary datasets

The CITES Trade Database, managed by UNEP-WCMC on behalf of the CITES Secretariat, is a compilation of signatory countries' official annual reports to CITES. This information is a requirement of the Convention, though it is known to have gaps in reporting, and/or records that are imprecise or inaccurate (e.g. discrepancies between national customs data and trade data as reported to CITES for the United States of America; Blundell & Mascia, 2005) or have missing data. The latter is complicated by delayed reporting. Furthermore, corrupt practices in the use of CITES trade certificates (Outhwaite, 2020) have also been reported in the media.

With these issues in mind, consideration as to how the information in the CITES annual reports may be validated, through comparisons with other reliable and readily available data sources, is required.[54] Identifying alternative and complementary information sources could allow for the cross-checking and verification of recorded data on the trade of commercially exploited CITES-listed marine species. This process could identify data gaps or suggest opportunities to correct inaccuracies. As the Convention has grown, more marine species have been listed, and CITES Authorities need to find ways to cooperate more fully with fisheries agencies that previously had their own data and information flows for other purposes. Cross-checking datasets and verifying catch and trade data against alternative data sources would go some way to stimulating and encouraging improved precision and accuracy in the submission of CITES trade records among Parties.

Alternative sources of information and data exist, and direct comparisons of trade records or indirect comparison to related datasets are possible, both of which can provide some context for the trade figures reported. Several relevant sources of information and data are presented and discussed below.

6.1 DATA AND INFORMATION LINKED TO THE CAPTURE OF MARINE SPECIES

Information and data on marine species capture production is not necessarily evidence of international trade. However, fish and fish products are highly traded.[55] During the last few decades this trade has increased significantly, from about USD 8 billion in 1976 to about USD 165 billion in 2018, when it represented about 37 percent of global fisheries and aquaculture production volume (FAO, 2020a and 2020b). High value fish or fish commodities can be considered a likely source for potential exports, especially for those species or products for which national markets are limited or non-existent (e.g. dried sea cucumber, shark fins, seahorses). Cross-checking CITES data with national and regional capture production datasets could help to identify potential unreported trade (especially as not all countries are CITES Parties and therefore do not certify their exports). Fisheries capture production records could be used to identify potential inconsistencies with the CITES trade data in the case of large discrepancies between capture and trade records.

[54] Considerations and requirements for national reporting to CITES are outlined in Conf. 11.17 (Rev. CoP18).

[55] FAO define fish as "a collective term, [which] includes molluscs, crustaceans and any aquatic animal which is harvested" (FAO Fisheries and Aquaculture Department, FAO, 2014).

National or regional fishery management organizations' reports or databases

Information on fisheries catches are published by national fisheries ministries, commercial fisheries cooperatives and regional fisheries bodies and management organizations. As with the system for documenting CITES trade records, fisheries data systems provide an important resource of government data, but also have inherent weaknesses that can result in gaps and inaccuracies in the information collated, especially in the case of small-scale and artisanal fisheries catch information.

Most national fisheries institutions routinely disseminate annual or monthly statistics on fish production by species or species group, and fishery. For example, Papua New Guinea's National Fisheries Authority reports on sea cucumber harvests,[56] while the Ministry of Fisheries and Aquatic Resources in Sri Lanka has published monthly records of fish catches.[57]

Some fisheries associations also issue reports:[58] this is true for CITES-listed species such as European eel,[59] and game-fishing organizations make information publicly available (which is of relevance to white, oceanic white-tip, mako, hammerhead, porbeagle and thresher sharks).[60] Game-fishing organizations also often support tagging programmes which can be used to verify the range and presence of specific shark species.

Regional Fisheries Bodies (RFBs) and Regional Fisheries Management Organizations[61] (RFMOs) share a range of fishery information, including stock assessments, observer records and time-area catch and bycatch data reported by their members. This is not always a source of data on CITES-listed or threatened taxa, as typically they are taken in low volumes or because the relevant species-level of data is not reported (i.e. species are lumped, such as for seahorses). Information repositories published by RFB and RFMO are provided in Table 6.1.1.

While they don't always disaggregate to the species level, cross-checking RFB and RFMO information sources with data in the CITES Trade Database could provide insights into the likely accuracy of CITES records. Such information – including the cross-checking of logsheets and observer records at vessel or fishing operation level – could confirm whether there are shifts in fishery practices as a result of implementation and compliance with conservation management measures for certain species, and whether these were having an impact on fishing mortality and CITES trade. Vessel data log sheets and onboard observer records are mostly not disseminated publicly, however capture production reports published by RFMOs offer the opportunity to assess whether implementation of new fishery controls are reflected in the trade chain.

In the CITES Trade Database, an assessment of shark records in 2019 revealed that they were dominated by commodities from a single genus (*Sphyrna* spp., hammerhead sharks), from a single exporting country (Mexico). It has been observed from collated RFMO records that this does not actually reflect the real catches of CITES-listed sharks. Examination of RFMO practices and related information over time can offer insights into shifts in trade data. For example, prior to the CITES Appendix II listing of oceanic whitetip shark, *Carcharhinus longimanus* (which came into effect in 2014), the Indian Ocean Tuna Commission's (IOTC) contracting and cooperating Parties recorded 1 687 specimens of oceanic whitetip sharks caught between 2008 and 2013.[62]

[56] https://www.fisheries.gov.pg/research-and-reports
[57] https://www.fisheries.gov.lk/web/index.php?option=com_content&view=article&id=41&Itemid=150&lang=en
[58] http://pacificalbacore.com/wfoa/fish-reports/
[59] https://www.sustainableeelgroup.org/tag/eel/
[60] https://igfa.org/game-fish-database/
[61] http://www.fao.org/fishery/topic/166304/en
[62] Clarke and IOTC, 2014. https://cites.org/sites/default/files/eng/prog/shark/docs/IOTC-2014-WPEB10-12_-_CITES.pdf).

TABLE 6.1.1.

Examples of public reporting by RFMOs

RFB, RFMO	Nature of data	Web links
International Commission for the conservation of Atlantic Tuna (ICCAT)	Bycatch database and reports	https://www.iccat.int/en/bycatch.html
Indian Ocean Tuna Commission (IOTC)	Datasets on catch by species, gear, vessel flags	https://www.iotc.org/data/datasets
Western and Central Pacific Fisheries Commission (WCPFC)	Latest stock assessments by species (including evolution of biomass, total catches and fishing mortality)	https://www.wcpfc.int/current-stock-status-and-advice
	Annual catch estimates by species	https://www.wcpfc.int/data-catalogue
Inter-American Tropical Tuna Commission (IATTC)	Observers' records, by species	http://www.iattc.org/ReportsENG.htm
	Catch reports (updated monthly)	https://www.iattc.org/CatchReportsDataENG.htm
North-East Atlantic Fisheries Commission (NEAFC)	Latest catch data (2018) by species and countries	https://www.neafc.org/system/files/2018-Final-Catch-tables_0.pdf
Northwest Atlantic Fisheries Organization (NAFO)	Catch data per year, country and division	https://www.nafo.int/Data/STATLANT
Fishery Committee for the Eastern Central Atlantic (CECAF)	Catch database by species or group and by year	www.fao.org/figis/servlet/TabSelector
International Council for the Exploration of the sea (ICES)	Catch datasets by country, species, catch area and year	http://www.ices.dk/data/dataset-collections/Pages/Fish-catch-and-stock-assessment.aspx
North Atlantic Marine Mammal Commission (NAMMCO)	Catch database by species, county, stock and year	https://nammco.no/topics/catch-database/
Southeast Asian Fisheries Development Center (SEAFDEC)	Catch database by species, county, fishing area and year	http://map.seafdec.org/NewBulletin/production_sp_area.php
Secretariat of the Pacific Community (SPC)	Catch reports, stock assessments, research publications	https://pacificdata.org/

However, since 2013, when the IOTC expanded its shark reporting requirements (IOTC resolution 17/05),[63] changes to the recording of oceanic whitetip shark captures has been strengthened. Alongside this, other RFMOs like the Western and Central Pacific Fisheries Commission (WCPFC) enacted a "catch and retention" ban for oceanic whitetip shark in 2011, making it illegal for fishers in their region to intentionally catch whitetip sharks, and requiring them to immediately release any whitetip sharks that were caught accidentally — with all their fins still attached. Therefore, knowledge of such shifts in fishing controls can be informative when assessing CITES shark trade data, globally and by region.

RFBs and RFMOs also publish project reports that contain information on CITES-listed species. To respond to countries' desire to overcome fundamental issues with reporting on discards, bycatch and discard practices, assessment and reporting is increasing visibility of these topics, especially for shark and sea turtle interactions, both of which have species on CITES Appendices. Some examples of ongoing work in this area includes the work FAO is doing with country partners across the Mediterranean and Black Sea, collecting data on incidental catches of seabirds, sharks, sea turtles, marine mammals and macrobenthic species in a General Fisheries Commission for the

[63] http://www.fao.org/ipoa-sharks/database-of-measures/en/

Mediterranean bycatch database.[64] The Medlem database is one output that collates data on large sharks and rays.[65] Bycatch working groups in other RFMOs also are involved in reporting from their regions,[66] and FAO also completed an assessment of global marine fisheries discards.[67] There are also emerging records of bycatch and discards from the use of novel monitoring equipment that record catches on fishing vessels (see Emery *et al.*, 2019), which give insights into the rate of fishery interactions with CITES-listed species.

Data and reports by national fisheries agencies, commercial fisheries associations or cooperatives are not generally published in user-friendly formats that facilitate automated data retrieval and analysis for comparison with information in the CITES Trade Database. This situation is improved in RFB/RFMO data systems, which use standard coding and classification lists, and make the data accessible in a number of formats. With the right tools and conversion factors there is potential for cooperation across these data sources, between data providers and users. Big data assessments will also offer more and more opportunities to cross-check marine species trade across various data sources to validate trade information.

FAO global capture production database and fisheries data

The FAO holds a broad range of country fisheries statistics that offers metrics for fish stock status assessments or the validation of fisheries value-chain information. Data on capture fisheries production are made available through the global capture fisheries database, which has been collated from records supplied by countries dating back to before 1950 (by country and FAO fishery area).[68] This database is updated annually and provides insight on capture fisheries production volumes by species, countries and FAO major fishing areas in a standardized format.

The database covers data from 1950 for about 250 countries and areas for over 2 200 species items. Data are collated annually from relevant national offices concerned with fishery statistics for all commercial, industrial, subsistence and recreational fishery operations in all inland and marine fishing areas. However, it should be highlighted that not all countries have proper collection in place for the artisanal, small-scale fisheries as well as recreational fisheries, owing to the practical and resourcing issues related to the systematic collection, analysis and reporting of data for this sector. In terms of species, countries provide data at the maximum level of detail for which they have capacity; catches are therefore reported at a range of taxonomic levels, including in aggregated species groupings. This is especially true for early years, or for species complexes where species discrimination has traditionally been poor. As an example, only a third of non-target or bycatch chondrichthyan data are identified to species level (Cashion, Bailly and Pauly, 2019). Conversely, it is also important to highlight that the reporting by species/groupings by countries has improved in recent years thanks to the efforts of FAO and other organizations. Data for certain species and major groups such as tunas, bonitos and billfishes or marine mammals are generally reviewed in collaboration with the regional agency concerned.

[64] Monitoring discards and incidental catches of vulnerable species, plus release guidance: http://www.fao.org/gfcm/publications/series/technical-paper/639/en/; http://www.fao.org/gfcm/publications/series/technical-paper/640/en/; http://www.fao.org/gfcm/data/good-practice-guides

[65] DOI: http://dx.doi.org/10.12681/mms.21148

[66] https://www.iccat.int/Documents/meetings/docs/2019/reports/2019_JWGBY-CATCH_ENG.pdf

[67] http://www.fao.org/3/CA2905EN/ca2905en.pdf

[68] Capture production records are accessible through the global production workspace in FishStatJ: http://www.fao.org/fishery/statistics/global-capture-production/en. Database: http://www.fao.org/fishery/statistics/software/fishstatj/en; plus Global Capture Production online query panel http://www.fao.org/fishery/statistics/global-capture-production/query/en

In addition to the collection of capture fisheries statistics, FAO also carries out an assessment of the status of fishing stocks. Data quality and coverage on fish stock status vary across fishing sectors, fishing areas and countries. In terms of geographic coverage of fish stock status measures, major fish stocks are well assessed across Europe (except for the Mediterranean), North America and Western South America. With the exception of Japan, Morocco and South Africa, coverage of fish stocks in Asia and Africa yields less information (FAO 2011; Ricard *et al.*, 2013). By sector, the informal small-scale fisheries sector is the most poorly represented, as systematic data collection, analysis and reporting is not regularly funded in the same way as it is in more formal sectors of the economy (Gillett, 2016).

Since 1970 FAO data on fishery effort (fisher and fishing vessel datasets) have also been compiled annually from country-supplied records.[69] For employment, data are available by country, working domain, working status and gender, while data on fishing fleets are structured by country, total length classes and vessel types. These records also have recognized weaknesses in the description of subsistence and artisanal catches, and fishing effort (World Bank, 2012; Watson, 2017). However, they do provide an understanding of the scale of effort and types of fleets fishing, which could be related to fisheries species exploited and potentially traded.

PSMA data

The first binding international agreement to target illegal, unreported and unregulated (IUU) fishing specifically is the Agreement on Port State Measures (PSMA). This FAO initiative to prevent, deter and eliminate IUU fishing works by preventing vessels engaged in IUU fishing from using ports and landing their catches. The effective implementation of the PSMA requires fishing vessels seeking entry into a designated port to undergo PSMA provisions, including inspections.

The agreement entered into force in 2016 and involves the monitoring, control and surveillance (MCS) of fishing vessels and their catches when they enter designated ports.[70] In the section that describes the procedures of port inspectors, the negotiated text of the PSMA states:

…review all other relevant documentation and records held onboard, including, to the extent possible, those in electronic format and vessel monitoring system (VMS) data from the flag State or relevant regional fisheries management organizations (RFMOs). Relevant documentation may include logbooks, catch, transshipment and trade documents, crew lists, stowage plans and drawings, descriptions of fish holds, and documents required pursuant to the Convention on International Trade in Endangered Species of Wild Fauna and Flora[.][71]

Importantly all PSMA information is time-stamped, spatially documented and linked to country ownership. Over time, information will accumulate, allowing medium- and longer-term trends to be observed. Data collected and collated under the provisions of the PSMA will be of specific interest to understanding metrics such as:

- transshipment information concerning donor vessels;
- evaluation of offloaded catch (quantity);
- catch retained onboard (quantity);
- compliance with applicable catch documentation scheme(s);
- compliance with applicable trade information scheme(s);
- apparent infringement(s) noted including reference to relevant legal instrument(s); and
- information on fish held and offloaded documenting species level information using ASFIS 3-alpha codes (known as FAO 3-alpha codes).[72]

[69] http://www.fao.org/figis/vrmf/finder/search/#stats; https://doi.org/10.4060/cb1213t
[70] http://www.fao.org/3/i5469t/I5469T.pdf
[71] See Annex B, Port State inspection procedures: para d)
[72] See http://www.fao.org/fishery/collection/asfis/en; http://www.fao.org/fishery/static/ASFIS/ASFIS_Structure.pdf

Article 16 of the PSMA refers to the electronic exchange of fishery information. In paragraphs 1 and 2 it explains how PSMA signatories shall establish a communication mechanism that allows for the direct electronic exchange of information, and how they should cooperate to establish an information-sharing mechanism, preferably coordinated by FAO. Such a mechanism would operate in conjunction with other relevant multilateral and intergovernmental initiatives to facilitate the exchange of information with existing databases relevant to this Agreement. PSMA implementation could potentially provide efficient monitoring records of the movements of CITES-listed species, particularly "Introduction from the Sea" events, in near real-time, which would be relevant for CITES where CITES-listed species are concerned. A Global Information Exchange System (GIES)[73] is being developed by FAO and expected to be the platform on which all the PSMA data will be updated in real time.

An essential element helping to achieve the aims of the PSMA is a programme whereby countries work together to assign unique vessel identifiers (UVI) to each fishing vessel, refrigerated transport vessel and supply vessel worldwide (Global Record).[74] This identifier code would remain constant throughout the vessel's lifetime regardless of change of name, ownership or flag. Therefore, data to be found within PSMA inspection reports, including notes entered into the "comments" or "findings by the inspector" sections, or "apparent infringement(s) noted, including reference to relevant legal instrument(s)" will likely hold information of value in linking movement of CITES-listed species and CITES trade records.

EUROSTAT

The EUROSTAT website gives access to European Union data on catches by fishing areas, landings of fishery products both in tonnes live weight and fisheries fleet data.[75] The Joint Research Centre (JRC) data dissemination tool provides access to different typologies of fisheries data submitted by EU Member States to the European Commission under the provisions of the Data Collection Framework (Regulation (EC) 199/2008). Such data are made freely available.[76]

6.2 DATA AND INFORMATION LINKED TO MARINE SPECIES TRADE

There are also opportunities for CITES trade records to be compared to publicly available data on trade, reported in a number of formats under non-CITES agreements by a range of other data providers. Creating stronger linkages across these data providers would help verify trade from CITES signatory and non-signatory countries. Examples of such opportunities are explored below.

World Trade Organization (WTO)

As marine biodiversity is considered a common-pool resource, countries often use trade policy as a mechanism to protect natural resources, and therefore fisheries assets, within their EEZs. The WTO website offers useful trade monitoring tools and import–export data can be accessed for over 200 countries, as well as annual national evaluations of the value and supply chains of global fisheries.[77] Such information can be particularly useful to help clarify the business relations of both CITES member and non-member countries.

[73] http://www.fao.org/3/mz890en/mz890en.pdf
[74] http://www.fao.org/global-record/en/
[75] https://ec.europa.eu/eurostat/data/database; https://ec.europa.eu/eurostat/web/fisheries/data/database
[76] https://datacollection.jrc.ec.europa.eu/index.html
[77] https://www.wto.org/english/res_e/statis_e/miwi_e/countryprofiles_e.htm

Regional Trade Agreements or Preferential Trade Arrangements databases offer a useful resource.[78] The trade deals, tariff and non-tariff measures, volumes and value of traded goods are valuable comparison points to cross-check reported CITES trade data. The WTO Environmental database also offers data on national policies linked to fisheries,[79] which could be used to verify whether non-signatory countries have listed species for protection under other controls.[80] It may also be useful to follow the ongoing negotiations within WTO to develop a framework for limiting harmful fisheries subsidies (which started in 2001 in many places), which could have an impact on the type of fishing and data that are collected and reported on traded marine species.

World Customs Organization (WCO)

The WCO focuses on trade regulation compliance for both signatory and non-signatory CITES countries. The organization collects CITES seizure data and also provides global trade data through its annual "illicit trade report".[81] The report, even if delayed in time, offers detailed and trustworthy analysis of information on illicit trade, and can be a useful tool to identify and help estimate the amount of illegal or unreported trade.

United Nations Office on Drugs and Crime (UNODC)

Information collated by UNODC offers another useful source of data across fisheries value and supply chains, specifically information on illicit trade, including all activities that may be subject to criminal or administrative penalties. Although not typically associated with wildlife issues, UNODC is increasingly recognizing criminality that the international wildlife trade poses and its links to other related criminal activities.

Since 2017 it has been a requirement within the Convention for CITES Parties to submit annual illegal trade reports (see paragraph 3 in Resolution Conf. 11.17 (Rev. CoP18) on National reports). These data form the foundation of "World WISE", a global seizure database which is currently under development and already contains over 164 000 seizures from 120 countries.[82] In 2016 UNODC published a report called "World Wildlife Crime Report" that is based on records held in their World WISE seizure database; a second version appeared in 2020.[83] Examples of marine species listed in their reports include illegal trade reports on sturgeon, corals and eels.

The UNODC platform SHERLOC offers data on national laws and case law that details how countries are tackling fisheries crime.[84] This can be useful in increasing understanding of how countries are legislating and implementing wildlife capture, health and trade controls.

Many of the information and data sources listed are challenging to use for direct comparisons as data on wildlife trade (e.g. WCO or UNODC) are not usually categorized in a standard format that allows easy species-related queries to be conducted. However, they can still provide useful indicators or tools to reveal groups at risk from illegal trade.

[78] http://rtais.wto.org/UI/PublicMaintainRTAHome.aspx; http://ptadb.wto.org/

[79] https://edb.wto.org/charts

[80] Also see the Secretariat of the Pacific Communities Reeflex https://www.spc.int/CoastalFisheries/Legislation/main

[81] http://www.wcoomd.org/-/media/wco/public/global/pdf/topics/enforcement-and-compliance/activities-and-programmes/illicit-trade-report/itr_2018_en.pdf?db=web

[82] https://www.unodc.org/unodc/en/data-and-analysis/wildlife.html

[83] https://www.unodc.org/documents/data-and-analysis/wildlife/2020/World_Wildlife_Report_2020_9July.pdf

[84] https://sherloc.unodc.org/cld/v3/sherloc/

FAO fish trade data

The FAO Global fisheries commodities production and trade database represents the most comprehensive database on fish trade.[85] It contains statistics dating back to 1976 on the annual production of fishery and aquaculture commodities, imports and exports (including re-exports) of fishery and aquaculture commodities by country, and commodities by value and volume. Data cover over 220 countries and regions and more than 1 000 commodities by species and product forms.[86] Data are collected at the maximum level of detail available at country level and are aggregated and disseminated according to the International Standard Statistical Classification of Fisheries Commodities (ISSCFC). This classification is linked to the Harmonized Commodity Description and Coding System (HS), as well as to the Standard International Trade Classification (SITC) and Central Product Classification (CPC).

Party trade data (e.g. European [countries], although others also hold useful trade records)

European Union trade data are made public annually by EUROSTAT.[87] CITES listed marine species are usually not separately recorded in EUROSTAT data, although these data sources can give insight of what is going on in intra-European trade of marine species, and can be compared with information Europe reports on its international trade, as well as through CITES reporting. Other Parties also compile additional national statistics in relation to animal trade; for instance, the United States Law Enforcement Management Information System (LEMIS) Database also provides a valuable data resource on wildlife or wildlife product shipments involving the United States of America.

UN Comtrade

Data collected by national customs authorities and compiled into the United Nations Commodity Trade Statistics Database (UN Comtrade)[88] by the United Nations Statistics Division provide a range of resources. UN Comtrade utilizes three distinct trade classification systems: the Harmonized Commodity Description and Coding System (HS), the Standard International Trade Classification (SITC), and Broad Economic Categories (BEC). Of these, records of trade using the HS taxonomy, which assigns HS codes to all forms of traded goods in a hierarchical structure (2, 4, and 6 digit codes respectively represent commodity chapters, headings and subheadings) offer an excellent resource. Their web portal offers data and infographics on "fish and aquatic resources" commodities traded both in value and weight. This database has commonly been used by the experts (some in this document) to understand shifts in trade in CITES-listed species (e.g. *Cheilinus undulatus* in China, Hong Kong SAR).

International Merchandise Trade Statistics (IMTS)

International Merchandise Trade Statistics (IMTS) are used in a Chatham House Resource Trade Database (CHRTD) and constitute a repository of bilateral trade in natural resources between more than 200 countries and territories.[89] The database includes the monetary values and masses of trade in over 1 350 different types of natural resources and resource products, including fishery products. It contains raw materials, intermediate products and by-products.

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[85] http://www.fao.org/fishery/statistics/global-commodities-production/2/en

[86] Aprox. 245 countries, territories or land areas, and approx. 600 species/commodity items

[87] https://ec.europa.eu/eurostat/data/database; https://ec.europa.eu/eurostat/web/fisheries/data/database

[88] https://comtrade.un.org/

[89] https://resourcetrade.earth/data

Trade portal provided by TRAFFIC

A TRAFFIC wildlife trade portal publishes information of seizures and incident data.[90] The portal allows users to filter and display results as a list but also in a dashboard format, while individual records offer information about a specific incident, such as the exact species, commodities and locations involved. All information available on the portal is obtained from publicly accessible or "open" sources, and a guide for users is provided.[91]

The Convention on the Conservation of Migratory Species of Wild Animals (CMS)

The CMS website offers the annual reports from their member countries:[92] these reports don't usually include much quantitative data on harvest/trade but can offer some relevant insights into the annual CITES reports from countries. To provide an assessment of implementation, the national reports are analysed and synthesized for each CMS COP, with the latest analysis reported in UNEP/CMS/COP13/Doc.20.

6.3 MARKET-RELATED INFORMATION

There is a further opportunity to look comparatively at CITES trade statistics against the reality of trade in CITES-listed marine species in global markets. In some cases, for example when dealing with less well documented species in capture production databases (i.e. seahorses), research into trade data is a critically important mechanism to understanding trends.

Trade and market research studies and periodicals

Through its platform GLOBEFISH,[93] FAO regularly publishes market information with a special emphasis on the international trade of fisheries and aquaculture species. The information, reports and publications made available on the GLOBEFISH website are a reliable source of information to analyse markets and trends in fish trade. FAO GLOBEFISH regional reports reveal an understanding of trade activity in species-focused market price reporting that is produced for the common market hubs (e.g. the European Union and China). This information is particularly useful when analysing drivers and trends in supply and demand. Some GLOBEFISH outputs focus on species, which makes them particularly interesting when comparing information sources for CITES-listed species, especially when providing an analysis of trends in supply and demand.

A wide range of one-off reports by academia and trade-relevant agencies (e.g. TRAFFIC) provides accessible reports on markets and market-service information through web platforms (e.g. Intrafish; FIS Fish Information & Services; InfoFish; seafood sources Seafoodsource)[94]. These platforms can help researchers compare CITES trade data to insights by or from market providers, on volumes and prices of marine species and their products in regional and global markets.

Information on new and emerging markets (e.g. internet markets, e-commerce)

Marketing and selling CITES-listed-species and commodities online is now becoming more and more prevalent. This is easily visible with a web search (e.g. the e-commerce websites "Alibaba" and "eBay" currently have two dozen pages dedicated to products fashioned out of Appendix II-listed giant clam).

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[90] https://www.wildlifetradeportal.org/#/dashboard

[91] https://www.wildlifetradeportal.org/wildlife-trade-portal-guide.pdf

[92] https://www.cms.int/en/documents/national-reports

[93] www.globefish.org

[94] https://www.traffic.org/; https://www.intrafish.com/ gives a market overview of Latin America and Asia; https://fis.com/; http://infofish.org/v3/; https://www.seafoodsource.com/educational-resources/2018-consumer-trends-report

Data scientists are currently working on making this trade more transparent. For example, Julio Hernandez Castro and David Roberts from the University of Kent created a programme to search and analyse website data to find and identify illegal CITES commodities in trade. In the case of ivory their work showed 87–93 percent accuracy on identifying such trade.[95] Such work is equally possible for marine-species commodities, although artificial intelligence code and machine learning algorithms would need to be prepared to enable the recognition of marine products of CITES-listed species in order to monitor trends for reporting to competent authorities. Automated systems such as these could potentially be configured to offer a "near real-time" alert system for those implementing and enforcing the Convention, and would be particularly beneficial for CITES Parties wanting the best available data to monitor trade levels, make Non-Detriment Findings and combat illegal trade.

[95] See their book here: https://www.counteringcrime.org/automatic-detection-of-potentially-illegal-online-sales-of-elephant-ivory-via-data-mining

Part 7. Discussion and recommendations

7.1 CHALLENGES NOTED IN THE ASSESSMENT OF CITES TRADE DATA

A number of generic inconsistencies were observed and highlighted throughout this report, and in the context of the more in-depth case studies for the seven taxa considered. It is hoped that highlighting these aspects can help CITES Parties develop ways to improve the reporting of marine species trade data. Improvements in the data reporting process will enhance the accuracy of the data and the level of reporting, which, in turn, will make the data more useful to those advising on the management and sustainability of aquatic species. The assessment highlighted both process and content challenges, the main elements of which are listed below.

Process challenges

- **Delays in CITES trade reporting:** In general, CITES Parties typically have a high rate of submission for annual reports, but there are notable delays in data becoming available for analysis. The reporting deadline is 31 October following the year of trade, meaning that trade in January of one year will not be reported until at least 22 months later if Parties submit by the reporting deadline. For the 2011–2015 period, 90 percent of annual reports were received, yet only between 39 percent and 48 percent were received on time each year (i.e. by the annual deadline), while 82 percent were received within one year after the reporting deadline. Furthermore, once the data is submitted it still needs to be checked and uploaded into this system, which can create a further delay in visibility of CITES trade data for Parties, partners and the general public. This delay in reporting means that analyses of the CITES Trade Database could be based on incomplete information, and that complete trade data are not available for countries to respond effectively or in a timely manner to changes in trade patterns. It could also create challenges for putting key CITES processes in place for the species that need it the most, in the absence of accurate and complete information. Such processes could include, for instance, preparation of Non-Detriment Findings or initiation of Review of Significant Trade process for species of conservation concern.
- **Lack of coordination across data holders:** Multiple opportunities exist for increased information exchange between the main Parties involved in the trade of CITES Appendix II-listed species that would help to improve data collection, data accuracy and subsequent management, including enforcement. Information flow between government agencies is an internal issue in this regard: a concerted effort to coordinate and encourage such a flow is needed, as many CITES Management and Scientific Authorities are traditionally based or linked to government structures with responsibility for the environment, whose predominant focus may be on terrestrial species and their respective management, and/or conservation issues. If these agencies are disconnected from fisheries authorities this can slow or hinder the evolution of data flows required for reporting on "fish" species and trade. This separation, and often lack of collaboration or coordination, is a significant stumbling block to overcoming seamless management and reporting on CITES-listed marine species.

- **Lack of understanding of reasons for reporting gaps or shortfalls:** An assessment across Parties is needed to achieve a better understanding of the technical and social nature of successes and additional challenges in reporting on CITES-listed marine species in trade.

Content challenges

- **Errors in species identification:** CITES trade data can be limited, compromised or confounded by difficulties in the identification of species or commodities along the fisheries value and supply chain. This occurs as trade is monitored by respective national fisheries or environment agencies, customs agents and freight handlers etc., involving people who are not always well trained in taxonomy, or do not have suitable resources to complete species identification. While identifying species can be a challenge even if a full specimen is viewable, CITES-listed species are often traded in such a way that the whole fish or fish commodities cannot easily be accessed and checked for species identification across the trade value chain. While trade might be dominated by one form (live), other forms may increasingly be traded (such as dried, chilled/frozen, mixed among other ingredients, tinned, packaged, etc.) and moved around via a more diverse range of transport modes, and authorities may need to be aware of this.
- **Missing records (spatial and temporal) of exports of CITES Appendix II species and commodities:** Missing CITES trade data records and missing elements of trade data (data fields) have been noted in the CITES Trade Database. Most often this may relate to missing annual reports by Parties for particular years, which then makes it more challenging to assess overarching trends in global trade. This missing information from CITES trade records is not an isolated situation: it might be also reflected across fishery and customs records, which may have gaps in reporting, do not adequately record marine species information, or amalgamate records at generic levels too coarse to allow species data and trends to be monitored.
- **Missing records (spatial and temporal) of imports of CITES Appendix II species and commodities:** CITES Parties are not obligated to report their imports of Appendix II taxa (see Chapter 3.1 and Annex E). In instances where exporting Parties have not submitted their CITES annual trade reports, or exporters are non-Parties to CITES, there is a risk of trade going entirely unrecorded. In the case of CITES marine taxa, a number of key products traded (such as queen conch shells and giant clam products) appeared to be exported from non-CITES Parties (e.g. Haiti, the Cook Islands) so this trade was only captured through importer-reported data (as non-Party States are not required to submit a CITES annual report).
- **Incorrect, or alternative (rather than preferred) entry of measurement units:** CITES annual reporting guidelines encourage the use of preferred units wherever possible in order to accurately understand trade. Inconsistencies in reporting can make interpreting trade trends challenging.

7.2 RECOMMENDATIONS FOR IMPROVEMENT OF CITES TRADE DATA

To support the legal and sustainable trade of marine resources, the recording and centralized documentation of international trade in CITES-listed species needs to be timely, orderly and reflect actual and real trends in trade of the species as much as possible. This report highlights the current strengths of the CITES process, but also identifies inconsistencies in the data, reporting issues and limitations in the amount and quality of trade data currently reported by CITES Parties. In general, while there are recognized data gaps that are important to be aware of, the species-specific dataset that

the CITES Trade Database offers provides a hugely valuable resource for supporting the implementation of the Convention and efforts should be made to further enhance its value for CITES Parties.

The following section lists general recommendations to enable a clearer and more comprehensive picture of the trade in CITES-listed marine taxa in future.

General

- **Enhanced capacity development for CITES Parties:** For developing countries and countries with economies in transition, there is a strong need for support and training relating to CITES implementation (including in making NDFs), species identification and reporting of trade in marine species. Support is also needed to foster coordination between agencies, and across institutions and organizations, which can provide data to contextualize the conservation implications of trade in CITES-listed marine taxa. While awareness of CITES was found to increase up the value and supply chain (Herath *et al.*, 2019), it was still limited across all fisheries stakeholder groups when compared to knowledge of local legislative measures for the management and regulation of fisheries.
- **Provide further guidance to CITES Parties to clarify reporting requirements and promote the reporting of information for Appendix II imports:** CITES Parties are not currently obligated to issue an import permit for Appendix II taxa (Article IV), but they are encouraged to report their Appendix II imports to CITES where data are collected (Annex 1 to Notification No. 2019/072). Clarification around the reporting of Appendix II imports would be beneficial, in addition to further encouragement for Parties issuing Appendix II import permits to report the trade in their annual reports. This is particularly important in relation to imports from non-CITES Parties (i.e. where the export data are not available).

Fill data gaps for trade in CITES-listed species

- **Strengthen the reporting of Appendix II exports:** Current CITES processes could be strengthened through the sharing of best practices between Parties and agencies, and identifying bottlenecks in the collection and reporting of CITES trade data. This is particularly true for marine trade data, where species are wide-ranging and may be harvested from international waters.
- **Report actual trade rather than permits issued:** Under the current annual report submission process Parties are encouraged to report on the actual quantity of trade that has occurred (rather than the quantities recorded on permits that were issued, but not necessarily used). This ensures that analyses and decisions are based on accurate levels of trade, as this may have direct implications for assessments of sustainability, particularly for wild-sourced trade. Reporting actual trade does, however, require sound, established links between customs and the CITES Management Authority to ensure accurate reporting. As per the first recommendation, some Parties may need capacity support to set up appropriate processes.
- **Report and implement trade data updates:** When discrepancies are found in the trade data, reporting Parties are encouraged to provide updated data to the CITES Secretariat so that the CITES Trade Database can be updated.
- **Introduce a process for auditing the CITES trade data:** A periodic audit of the data would be beneficial to help the CITES Secretariat identify areas of potential misreporting/underreporting and work with Parties to respond to known data gaps. This could be useful for the strengthening of Introduction

from the Sea (IFS) reporting, which appears to be minimal to date. It has been suggested that underreporting introductions from the sea could lead to some species, such as sharks, having lower reported trade levels than expected. The Standing Committee may wish to consider revising Resolution 11.17 (Rev. CoP18) on national reporting so that a review of misreporting/underreporting can be undertaken periodically.

- **Increase coordination and cross-referencing with other sources of relevant trade data:** Chapter 6 outlines sources of publicly available data that could be cross-referenced with the CITES trade data to identify potential underreporting of specific species or trade routes. The feasibility of periodically cross-referencing CITES trade data with these other trade data sources should be explored. This could provide a more thorough understanding of the patterns of trade in CITES-listed taxa; identify data gaps and areas for improvement in all datasets; and potentially provide more up-to-date data to enable more proactive management by CITES Authorities. This aligns with the study proposed in Decision 18.221, which requests investigation into:

  [the] apparent mismatch between the trade in products of CITES-listed sharks recorded in the CITES Trade Database and what would be expected against the information available on catches of listed species.

  Such assessments would benefit from stronger data linkages across information providers, which could assist in verifying trade and share lessons learnt (e.g. CITES Management and Scientific authorities, with records supplied by other government or UN Agencies). With new digital data streams coming online there are also opportunities to build automated links among data providers to facilitate cross-comparisons and inter-operability of this kind.

Improve the timeliness of CITES trade reporting

- **Timely reporting of trade data to CITES:** CITES Parties are urged to submit their annual CITES trade reports by the October 31 deadline (Resolution 11.17 (Rev. CoP18)) to ensure that the most up-to-date information is available to Parties and decision makers for monitoring international trade in wildlife.
- **Identify reporting challenges and opportunities for simplified reporting procedures:** The delays and discrepancies in reporting suggest that the annual reporting process remains challenging for some Parties to fully implement in a timely fashion. It may be useful for CITES to invest in a study on the challenges and limitations around reporting, and to identify areas where more capacity building or process streamlining may be needed. This should include specific reference to the implementation and compliance of CITES provisions for marine species.
- **Technological solutions to reporting:** Under the current process of submitting annual trade reports to CITES (by 31 October in the year following trade), trade data are, at best, submitted many months after trade occurred. Developing and implementing technological solutions (along with accompanying capacity building) should enable more timely data submission, more automated data checks and for products to be followed through the supply chain. Recently, the CITES Secretariat has published guidance for Parties to establish electronic permitting systems and some Parties are taking steps in this direction.[96] For example, the Secretariat and partners have assisted Sri Lanka in moving to a digital system for recording trade in CITES-listed species, with Sri Lanka

[96] The CITES Secretariat has prepared a guide for Parties on implementation of electronic permitting: https://cites.org/eng/prog/eCITES

becoming one of the first countries to go live with a CITES electronic permit system.[97]

- Ultimately, with CITES Party cooperation the introduction of fully integrated electronic reporting systems could significantly reduce the lag time between trade occurring and being reported to CITES, allowing for more rapid management responses. Work is being initiated in this area through the inter-sessional working group on electronic systems and information technologies (see CoP18 Doc. 41), but more focussed efforts would be needed to make real-time reporting a reality for CITES Parties.

Actions to enable more accurate and precise tracking of listed commodities across the value and supply chains

- **Adopt and make consistent use of preferred taxon-specific term, unit and source codes:** Parties should report trade using the preferred terms and units (see latest guidelines supplied by CITES for the preparation and submission of annual reports e.g. Annex 1 to Notification No. 2019/072), and amend the guidelines[98] should taxon-specific updates to term descriptions be needed. An assessment of additional CITES term codes for marine species (including taxon-specific term codes) would be beneficial to ensure that terms unique to marine taxa life stages or commodities can be adequately reported. For example, differentiating between live "glass" (i.e. juvenile) eels and adult eels to ensure that trade reported by weight is not vastly over- or under-estimated. In the case of source codes, as new approaches are evolving for culturing corals, for example; considerations around what source code is most appropriate is required in the marine context.
- **Develop conversion factors:** Recognizing that Parties can still reasonably report as either the "preferred" or "alternative" units according to the guidelines, conversion factors should be developed and made available so that alternative units can be converted to preferred units of measure, wherever feasible, to aid with analysis. The CITES Secretariat may wish to consider how standard conversion factors for a range of marine taxa could be best identified and disseminated to Parties (either through existing Animal Committee working groups or otherwise). This would allow for more consistent estimates of the number of individuals in trade (e.g. for sharks, eel, seahorses, humphead wrasse and queen conch) that are reported in other terms/units (e.g. meat, fins as weight to numbers of individuals). This would facilitate a broader understanding of the scale of the international trade in marine species and, ultimately, a better understanding of the sustainability of such trade on populations in the wild.
- **Include CITES-listed species in national classifications based on the HS of WCO:** The Harmonized System (HS) is used as a basis for the collection of customs duties and international trade statistics by more than 200 countries, with over 98 percent of the merchandise trade classified in terms of the HS. Countries usually develop national classifications based on the HS adding a few additional codes to allow the monitoring of selected products. In this respect, countries should develop more comprehensive national classifications based on HS in collaboration with CITES, to take into account relevant marine species (and other species) of interest to CITES. Species-specific HS codes will enable more comprehensive monitoring of trade in CITES-listed taxa and support the officials who report trade of these species to CITES.

[97] See CITES Press release: https://cites.org/eng/news/new_wildlife_trade_system_goes_live_Sri Lanka_12032020

[98] See Guidelines on the submission of annual reports (Annex 1 to Notification No. 2019/072)

Increase communication of trade in CITES-listed marine species:

- Use innovative ways to communicate trade patterns for marine species: With over 20 million records, innovative approaches are needed to make the most of this important dataset. This may include using visualizations and infographics to communicate high-level trade trends. A standardized set of representative graphics could be developed to communicate high-level patterns and trends in the CITES trade data to inform CITES Parties and support decision making. This could be achieved, for instance, through the development of a standardized triennial "CITES State of Global Wildlife Trade Report", which would provide national, regional, and international overviews of trade in CITES-listed wildlife. Online tools can also help make the data more accessible. Further integration of marine-specific search functionality into online trade data visualization tools, or the development of automated summary trade report generation (e.g. by Party, region, taxonomic group or "marine taxa") would further increase visibility and communication of the CITES trade data.
- **Increase visibility and communication of online trade:** Automated mechanisms for detecting and monitoring online marketplaces should be considered more holistically by the Convention in order to ensure that CITES Parties have a full picture of the trade in CITES-listed species. This will be important for marine species, but also wider CITES-listed species groups. As online trade grows, the Convention needs to keep pace with other modes of trade that could otherwise go largely undetected.

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Annex A. Species included in analysis

TABLE A.1
List of CITES-listed species included in the analysis[a]

Scientific name	Common name	CITES listing proposal related to listing on CITES
Elasmobranchii	**Sharks and rays**	
Alopias spp.	Thresher sharks	CoP17-Prop-43
Carcharhinus falciformis	Silky shark	CoP17-Prop-42
Carcharhinus longimanus	Oceanic whitetip	CoP16-Prop-42
Cetorhinus maximus	Basking shark	CoP12-Prop-36
Carcharodon carcharias	Great white shark	CoP13-Prop-32
Lamna nasus	Porbeagle	CoP16-Prop-44
Sphyrna lewini	Scalloped hammerhead	CoP16-Prop-43
Sphyrna mokarran	Great hammerhead	
Sphyrna zygaena	Smooth hammerhead	
Rhincodon typus	Whale shark	CoP12-Prop-35
Manta spp.	Manta rays	CoP16-Prop-46
Mobula spp.	Mobula rays	CoP17-Prop-44
Actinopteri	**Bony fish**	
Anguilla anguilla	European eel	CoP14-Prop-18
Cheilinus undulatus	Humphead wrasse	CoP13-Prop-33
Hippocampus spp.	Seahorses	CoP12-Prop-37
Bivalva		
Tridacnidae spp.	Giant clams	CoP4-Prop-55 & 56; CoP5-Prop-39-43 (available from speciesplus.net)
Gastropoda		
Strombus gigas	Queen conch	CoP8-Prop-78
Anthozoa	**Coral**	
Antipatharia spp.	-	CoP3-Prop-76 (available from speciesplus.net)
Helioporidae spp.	-	CoP7-Prop-49-52
Scleractinia spp.	-	
Tubiporidae spp.	-	
Hydrozoa	**Coral**	
Milleporidae spp.	-	CoP7-Prop-49-52
Stylasteridae spp.	-	

[a] New species listed at CoP18 are not included in the data analyses.

Annex B. Conversion factors used

SHARK FINS AND MEAT

In order to gain an understanding of the number of individual sharks represented in the trade data, shark fins and meat were converted into number of individuals for the main species in trade, using the following methodology:

- **Shark fins:** reported weights (kg) were converted into number of dried fins, using the conversion factors detailed in Table B.1, to give the estimated number of fins in trade. The dry weight of fins originating from one individual were estimated based on the proportion of fin mass to body mass (wet fin to round body mass), and wet fin to dry fin mass ratio (see review by Biery and Pauly, 2012 for ratios). Conversion factors were calculated using the following: average weight * (wet fin to round mass ratio * wet fin to dry fin ration)/100 and assumed that all primary fins (first dorsal fin, pectoral fins, and upper and lower caudal fins) from each shark harvested were included in trade.
- **Shark meat:** reported weight of meat (kg) were converted into number of individuals, using the conversion factors detailed in Table B.2, to give an estimated number of individuals in trade. Conversion factors of meat were calculated using estimated proportions of dressed weight (gutted and headed) to round weight multiplied by the average body weight for the species.

TABLE B.1
Conversion factors used to estimate the number of individuals in trade from reported weight of fins

		Wet weight		Dry weight	
Taxon	Average adult weight (kg)	Fin : round mass ratio (%)[1]	Wet fin weight per shark (kg)	Wet to dry fin mass ratio[1]	Dry fin weight per shark (kg)
Carcharhinus longimanus	92[a]	7.34	6.8	0.59	4.0
Carcharodon carcharias	1 870[a]	2.67[d]	49.9	0.43g	21.3
Cetorhinus maximus	2 200[a]	3.01[e]	66.2	0.43[g]	28.3
Lamna nasus	127[a]	2.20	2.8	0.41	1.1
Sphyrna lewini	84[a]	2.13	1.8	0.40[h]	0.7
Sphyrna mokarran	450[b]	1.96	8.8	0.40[h]	3.5
Sphyrna spp.	311[c]	3.07[f]	9.6	0.40[h]	3.8
Sphyrna zygaena	400[b]	5.74	23.0	0.40	9.2

[1] Summarised in review by Biery and Pauly, 2012.
[a] *Source*: AnAge (Available from: https://genomics.senescence.info/species/. Accessed 13 November 2020).
[b] *Source*: Fishbase (Available from: fishbase.de. Accessed 13 November 2020).
[c] Mean weight of three *Sphyrna* species in trade.
[d] Family mean.
[e] Mean from all species reviewed by Biery and Pauly, 2012.
[f] Genus mean.
[g] Mean from all wet to dry fin mass conversions reviewed by Biery and Pauly, 2012.
[h] Based on value for *Sphyrna zygaena*

TABLE B.2
Conversion factors used to estimate the number of individuals in trade from reported weight of meat

Taxon	Average adult weight (kg)	Dressed to round weight ratio (%)	Average dressed weight per shark (kg)
Cetorhinus maximus	2 200[a]	50[b]	1 100.0
Lamna nasus	127[a]	82[c]	104.1
Sphyrna lewini	84[a]	50[b]	42.0

[a] *Source*: AnAge (Available from: https://genomics.senescence.info/species/. Accessed 13 November 2020).
[b] Hareide et al. 2007.
[c] No species-specific data available, based on average shark (FishServe, 2016).

Conversion factors of fin weight were calculated using estimated proportions of fin mass to body mass (wet fin to round body mass) found in Biery and Pauly (2012) and the average body weight of shark species, as found in various literature. These values were multiplied together to determine the weight of fins originating from one individual.

Conversion factors for the mean proportion of the weight of dressed meat derived from an individual depending on body mass were located through various sources depending on the species. This proportion was sourced from Hareide *et al.* (2007) (originally FAO data, but no further details provided) for *Lamna nasus*. For *Sphyrna lewini*, no species specific data was available and therefore the proportion of an individual to dressed weight was taken from an mean shark species estimate provided by FishServe (2016). These proportions were then applied to the mean body weight of the species to determine the weight of the dressed meat product derived from one individual.

[1] Note from Expert Florian Stein: The range for the number of eels is estimated on the following assumptions: (1) adult, grown live eel weight = 500g (max. eel weight produced in Moroccan farms, pers. comm. Stein 2019), (2) Number of glass eels per kg = 3,000. Both values are rough estimates that include uncertainty as they can vary greatly (e.g. based on origin of glass eels, farming duration, market demand).

[2] Note from Expert Florian Stein: Processed eel kabayaki butterfly fillets are globally traded in the following weight classes: 7oz (198g), 8oz (227g), 9oz (255g), 10oz (283g), 11oz (312g), 12oz (340g), 13oz (369g) and 14 oz (397g). Import inspections by Environment and Climate Change Canada in 2017 and 2018 revealed a mean weight of 285g. Therefore, eel meat weight was divided by 0.285.

CORALS

Under the guidelines for CITES annual reports (Annex 1 to Notification No. 2019/072), raw corals should be reported in kg and live corals by number of pieces. Raw corals reported by number of pieces and live corals reported by weight were converted to the recommended units using the conversion factors in Table B.3.

TABLE B.3
Conversion factors used to standardize reported units for live and raw coral, following conversion factors published in Green & Shirley (1999)

Term	Conversion
Live corals (kg)	= reported weight ÷ 0.2061
Raw corals (pieces)	= reported number × 0.58

EUROPEAN EELS

CITES trade term codes have not, historically, distinguished between eels at different life stages (Annex to Notification No. 2017/006), although a variety of life stages are in demand in trade (Crook, 2010). In order to gain an understanding of the number of individual eels represented in the trade data, live European eels and eel meat reported by weight was converted to estimate individuals using the following conversion factors:

Live eels: the number of live eels in trade was estimated from live eels reported by weight following conversion factors used by UNODC (2020) and reported by Appelbaum *et al.* (1998), where one glass eel weighed 0.00027 kg (0.27 g) and one adult eel weighed 0.27 kg[1].

Eel meat: the number of individual eels traded as meat was estimated from eel meat reported by weight based on conversion factors from import inspections by Environmental and Climate Change Canada (2017; 2018), which found the mean weight of an individual processed eel to be 285g (i.e. one kg of eel meat equates to approximately 3.5 individual eels).[2]

SEAHORSES

Under the guidelines for CITES annual reports (Annex 1 to Notification No. 2019/072), bodies should be reported in number of items. Seahorse bodies reported by weight were therefore converted to number of individuals, using the global conversion factor of 2.69 g from Evanson *et al.* (2011). For the purposes of this conversion, it was assumed that all trade reported as "bodies" represented dried seahorses.

QUEEN CONCH

Under the guidelines for CITES annual reports (Annex 1 to Notification No. 2019/072), shells should be reported in number of items. Queen conch shells reported by weight were therefore converted to number of individuals, using an estimated average weight of shells of 1.15 kg based on the range of queen conch shell weights (700–1500 g) reported in Prada *et al.* (2017).

Annex C. CITES Parties

TABLE C.1
Parties to CITES by CITES region

Africa	
Algeria	Libya
Angola	Madagascar
Benin	Malawi
Botswana	Mali
Burkina Faso	Mauritania
Burundi	Mauritius
Cabo Verde	Morocco
Cameroon	Mozambique
Central African Republic	Namibia
Chad	Niger
Comoros	Nigeria
Congo	Rwanda
Côte d'Ivoire	Sao Tome and Principe
Democratic Republic of the Congo	Senegal
Djibouti	Seychelles
Egypt	Sierra Leone
Equatorial Guinea	Somalia
Eritrea	South Africa
Ethiopia	Sudan
Gabon	Swaziland
Gambia	Togo
Ghana	Tunisia
Guinea	Uganda
Guinea-Bissau	United Republic of Tanzania
Kenya	Zambia
Lesotho	Zimbabwe
Liberia	
Asia	
Afghanistan	Kazakhstan
Bahrain	Kuwait
Bangladesh	Kyrgyzstan
Bhutan	Lao People's Democratic Republic
Brunei Darussalam	Lebanon
Cambodia	Malaysia
China	Maldives
India	Mongolia
Indonesia	Myanmar
Iran (Islamic Republic of)	Nepal
Iraq	Oman
Japan	Pakistan
Jordan	Philippines
Qatar	Tajikistan
Republic of Korea	Thailand
Saudi Arabia	United Arab Emirates
Singapore	Uzbekistan
Sri Lanka	Viet Nam
Syrian Arab Republic	Yemen

TABLE C.1 (CONT.)

Central and South America and the Caribbean	
Antigua and Barbuda	Grenada
Argentina	Guyana
Bahamas	Honduras
Barbados	Jamaica
Belize	Nicaragua
Bolivia (Plurinational State of)	Panama
Brazil	Paraguay
Chile	Peru
Colombia	Saint Kitts and Nevis
Costa Rica	Saint Lucia
Cuba	Saint Vincent and the Grenadines
Dominica	Suriname
Dominican Republic	Trinidad and Tobago
Ecuador	Uruguay
El Salvador	Venezuela (Bolivarian Republic of)
Europe	
Albania	Liechtenstein
Armenia	Lithuania
Austria	Luxembourg
Azerbaijan	Malta
Belarus	Monaco
Belgium	Montenegro
Bosnia and Herzegovina	Netherlands
Bulgaria	Norway
Croatia	Poland
Cyprus	Portugal
Czech Republic	Republic of Moldova
Denmark	Romania
Estonia	Russian Federation
European Union	San Marino
Finland	Serbia
France	Slovakia
Georgia	Slovenia
Germany	Spain
Greece	Sweden
Hungary	Switzerland
Iceland	The former Yugoslav Republic of Macedonia
Ireland	Turkey
Israel	Ukraine
Italy	United Kingdom of Great Britain & Northern Ireland
Latvia	Liechtenstein
North America	
Canada	United States of America
Mexico	
Oceania	
Australia	Samoa
Fiji	Solomon Islands
New Zealand	Tonga
Palau	Vanuatu
Papua New Guinea	

Annex D. Annual report submission of key reporters

TABLE D.1
Key exporters and importers of commercially traded marine products from the case studies and the dates of their submission of annual reports to CITES 2011–2017

		2011		2012		2013		2014		2015		2016		2017	
Country/Territory	Type	Date	Reporting bracket	Date	Reporting bracket	Date	Reporting bracket	Date	Reporting bracket	Date	Reporting bracket	Date	Reporting bracket	Date	Reporting bracket
China	Exporter/ Importer	01/11/2012	1 month	29/10/2013	Before deadline	02/11/2014	1 month	30/10/2015	Before deadline	28/10/2016	Before deadline	30/10/2017	Before deadline		
Viet Nam	Exporter/ Importer	22/11/2012	1 month	28/11/2013	1 month	13/01/2014	Before deadline	31/10/2015	Before deadline	09/12/2016	2–6 months	15/12/2017	2–6 months		
Mexico	Exporter	16/11/2012	1 month	03/07/2013	Before deadline	25/08/2014	Before deadline	23/11/2015	1 month	03/06/2016	Before deadline	18/10/2017	Before deadline		
Peru	Exporter	31/10/2012	Before deadline	28/10/2013	Before deadline	28/10/2014	Before deadline	31/10/2015	Before deadline	31/10/2016	Before deadline	31/10/2017	Before deadline		
Norway	Exporter	29/10/2012	Before deadline	31/10/2013	Before deadline	04/11/2014	1 month	03/11/2015	1 month	23/11/2016	1 month	18/11/2017	1 month		
Canada	Exporter	05/12/2013	Up to 2 years	27/01/2016	Up to 3 years	25/11/2015	Up to 2 years	25/11/2014	Before deadline	08/12/2016	2–6 months	31/10/2017	Before deadline		
Indonesia	Exporter	17/01/2013	2–6 months	03/07/2014	7–12 months	16/03/2015	2–6 months	08/01/2016	2–6 months	08/11/2016	1 month	09/10/2017	Before deadline		
Fiji	Exporter	03/11/2014	Up to 3 years	17/11/2015	Up to 3 years	17/11/2015	Up to 2 years	18/11/2015	1 month						
Morocco	Exporter	23/09/2013	7–12 months	26/09/2013	Before deadline	12/12/2014	2–6 months	25/10/2017	Up to 2 years	20/09/2016	Before deadline	25/10/2017	Before deadline		
Tunisia	Exporter	28/06/2013	7–12 months			18/09/2014	Before deadline	21/01/2015	Before deadline	23/05/2016	Before deadline	31/01/2017	Before deadline		
Thailand	Exporter			25/10/2013	Before deadline	20/10/2014	Before deadline	27/10/2015	Before deadline	22/11/2016	1 month	24/10/2017	Before deadline		
Viet Nam	Exporter	22/11/2012	1 month	28/11/2013	1 month	13/01/2014	Before deadline	31/10/2015	Before deadline	09/12/2016	2–6 months	15/12/2017	2–6 months		
Malaysia	Exporter	29/10/2012	Before deadline	20/12/2013	2–6 months	31/10/2014	Before deadline	30/10/2015	Before deadline	31/10/2016	Before deadline	06/12/2017	2–6 months		
Sri Lanka	Exporter	01/03/2013	2–6 months	23/03/2015	Up to 2 years	14/09/2015	7–12 months	23/10/2015	Before deadline	21/09/2016	Before deadline	01/08/2018	7–12 months		
France	Exporter	19/09/2012	Before deadline	11/09/2013	Before deadline	22/08/2014	Before deadline	01/06/2015	Before deadline	24/08/2016	Before deadline	10/08/2017	Before deadline	23/07/2018	Before deadline

TABLE D.1 (CONT.)

		2011		2012		2013		2014		2015		2016		2017	
Country/Territory	Type	Date	Reporting bracket	Date	Reporting bracket	Date	Reporting bracket	Date	Reporting bracket	Date	Reporting bracket	Date	Reporting bracket	Date	Reporting bracket
Palau	Exporter	03/05/2013	7–12 months	09/01/2016	Up to 3 years	09/01/2016	Up to 2 years	09/01/2016	2–6 months	09/01/2016	Before deadline				
Solomon Islands	Exporter					28/03/2016	Up to 2 years	28/03/2016	2–6 months						
Nicaragua	Exporter	24/05/2014	Up to 2 years	23/01/2016	Up to 3 years	23/01/2016	Up to 2 years	23/01/2016	2–6 months	11/07/2016	Before deadline	17/07/2017	Before deadline		
Belize	Exporter	07/07/2014	Up to 2 years	07/07/2014	7–12 months	21/12/2016	Up to 3 years	21/12/2016	Up to 2 years	21/12/2016	2–6 months				
Bahamas	Exporter	23/04/2013	2–6 months	17/12/2015	Up to 3 years	21/12/2015	Up to 2 years	29/12/2015	2–6 months	11/11/2016	1 month	29/11/2017	1 month		
China, Hong Kong SAR	Importer	01/11/2012	1 month	29/10/2013	Before deadline	02/11/2014	1 month	30/10/2015	Before deadline	28/10/2016	Before deadline	30/10/2017	Before deadline		
United States of America	Importer	29/10/2012	Before deadline	05/11/2013	1 month	22/10/2014	Before deadline	26/10/2015	Before deadline	25/10/2016	Before deadline	28/10/2017	Before deadline		
Republic of Korea	Importer	26/03/2014	Up to 2 years	17/02/2014	2–6 months	28/08/2015	7–12 months	18/03/2016	2–6 months	28/11/2016	1 month	09/05/2018	7–12 months		
Germany	Importer	24/05/2012	Before deadline	29/05/2013	Before deadline	30/05/2014	Before deadline	05/06/2015	Before deadline	25/05/2016	Before deadline	09/06/2017	Before deadline	07/06/2008	Before deadline
New Zealand	Importer	31/10/2012	Before deadline	05/09/2013	Before deadline	25/08/2014	Before deadline	18/06/2015	Before deadline	23/11/2016	1 month	20/12/2017	2–6 months		
United Kingdom of Great Britain and Northern Ireland	Importer	18/09/2012	Before deadline	13/06/2013	Before deadline	15/06/2014	Before deadline	15/06/2015	Before deadline	02/06/2016	Before deadline	14/06/2017	Before deadline	01/06/2018	Before deadline

Source: CITES website. Accessed 30 October 2018.

Annex E. Reporting of Appendix II imports

Article IV of the CITES Convention only stipulates that export permits are required for trade in products of Appendix II-listed species, although the guidelines for the preparation and submission of annual reports (Annex 1 to Notification No. 2019/072) states in the section on "General principles" that "Annual reports must contain information on imports, exports, re-exports and introductions from the sea of specimens of all species included in Appendices I, II and III".

TABLE E.1
Parties to CITES which did not report any imports of Appendix II-listed CITES species during the period 2007–2016. Countries in bold were key importers of marine species (see Chapter 3 and Annex D)

Parties with no reported Appendix II imports 2007–2016	
Angola	Guinea-Bissau
Armenia	Lebanon
Benin	Liberia
Bolivia (Plurinational State of)	Liechtenstein
Burkina Faso	Mauritania
Burundi	**Nicaragua**
Cabo Verde	Pakistan
Cameroon	**Palau**
Central African Republic	Papua New Guinea
Chad	Saint Kitts and Nevis
Colombia	Saint Vincent and the Grenadines
Comoros	Samoa
Congo	Sierra Leone
Democratic Republic of the Congo	**Solomon Islands**
Djibouti	Tajikistan
Equatorial Guinea	Togo
Eritrea	Tonga
Ethiopia	United Republic of Tanzania
Grenada	Vanuatu
Guinea	Yemen

Source: CITES Trade Database (Available from: trade.cites.org, managed by UNEP-WCMC on behalf of the CITES Secretariat. Accessed 2 October 2018).

Annex F. CITES trade in case study species

TABLE F.1
Direct exports of Appendix II-listed shark species recorded in the CITES Trade Database over the period 2003–2016[a]

Term	Unit	Reporter	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Bodies		E			1.00							3.00	1.00			10.00
		I														12.00
Bone pieces		E														
		I								32.00						
Bones		E							3.00			3.00			3.00	3.00
		I			1.00	1.00		383.00	3.00	3.00						3.00
Carvings		E	1.00													
		I									9.00	1.00				
Derivatives		E								1.00						
		I														
Fins	Kg	E							200.00			605.60		5 728.29	28 680.84	37 350.81
		I			5 538.00			700.00	119.10			576.30		648.70	19 987.99	20 704.88
		E						1.00			112.00		200.74	448.00	626.00	2 554.00
		I		21.00	8.00	39.00										44.00
Large leather products		E			2.00											
		I														
Live	Kg	E													1 082.97	
		I														
		E					6.00	2.00				2.00		1.00	15.00	
		I			2.00	2.00	8.00	2.00			1.00				20.00	6.00
Meat	Kg	E			2 855.40		700.00							851.00	963.64	95 096.00
		I												991.00	980.00	126.00
Skin pieces		E														
		I			2.00											
Skins		E														
		I									2.00	21.00				
Skulls		E													1.00	
		I														
Specimens	Kg	E												491.00		20.00
		I						7.00								
		E				1.00	50.00	5.00	56.00	177.00	150.00	27.00	201.00	145.00	638.00	8.00
		I					52.00		30.00	4.00	217.00	11.00	37.00	15.00	477.00	289.00
Tails		E												108.00		
		I														
Teeth		E						750.00	304.00	4.00	9.00	520.00			525.00	
		I			26.00	2.00			1050.00	300.00	520.00					

Source: CITES Trade Database, managed by UNEP-WCMC. Accessed 2 October 2018.
[a] Source I trade was excluded.

TABLE F.2

Direct exports of Appendix II-listed corals (Anthozoa and Hydrozoa) recorded in the CITES Trade Database over the period 2007–2016[a]

Term	Unit	Purpose	Reporter	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Bodies		S	E			55.00							395.00
			I					6 000.00				40.00	
Carvings	kg	T	E				0.04						
			I		17 280.00					950.00			
		S	E										
			I	650.00	160.00								390.00
		T	E	807.00	148.00	1.00	32.00	46.00	41.00	279.00	162.00		
			I	6 634.00	2 026.00	4.00	22.00	5.00	29.00		1 192.00	17.00	11 461.00
Cosmetics		T	E									1 300.00	
			I										
Derivatives	kg	T	E										
			I						1 749.00	3 375.21	131.00	6 000.00	2 815.00
	m^3	S	E			2 000.00							
			I										
		S	E					1 419.00		113.00			
			I										
		T	E			915.00							
			I	515.00	902.00	3.00	1 378.00	447.00	1 659.00	2 341.00	1 694.00	722.00	1 637.00
Live	kg	T	E	12 251.80	1 076.00	24 835.00	3 699.00	2 696.00	864.00	1 202.00	1 200.00	2 220.00	
			I	187 280.00	110 189.00	150 757.32	90 828.00	120 431.00	116 205.50	120 557.00	71 879.00	67 449.00	44 158.00
		P	E	4.00					1.00		105.00		
			I	220.00		7.00	3.00	304.00	1 933.00	60.00	80.00	64.00	399.00
		S	E	11 472.00	1 007.00	913.00	142.00	1 943.00	1 538.00	21 269.00	15 357.00	362.00	171.00
			I	12 044.00	506.00	203.00	5 438.00	50.00	5 343.00	2 194.00	11 787.00	5 138.00	58 104.00
		T	E	1 244 082.00	1 574 960.00	1 705 567.00	1 753 095.00	1 730 345.00	3 238 244.00	2 774 956.00	2 149 333.00	1 642 142.00	1 704 014.00
			I	1 832 318.00	1 212 183.00	1 197 004.00	4 438 156.00	1 387 916.00	1 351 130.50	1 577 063.00	1 393 402.88	1 485 921.59	1 313 566.00
			E		25.00				17 250.00	539.00			11.00
			I	7 615.00	12 363.00	91 883.00		29 971.00	1 525.00	38 600.00	31 882.00	414 828.00	100.00
Raw corals	kg	P	E			39.91		5.92		9.19		14.15	
			I	43.83	107.00	55.84	20.18	14.01	63.48	3 044.85	19.04		20.88
		S	E	5.00	761.63	1 217.50	854.42	150.90	128.00	309.54	116.99	35.80	2.39
			I	1 501.51	49.50	25.64	575.42	53.23	64.04	110.73	66.32	49.00	210.55
		T	E	1 950 446.15	1 684 094.05	2 621 643.45	1 998 136.00	477 342.00	1 423 927.00	4 312 880.00	3 738 690.00	969 809.58	17 460.00
			I	2 070 771.90	1 891 959.80	1 342 172.00	1 170 206.40	1 234 423.20	1 485 387.00	1 359 528.50	1 132 230.00	1 156 479.35	859 104.00
		P	E	1 134.00	831.00	98.00	44.00	39.00	86.00	216.00	108.00	73.00	43.00
			I	826.00	644.00	259.00	121.00	89.00	190.00	3 521.00	35.00	68.00	79.00
		S	E	62 663.00	61 968.00	7 678.00	7 416.00	1 775.00	5 060.00	1 507.00	3 531.00	1 293.00	53 606.00
			I	1 319.00	1 744.00	2 173.00	5 581.00	5 777.00	5 358.00	2 779.00	8 082.00	11 237.00	7 044.00
		T	E	903 987.00	815 727.00	918 476.00	956 096.00	846 871.00	850 187.00	255 479.00	685 760.00	548 735.00	1 298 685.00
			I	898 263.00	834 287.00	786 839.00	773 972.00	733 877.00	655 485.00	591 209.00	680 811.00	492 133.07	590 378.50
Specimens	kg	S	E	1.52	6.00	8.00	425.23	0.40	435.76	180.96	4.20	20.00	
			I	90.00	0.05	1 042.53	361.78		13.98	489.90	7.41	5.00	0.40
		S	E	9 133.00	2 214.00	2 691.00	5 017.00	6 165.00	8 656.00	30 260.00	5 064.00	5 853.00	1 764.00
			I	4 310.00	240.00	3 537.00	1 246.00	34 395.00	3 919.00	4 260.00	5 141.00	2 543.00	3 765.00
		T	E						76.00	1.00			
			I					10.00	45.00	500.00	2.00	450.00	
			E							3 704.00			
			I				415.00	15.00					

Source: CITES Trade Database, managed by UNEP-WCMC on behalf of the CITES Secretariat. Accessed 2 October 2018.

[a] Only term/unit/purpose combinations with over 1000 units for the 10 year period (reported by exporters or importers) are shown; source I trade was excluded.

TABLE F.3

Direct exports of live and raw Appendix II-listed corals (Anthozoa and Hydrozoa) recorded in the CITES Trade Database over the period 2007–2016 following standardisation to live corals in pieces and raw corals in kg[a]

Term	Unit	Purpose[b]	Reporter	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Live		P	E	4.00					1.00		105.00		
			I	220.00		7.00	3.00	304.00	1 933.00	60.00	80.00	64.00	399.00
		T	E	1 303 527.90	1 580 180.77	1 826 066.76	1 771 042.60	1 743 426.03	3 242 436.14	2 780 788.12	2 155 155.42	1 652 913.47	1 704 014.00
			I	2 741 003.10	1 746 821.52	1 928 480.56	4 878 854.69	1 972 248.85	1 914 961.16	2 162 007.20	1 742 160.76	1 813 185.05	1 527 821.22
			E		25.00				17 250.00	539.00			11.00
			I	7 615.00	12 441.75	91 883.00		29 971.00	1 525.00	38 600.00	31 882.00	414 828.00	100.00
Raw corals	kg	P	E	657.72	481.98	96.75	25.52	28.54	49.88	134.47	62.64	56.49	24.94
			I	522.91	480.52	206.06	90.36	65.63	173.68	5 087.03	39.34	39.44	66.70
		T	E	2 474 758.61	2 157 215.71	3 154 359.53	2 552 671.68	968 527.18	1 917 035.46	4 461 057.82	4 136 430.80	1 288 075.88	770 697.30
			I	2 591 764.44	2 375 846.26	1 798 538.62	1 619 110.16	1 660 071.86	1 865 568.30	1 702 429.72	1 527 100.38	1 441 916.53	1 201 523.53
			E			293.24	250.00			59.16		250.00	
			I				5.80		1.16		0.58		

Source: CITES Trade Database, managed by UNEP-WCMC on behalf of the CITES Secretariat. Accessed 2 October 2018.

[a] Source I trade was excluded.

[b] Only exports reported with purpose P, T and no purpose reported are shown.

TABLE F.4

Direct exports of European eel (*Anguilla anguilla*) recorded in the CITES Trade Database over the period 2009–2016

Term	Unit	Source[a]	Reporter	2009	2010	2011	2012	2013	2014	2015	2016
Bodies	kg	O	E	253.44							
			I	137 240.00	50 000.00		24 000.00				
		W	E			24 000.00					87 975.50
			I		30.00		3 111.00				
		O	E	5.00							
			I								
		W	E		14 866.00						
			I								
Extract		W	E								
			I		130.00		30.00				
Fingerlings	kg	W	E	1 588.40	17 306.50						
			I		13 646.00						
		W	E					4 500.00			
			I								
Live	kg	C	E								
			I							4 000.00	
		O	E	1 500.00	1 500.00						
			I	45 000.00	1 140.00	900.00	115.00				
		R	E								
			I		750.00	850.00	800.00				
		W	E	170 906.30	49 412.00	4 795.00	7 577.00	29 823.00	211 620.00	257 834.00	319 760.08
			I	78 360.00	59 405.50	3 930.00	9 917.00	86 803.00	59 204.00	498 216.00	286 742.88
		O	E								
			I	1 500.00	1 500.00						
		R	E	4 258.00							
			I								
Live		W	E	36.00	87.00				42.00		
			I	11 367.00	9 603.00	11 272.00	8 960.00		198 940.00	16 688.00	6 859.00
		X	E								
			I							242.00	
Meat	kg	F	E								
			I			18 950.00					
		O	E	1 680.00	49 650.00	18 168.52					
			I	64 673.10	25 000.00						
		R	E								
			I	80.00							
		W	E		24 042.00	4 500.00	290.00	292 387.00	281 000.00	128 499.00	
			I	62.00	12.00		4 509.00			8 000.00	51 180.00
		W	E								
			I			4 509.00			300.00	30.00	
Specimens	kg	W	E			0.15	0.30				
			I								
		F	E			11.00					
			I								
		W	E	100.00	130.00						48.00
			I	100.00		25.00					600.00

Source: CITES Trade Database, managed by UNEP-WCMC on behalf of the CITES Secretariat. Accessed 2 October 2018.

[a] Source I trade was excluded.

TABLE F.5
Direct exports of seahorses (*Hippocampus* spp.) recorded in the CITES Trade Database over the period 2007–2016[a]

Term	Unit	Reporter	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Bodies	kg	E	16 017.40	13 278.90	9 463.44	58.50	42.26	2.00	1 380.63	110.00	1.00	
		I	11 705.54	10 578.16	8 753.45	9 577.00	8 450.55	2 273.97	1 199.82	136.00	754.00	181.50
		E		467.00	27 567.00	11 515.30	7 882.43	3 070.47	348.09	2 924.02	995.00	
		I	925.00	11 440.00	9 637.00		116.00	1 800.00	53.00	201.00	150.00	
Derivatives	kg	E	578.51	210.08		14.37						
		I					180.62					
		E		1 900.00		7 000.00						
		I		2 090.00			230.00					110.00
Fingerlings		E			90.00	1 360.00	1 100.00	1 072.00	840.00		675.00	795.00
		I						150.00				55.00
Fins		E										
		I									200.00	
Live	kg	E	665.00		3.00							1.00
		I	90.00									
		E	136 548.00	97 605.00	97 160.00	95 348.00	115 647.00	78 746.00	43 911.00	54 482.00	49 666.00	7 793.00
		I	78 497.00	82 650.00	62 325.00	53 885.00	64 363.00	59 883.00	36 400.00	26 760.00	26 494.00	10 945.00
Medicine	kg	E							1.70			
		I										
		E						184.00				
		I										
Powder		E										
		I						2.00				
Skeletons	kg	E										270.00
		I										
		E			60.00	1 354.00		598.00			159.00	
		I										
Specimens	kg	E										
		I			15.80							
		E		6.00	12.00	101.00			8.00	44.00	428.00	52.00
		I	81.00	15.00	22.00	57.00	50.00		12.00	6.00	5.00	5.00

Source: CITES Trade Database, managed by UNEP-WCMC on behalf of the CITES Secretariat. Accessed 2 October 2018.
a Source I trade was excluded.

TABLE F.6

Direct exports of humphead wrasse (*Cheilinus undulatus*) recorded in the CITES Trade Database over the period 2005–2016[a]

Term	Unit	Purpose	Reporter	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Derivatives		T	E					66.0		100.0					
			I												
Live		E	E												
			I				10.0		1.0						2.0
		P	E												
			I	1.0											
		Q	E		40.0										
			I												
		S	E			350.0									
			I												
		T	E	5 230.0	2.0	23 529.0	25 324.0	30 512.0	3 814.0	2 710.0	1 674.0	1 275.0	1 233.0	514.0	1078.0
			I	1.0	906.0	20 628.0	18 914.0	17 176.0	3 291.0	1 609.0	1 671.0	589.0	352.0	7.0	288.0
		Z	E	17.0				1.0	5.0			5.0			
			I	8.0	1.0	1.0			5.0	3.0		1.0	6.0	6.0	4.0
Meat	kg	T	E						679.1						
			I						599.2						
Specimens	kg	S	E	9 900.0											
			I												

Source: CITES Trade Database, managed by UNEP-WCMC on behalf of the CITES Secretariat. Accessed 2 October 2018.

[a] All trade was wild-sourced.

TABLE F.7

Direct exports of giant clams (Tridacnidae spp.) recorded in the CITES Trade Database over the period 2007–2016[a]

Term	Unit	Purpose	Reporter	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Bodies		T	E			514.00	639.00	3 141.00	1 141.00		1.00		
			I								500.00		
Carvings	kg	P	E			32.50	166.40	417.26	281.72	254.40	153.77	140.41	73.14
			I										
Live		P	E					1 864.00	5.00	6.00	3.00		
			I	600.00								5.00	
		T	E	154 734.00	56 204.00	48 762.00	92 983.00	87 754.00	46 189.00	73 235.00	69 634.00	40 135.00	22 922.00
			I	162 424.00	129 256.00	98 354.00	148 611.00	138 508.00	115 701.00	94 686.00	95 815.00	103 019.00	74 776.00
			E							13 107.00	200.00		
			I		800.00						153.00		
Meat	kg	P	E										
			I	5 191.05	1 333.80	2 026.40	1 176.90	1 031.00	1 421.59	1 764.00	1 954.70		3 650.30
		P	E							620.00	852.00		
			I	4 419.00	785.00	1 294.50	538.00	1 113.00	2 925.00	1 352.00	165.00	25.00	184.00
		T	E			525.00	324.00	276.00	296.00				
			I				225.00						
Powder			E	903.00	487.00	34.00	34.00	101.00	42.00	614.50	531.50	48.00	
			I	289.00	231.00	220.00	125.00	94.00	90.00	78.00	57.00	8.00	58.00
Shells		P	E	10.00	1 707.50	3 726.00	4 423.00	237.00	259.00	3 359.00	7 774.00		
			I	3 100.00	3 041.00	2 024.00	2 309.00	328.00	2 680.00	430.00	610.00	5 621.00	2 762.00
		T	E	89.00	4.00		12.00		150.00	290.00	651.00	67.00	121.00
			I	2.00		4.00	92.00	140.00	87.00	190.00	402.00	40.00	493.00
Specimens			E			514.00	639.00	3 141.00	1 141.00		1.00		
			I								500.00		

Source: CITES Trade Database, managed by UNEP-WCMC on behalf of the CITES: Secretariat. Accessed 2 October 2018.

TABLE F.8

Direct exports of queen conch (*Strombus gigas*) recorded in the CITES Trade Database over the period 2007–2016[a]

[a] Only term/unit/purpose combinations with over 1000 units for the 10 year period (reported by exporters or importers) are show; source I trade was excluded.

Term	Unit	Purpose	Reporter	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Bodies	kg	T	E	4 990.00	0.50		2.27						
			I						33 566.00	36 287.00			
		T	E	2 921.00	1 644.00	17.00	98.00	121.00					
			I										
Carvings		T	E							4.00	551.00	5.00	
			I	406.00	627.00	38.00	166.00		196.00	262.00	2 392.00	302.00	
			E										
			I				34.00		624.00	564.00	733.00	382.00	
Derivatives	kg	T	E		17 259.00	57 132.50	1 303.52				977.14		
			I	15 000.01							0.04	0.06	
		P	E			1 288.00	51.00	158.00	16.00		261.00		
			I		135.00	123.00	50.00						
		T	E		42.00	35 728.00	3 564.00	1 370.00	3 012.00	4 151.00	1 389.00	3.00	
			I	1 605.00	1 484.00	1 502.00	3 683.00	167.00	130.00	1 714.00	2 071.00	3 331.00	
Live	kg	T	E	190.51									
			I	773.00		11 785.87							
Meat	kg	P	E	14 003.54	4 521.38	19 458.46	33 753.58	174 674.60	44 198.95	42 970.94	70 406.97	66 216.55	4 749.29
			I	22.00	37.54	45.54	40.50	12.00	4.54		32.23	31.16	23.15
		S	E		8.66					0.05		257.20	12 505.55
			I										
		T	E	1 236 207.50	1 648 436.57	1 882 591.95	1 580 238.93	1 022 683.37	1 313 810.11	1 848 018.88	1 356 975.15	1 303 579.20	900 023.46
			I	1 289 790.25	1 340 039.72	1 741 310.40	1 636 142.53	1 650 149.14	1 748 097.21	2 033 096.03	1 963 796.70	2 057 337.01	2 200 750.14
			E		3.63		110 312.16	232 638.15	115 374.26		3.18	4.54	
			I					2.27					
		T	E	4 050.00	29 000.00	1 217.00	7 182.80	389 648.75	57.00	25 375.15	348 962.34	16 843.00	25 000.00
			I		20.00			4 678.00					
			E					22 347.24					
			I										
Pearl/pearls		T	E	493.00	348.00					3 156.00	2 374.00	1 101.00	1 209.00
			I									244.00	3 563.00
Shells	kg	P	E	36.29	4.54	7 718.43	6 883.63	13.60		4.54	22.68	4.55	0.01
			I					0.03					
		T	E	6 804.00	13 637.00	211 352.34	2 721.60	15 141.70	25 552.29	3 435.09	2 097.09	186 955.39	110 156.18
			I	72.00	2 138.23	19 669.27	44 173.00	1 070.35	12 263.47	1 916.09	328.85	2 879.62	15 725.08
		P	E	55.00	433.00	321.00	145.00	1 057.00	91.00	190.00	132.00	209.00	37.00
			I	149.00	50.00	24.00	64.00	30.00	10.00	30.00	44.00	147.00	23.00
		T	E	209 059.00	103 724.00	66 194.00	507 699.00	283 958.00	215 686.00	67 206.00	149 366.00	210 486.00	209 087.00
			I	128 758.00	36 589.00	33 283.00	38 667.00	47 177.00	116 404.00	64 814.00	102 850.16	68 045.00	74 864.00
Skins	kg	T	E				8 232.74	7 189.56	21 931.17	57 016.51	32 474.47	47 375.94	
			I										
Specimens		S	E	8.00	8.00	82.00		100.00	50.00	243.00	1 400.00	575.00	60.00
			I	1.00						316.00		165.00	230.00
Unspecified			E				2.27	9 573.00					
			I										

Source: CITES Trade Database, managed by UNEP-WCMC on behalf of the CITES Secretariat. Accessed 2 October 2018.

[a] Only term/unit/purpose combinations with over 1000 units for the 10 year period (reported by exporters or importers) are shown; source I trade was excluded.

Annex G. Source and purpose codes

TABLE G.1
Codes for describing the source of trade

Code	Description
A	Plants that are artificially propagated in accordance with Resolution Conf. 11.11 (Rev. CoP17), as well as parts and derivatives thereof, exported under the provisions of Article VII, paragraph 5 (specimens of species included in Appendix I that have been propagated artificially for non-commercial purposes and specimens of species included in Appendices II and III)
C	Animals bred in captivity in accordance with Resolution Conf. 10.16 (Rev.), as well as parts and derivatives thereof, exported under the provisions of Article VII, paragraph 5
D	Appendix-I animals bred in captivity for commercial purposes in operations included in the Secretariat's Register, in accordance with Resolution Conf. 12.10 (Rev. CoP15), and Appendix-I plants artificially propagated for commercial purposes, as well as parts and derivatives thereof, exported under the provisions of Article VII, paragraph 4, of the Convention
F	Animals born in captivity (F1 or subsequent generations) that do not fulfil the definition of "bred in captivity" in Resolution Conf. 10.16 (Rev.), as well as parts and derivatives thereof
I	Confiscated or seized specimens (may be used with another code)
O	Pre-Convention specimens
R	Ranched specimens: specimens of animals reared in a controlled environment, taken as eggs or juveniles from the wild, where they would otherwise have had a very low probability of surviving to adulthood
U	Source unknown (must be justified)
X	Specimens taken in "the marine environment not under the jurisdiction of any State"
W	Specimens taken from the wild

Source: CITES Resolution Conf. 12.3 (Rev. CoP18) Permits and Certificates.

TABLE G.2
Codes for describing the purpose of trade

Code	Description
B	Breeding in captivity or artificial propagation
E	Educational
G	Botanical garden
H	Hunting trophy
L	Law enforcement/judicial/forensic
M	Medical (including biomedical research)
N	Reintroduction or introduction into the wild
P	Personal
Q	Circus or travelling exhibition
S	Scientific
T	Commercial
Z	Zoo

Source: CITES Resolution Conf. 12.3 (Rev. CoP18) Permits and Certificates.

Fish and fish products are amongst the most highly traded food items in the world today, with most of the world's countries reporting some fish trade. This assessment of commercial trade in CITES-listed marine species occurs within a broader context of globalization and a more general rapid expansion of the international trade in fish and fish products. It summarizes ten years (2007–2016) of trade in a subset of commercially exploited marine taxa listed in CITES Appendix II. We examine both CITES trade data reporting processes (including information on the practical elements of reporting by CITES Parties) and analyse CITES trade records. The analysis shows how, for Appendix II CITES-listed marine species, the overall number of direct export transactions reported by CITES Parties has increased sevenfold during 1990–2016 and how trade for each CITES-listed marine species sub-group has changed through time. An assessment is made, with assistance from species and trade experts, on the strengths and challenges of collating and reporting on trade in CITES-listed marine species. Additional datasets of relevance to marine species trade are highlighted, and recommendations for further refining and improving CITES trade reporting for marine species are provided.

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