CONVENTION SUR LE COMMERCE INTERNATIONAL DES ESPECES
DE FAUNE ET DE FLORE SAUVAGES MENACEES D'EXTINCTION

Soixante-quatorzième session du Comité permanent
Lyon (France), 7 - 11 mars 2022

Questions spécifiques aux espèces

Hippocampes (*Hippocampus* spp.)

Rapport du Secrétariat

1. Le présent document a été préparé par le Secrétariat.

2. À sa 18e session (CoP18, Genève, 2019), la Conférence des Parties a adopté les décisions 18.228 à 18.233, *Hippocampes* (Hippocampus *spp.*) comme suit :

À l'adresse du Secrétariat

18.228 *Le Secrétariat publie sur le site Web de la CITES le matériel disponible afin de soutenir l'application de la CITES aux hippocampes (orientations sur les avis de commerce non préjudiciable, matériel d'identification, etc.).*

18.229 *Le Secrétariat :*

a) envoie une notification aux Parties les invitant à informer le Secrétariat de toute mesure de gestion nationale qui réglemente ou restreint le commerce international et de la manière dont elles mettent en œuvre et appliquent de telles mesures pour les hippocampes ;

b) compile les réponses reçues à la notification publiée conformément au point a) de la présente décision et les communique aux autorités CITES dans le cadre d'une notification aux Parties et sur son site Web ; et

c) sous réserve d'un financement externe :

i) commandite une étude sur le commerce des Hippocampus *spp., y compris sur les réglementations applicables, afin de comprendre l'évolution des schémas du commerce international depuis l'inscription des hippocampes à l'Annexe II et l'Étude du commerce important des* Hippocampus *spp., ainsi que les problèmes d'application et les solutions possibles ; et*

ii) organise un atelier de spécialistes pour examiner l'application de la CITES au commerce des Hippocampus *spp. et le contrôle du respect de la Convention, y compris les recommandations du processus d'Étude du commerce important, et propose des mesures concrètes pour faire face aux problèmes d'application et de contrôle du respect de la Convention; et*

d) fait rapport sur l'application des paragraphes a) à c) de la présente décision au Comité pour les animaux et au Comité permanent, le cas échéant.

À l'adresse des Parties

18.230 *Pour soutenir une application efficace des dispositions de l'Annexe II de la CITES aux hippocampes, les Parties sont invitées à :*

a) informer le Secrétariat de toute mesure de gestion nationale qui réglemente ou restreint le commerce international des hippocampes de la manière dont elles mettent en œuvre et appliquent de telles mesures pour les hippocampes ;

b) partager des copies de leurs avis de commerce non préjudiciable avec le Secrétariat pour qu'elles soient portées sur le site web de la CITES afin d'aider d'autres Parties ; et

c) informer les négociants d'hippocampes se trouvant dans leur juridiction de tout quota, y compris tout quota zéro, et de toute suspension du commerce pour les hippocampes afin de faciliter le respect et l'application par tous les participants au commerce.

18.231 *Les Parties sont encouragées à :*

a) utiliser les outils existants pour l'application et le respect effectifs de la CITES concernant les hippocampes ;

b) lorsque des quotas, suspensions du commerce, ou les deux, sont en place, élaborer des programmes de suivi pour les hippocampes dans leurs eaux nationales afin de comprendre l'efficacité de ces mesures et de toute autre mesure pertinente d'application et de respect pour la conservation et la gestion des hippocampes ; et

c) partager la conception et les résultats préliminaires de ces programmes avec le Secrétariat pour qu'il puisse faire rapport à la 19e session de la Conférence des Parties.

18.232 À l'adresse du Comité pour les animaux

Le Comité pour les animaux analyse et examine les résultats de toutes les activités menées au titre de la décision 18.229 et toute autre information pertinente dont dispose le Comité pour les animaux et élabore des recommandations, s'il y a lieu, pour garantir un commerce durable et légal des hippocampes.

18.233 À l'adresse du Comité permanent

Le Comité permanent analyse et examine les résultats de toutes les activités menées au titre de la décision 18.229 et rédige des recommandations, s'il y a lieu, pour renforcer l'application et le respect de la CITES en ce qui concerne le commerce des hippocampes.

Mise en œuvre de la décision 18.229, paragraphes a) et b)

3. Concernant le paragraphe a) de la décision 18.229, le Secrétariat a publié la notification aux Parties le 28 février 2020 (notification no. 2020/015) demandant des informations sur les mesures de gestion nationale règlementant les hippocampes (*Hippocampus* spp.), leur mise en œuvre et application. La Notification invite également les Parties à partager avec le Secrétariat les informations relatives à leurs avis de commerce non-préjudiciable en vue de les publier sur le site internet de la CITES pour aider d'autres Parties.

4. En la 31e session du Comité pour les animaux (AC31, on ligne, juin 2021), le Secrétariat a indiqué que des réponses avaient été reçues des 14 Parties suivantes : Australie, Cambodge, Colombie, Croatie, États-Unis d'Amérique, Indonésie, Italie, Japon, Malte, Mexique, Monaco, Pérou, Royaume-Uni de Grande-Bretagne et d'Irlande du Nord et Thaïlande. Ces réponses ont été rassemblées et sont présentées en Annexe (Rev. 1, en anglais uniquement) du document AC31 Doc. 26 dans la langue et au format auxquels elles ont été reçues.

5. Les discussions sur les hippocampes qui se sont tenues lors de l'AC31 sont présentées aux document SC74 Doc. 70.2, dont la proposition d'un ensemble de décisions sur les hippocampes visant à renouveler les activités pour lesquelles des travaux sont en cours ou n'ont pas encore pu être complétés, pour examen par

la Comité permanent puis soumission à la 19ème session de la Conférence des Parties (CoP19, Panama City, 2022).

6. En application de la Décision 18.229, paragraphe b), la compilation par le Secrétariat des réponses reçues à la Notification ont également été communiquées aux Organes CITES le 13 octobre 2021 avec la Notification aux Parties N°2021/062. Le Secrétariat considère que la publication du document AC31 Doc. 26 A (Rev. 1) permet de répondre à la demande de rendre disponible la compilation des réponses sur le site Web de la CITES.

Mise en œuvre de la décision 18.229, paragraphes c)

7. En la 31e session du Comité pour les animaux (AC31, en ligne, juin 2021), le Secrétariat souligne dans l'addendum au document AC31 Doc. 26 que, en appui à l'application de la Décision 18.229, le Projet Hippocampe, basé à l'Université de Colombie Britannique (UBC), a indépendamment obtenu un financement de l'Agence américaine d'observation océanique et atmosphérique (NOAA) pour entreprendre l'étude sur le commerce d'hippocampes.

8. L'étude du Projet Hippocampe s'articule en deux parties (i) un examen des changements au niveau du commerce international d'hippocampes vivants *Hippocampus* spp.) suite à l'inscription de l'espèce en Annexe II de la CITES ; (ii) une analyse de la mise en œuvre de l'inscription en Annexe II de la CITES des hippocampes séchés (*Hippocampus* spp.), à travers la rédaction d'une série de rapports sur cette mise en œuvre, mettant l'accent sur une sélection des exportateurs nets d'hippocampes ayant déclaré une interdiction nationale ou une suspension des exportations ainsi qu'une sélection d'importateurs clés d'hippocampes séchés. Le Secrétariat s'est longuement entretenu avec le Projet Hippocampe pour voir comment le paragraphe c) i) de la Décision 18.229 pouvait être intégré à l'étude et comment l'atelier de validation des résultats de l'étude du Projet Hippocampe pourrait également satisfaire au paragraphe c) ii) de la même Décision.

9. Grâce au financement alloué par Monaco et la NOAA, le Secrétariat a été en mesure de contribuer à la production d'une partie des rapports de mise en œuvre. Les références géographiques ou opinions exprimées dans les rapports produits par le Projet Hippocampe n'engagent nullement le Secrétariat, qui n'a pas participé à la sélection des pays pour les rapports de mise en œuvre.

10. En application de la Décision 18.229, paragraphe c) i), le Secrétariat a également chargé le Projet Hippocampe de produire deux synthèses sur le rapport d'étude du commerce vivant et les rapports de mise en œuvre, pour soumission à la présente session, en se concentrant sur le mandat de la CITES. Ces synthèses sont présentées en anglais, respectivement, à l'Annexe 1 (étude du commerce vivant) et l'Annexe 2 (rapports de mise en œuvre).

11. Le programme et calendrier de travail initial du Projet Hippocampe a été considérablement modifié par la pandémie de COVID-19, qui a engendré des retards, et l'atelier en présentiel initialement prévu en 2021 n'a pas pu avoir lieu. Des fonds ont été accordés par Monaco et la NOAA pour l'atelier d'experts prévu à la Décision 18.229, paragraphe c), ii), mais au regard des restrictions actuelles liées à la pandémie en ce qui concerne les réunions et déplacements, il n'est pas évident que cet atelier puisse avoir lieu. Des moyens alternatifs de réaliser cette activité sous un autre format, comme un processus de consultations approfondies sont en cours de discussion.

12. Le Comité pour les animaux a proposé une suite à ces travaux au document SC74 Doc. 70.2.

Synthèse de l'étude du commerce d'animaux vivants (Annexe 1 au présent document)

13. Le commerce international d'hippocampes vivants a été étudié par espèce, origine, destination, volume et changements au fil du temps. Les informations ont été rassemblées à partir d'entretiens avec les acteurs et des données CITES sur le commerce à l'échelle mondiale ainsi que pour l'Union Européenne (UE) et les États-Unis d'Amérique (USA), les deux principaux marchés pour les hippocampes vivants.

14. L'étude met en exergue l'influence à la fois de l'inscription en Annexe II et du processus d'application (Étude du commerce important, ECI) sur le commerce d'hippocampes vivants. L'étude conclut que les exportations d'hippocampes par les principales Parties commerçantes ont considérablement diminué au cours des toutes premières années après l'inscription ; et ont encore diminué un peu plus après l'inclusion d'*Hippocampus* spp. dans l'Étude du commerce important (ECI), avec un volume d'échange de spécimens vivants à seulement 7% du taux avant inscription de l'espèce.

15. L'étude a montré que presque tous les hippocampes vivants du commerce international provenaient maintenant d'élevages en captivité (génération F2 ou ultérieure). Le nombre d'espèces d'origine sauvage dans le commerce a décliné, tandis que le nombre d'espèces élevées en aquarium a augmenté. Le nombre de pays fournissant des hippocampes sauvages a apparemment diminué, tandis que le nombre fournissant des hippocampes élevés en aquarium a augmenté. Plus de pays ont importé des hippocampes vivants après l'inscription en Annexe de la CITES, mais ce chiffre s'est ensuite stabilisé. Les échanges mondiaux ont largement fait écho aux changements qui se sont produits aux États-Unis d'Amérique (marché le plus important), tandis que les changements en UE ont été influencés par l'augmentation de l'élevage et du commerce des hippocampes au sein de l'UE.

16. En résumé, l'étude conclut que l'inscription à la CITES des hippocampes apparait avoir réduit l'incidence du commerce international sur certaines populations sauvages, en particulier celles concernées par le commerce vivant. À l'inverse, le commerce illégal d'hippocampes séchés reste un problème depuis l'inscription à la CITES, constatant de grands volumes d'hippocampes de contrebande.

Synthèse des rapports de mise en œuvre (Annexe 2 au présent document)

17. La synthèse de l'étude sur la mise en œuvre de la CITES pour les hippocampes, demandée par le Secrétariat, conclut que les États de l'aire de répartition ont deux options possibles. Ils peuvent soit a) accroitre leurs efforts pour lutter contre le commerce illégal ou or b) ils peuvent lever leurs suspensions nationales et s'employer à assurer que les hippocampes commercialisés proviennent de sources durables et faire appliquer l'inscription en Annexe II à la CITES avec précaution. Les auteurs font référence au chalutage de fond comme pesant lourdement sur les populations sauvages.

Prochaines étapes envisagées

18. Étant donné que les résultats de l'étude n'étaient pas disponible pour examen à l'AC31 et qu'il ne sera peut-être pas possible d'organiser l'atelier avant la 19ème session de la Conférence des Parties (CoP19), le Comité pour les animaux a proposé au document SC74 Doc. 70.2 des décisions préalables afin de permettre une pleine mise en œuvre après la CoP19. Celles-ci sont présentées en Annexe du document SC74 Doc. 70.2 et appuyées par le Secrétariat.

Recommandations

19. Le Comité permanent est invité à prendre connaissance du présent rapport.

CHANGES IN THE INTERNATIONAL TRADE IN LIVE SEAHORSES (*HIPPOCAMPUS* SPP.) AFTER THEIR LISTING ON CITES APPENDIX II

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About Project Seahorse

Project Seahorse (www.projectseahorse.org) is an award-winning team that has made measurable gains in marine conservation around the world. Visit our website to learn more about our efforts to endure sustainable and legal seahorse trade: https://projectseahorse.org/regulating-trade/. See also our toolkit for supporting Parties in implementing CITES for seahorses, available at: https://www.iucn-seahorse.org/cites-toolkit#ndf. Project Seahorse manages the IUCN SSC Specialist Group for Seahorses, Pipefish and Seadragons (SPS SG; www.iucn-seahorse.org).

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Summary

Seahorses were among the first fully marine fishes added to CITES Appendix II, and are commonly the first marine fishes through CITES processes. Although the vast majority of seahorses are traded dead for traditional medicine or curios, the live trade for ornamental display exerted the main pressure on some populations. We investigated international trade in live seahorses by species, origins, sources, destinations, volumes and their changes over time. In gathering information, we drew on stakeholder interviews and formal CITES trade data at a global level and for the European Union (EU) and the United States of America (US), the two dominant markets for live seahorses.

Our temporal comparisons highlight the influence of both the Appendix II listing and the CITES enforcement process (Review of Significant Trade, RST). Globally, we found that reported exports of seahorses from the key trading Parties declined notably in the first few years after the listing. Documented exports dropped yet more with the onset of RST, such that official trade volumes in 2018 were just 7% of levels before the listing. Two changes probably explain this documented decline in traded volumes: (i) a decrease in reported wild sourcing from the after the listing and (ii) a later decrease in reported volumes of captive born seahorses (those whose parents came from the wild).

Almost all live seahorses in international trade are now captive bred (F2 generation or more). Such change is reflected in the fact that the number of wild-sourced species in trade has declined while the number of species raised in tanks has risen. Similarly, the number of countries supplying wild seahorses apparently decreased, whereas the number supplying tank raised seahorses has increased. More countries imported live seahorses after the listing but that number then levelled off. Global changes were largely echoed in changes in the US (as the biggest market) while changes in the EU were influenced by the growing culture and trade of seahorses within the EU.

In summary, the CITES listing for seahorses appears to have reduced pressure of international trade on some wild populations in some places, those involved in live trade. In contrast, the trade in dried seahorses remains very problematic after the CITES listing, involving large volumes of smuggled seahorses. The difference probably lies in the relatively small volumes in live trade, target capture of live seahorses, feasibility of culturing enough seahorses for the live trade, difficulty in smuggling live seahorses, consumer preference for captive bred fish, high prices for live seahorses, and good regulatory capacity in many countries involved in live trade. The missing step in CITES implementation is good monitoring to determine how wild seahorse populations are actually responding to the changes we document.

Context

Seahorses, all 46 species in the genus *Hippocampus*, offer an important case study to understand how CITES action affects wildlife exports. They were among the first fully marine fishes added to CITES Appendix II, a decision taken in November 2002 but implemented in May 2004. Seahorses are traded globally and in very large volumes (Vincent 1996); tens of millions of animals are traded – dried and alive – among more than 80 countries each year (Foster *et al.* 2016). Vast numbers of dried seahorses are traded for traditional medicines (primarily) and curios while live seahorses are sold for ornamental display, primarily in home aquariums (Koldewey and Martin-Smith 2010; Vincent 1996). The dried trade comprises 98% of total trade (Foster *et al.* 2016), but the aquarium trade can be the main pressure on some populations (Vincent *et al.* 2011). Specimens for both trades are sourced from incidental and targeted fisheries, whereas cultured specimens contribute primarily to the live trade (Koldewey and Martin-Smith 2010; Lawson *et al.* 2017; Vincent 1996; Vincent *et al.* 2011).

In addition to being the first marine fishes listed on CITES Appendix II, seahorses were also the first to go through the Review of Significant Trade (RST), the CITES enforcement process (Foster and Vincent 2021). Since 2009, eight species of seahorses have been taken through three rounds of RST, such that seahorses offer an example of a group of species that has been influenced by not only by their listing but also by a CITES enforcement mechanism. First, from 2009, historically important origin Parties began ending their permitted exports as CITES turned to scrutinizing the sustainability of their trade. Second, from 2013, some Parties had their trade suspended by CITES after failing to meet the recommendations issued by the CITES Animals (technical) Committee. The RST processes led to a decline in legal global trade in seahorses (Foster and Vincent 2021). It also led to a huge illegal trade in the animals, with about 95% of those entering Hong Kong SAR, the key entrepot for seahorses, coming from countries that had ostensibly banned their export (Foster *et al.* 2019a).

In contrast to considerable work on the dried trade, we know little about how CITES has affected the trade in live seahorses (though see Koldewey and Martin-Smith 2010; Koning and Hoeksema 2021 for high level overviews). We here respond to CITES' formal call, in 2019, for an investigation into the effects of the CITES listing and CITES ensuing processes on the live trade in seahorses (CITES Decision 18.229(c)(i)). Our study has two aims: 1) to understand how the CITES listing and RST process have affected the live trade in seahorses; and 2) to help national CITES Authorities better implement sustainable and legal trade for live seahorses. To those ends, we collected new data and synthesized existing data sets to paint a picture of the international trade in live seahorses during four time periods: Pre-CITES (before 2004), Pre-RST (2004–2008), Early RST (2009–2012) and Late RST (2013–2018). We then use this picture to offer recommendations to improve implementation of the Convention for live seahorses.

Methods

We investigated international live seahorse trade by species, origins (exporting countries / jurisdictions), sources (whether specimens were wild sourced or cultured), destinations (importing / consumer countries / jurisdictions), volumes and their changes over time. In doing this, we drew on two types of data to describe the international trade in live seahorses and how it has changed over time: (1) our own stakeholder interviews and (2) CITES trade data. Details of our methods can be found in Foster *et al.* (2021).

We conducted our analyses for three geographies, each across four time periods. In addition to the global overview, we also delved into two main destination markets for the live seahorse trade: the European Union (EU) and the United States of America (US). For each geography, we compared seahorse trade across four time periods: (i) Pre-CITES – before the CITES listing in 2004; (ii) Pre-RST – after the listing but before the CITES review process (2004-2008); (iii) Early RST – early in the CITES review process (2009-2012; Parties first publicly responded to the scrutiny in 2011, and the first set of RST recommendations were issued to Parties of concern in 2012); (iv) Late RST – late in the CITES review process (2013-2020; the first CITES imposed trade suspension was announced in 2013). We explain the rationale for these markets and time periods in more detail in Foster *et al.* (2021).

Stakeholder interviews

We used stakeholder interviews to gather information on seahorse species, biology, volumes, values, uses, trade structure, trade routes, and seasonality of the trade, including temporal trends and geographic differences in these parameters. Interviews were semi-structured and triangulation was used to cross-validate information received by (i) asking the same questions in three different ways within an interview and (ii) comparing the answers within and among interviews, at the same trade level and region. Respondents were found through both targeted and snowball sampling (where one respondent suggests other potential respondents). Our trade survey protocols have ethics clearance from The University of British Columbia (H12-02731 and B05-0346), based on Canada's national standards.

We used information from three sets of stakeholder interviews for this study:

a) Surveys of 47 countries carried out pre-CITES listing from 1998-2002, of which 40 were found to participate in the international live trade in seahorses, while we missed five countries that were identified as being involved in trade (Table A.1).
b) A survey in Los Angeles, US, carried out in 2005, just after the CITES listing took effect (Magera *et al.* 2005). Los Angeles was the largest known port of import for marine ornamental fish in the US at that time (Eskew *et al.* 2020). The study also aimed to obtain an overall picture of the live seahorse trade in Los Angeles and the effects and reactions of industry to the (then) very recent CITES Appendix II listing of seahorses.
c) Surveys of importers and wholesalers in the three major import hubs for live seahorse trade, the European Union (EU), the United Kingdom (UK) and the United States (US), carried out in late 2020 and early 2021. A list of potential respondents was generated by working with experts from the trade associations Ornamental Fish International (OFI; for the EU) and the Ornamental Aquatic Trade Association (OATA; for the UK), and from the Dallas World Aquarium (for the US). We restricted our list of potential respondents to companies reported by those experts to have a significant market share of the marine ornamental fish trade in their respective regions.

CITES trade data

The CITES trade database (www.trade.cites.org) is publicly available and holds records of the international trade in wildlife species that are listed on the Appendices. Once a taxon is listed, Parties are required to submit annual reports of their export data including species, volumes, destination, purpose of trade and whether it was wild sourced or cultured, *inter alia*. Some countries also voluntarily report their import data for Appendix II species (even though import data is only required for Appendix I). CITES records provide an overview of legal and reported global trade from the time of the CITES listing for seahorses, in May 2004; the partial data from 2004 were omitted from our analysis of reported volumes.

The CITES database is used by the EU as a repository for trade in species listed on Annex D of the EU Wildlife Trade Regulations (EU 2010). All seahorses were added to Annex D on 1 June 1997, and thus the CITES database contains records of seahorse imports into EU member States prior to the genus being listed on CITES, from 1997 to May 2004.

For our analysis, we queried the CITES trade database on 14 Jan 2021 for a comparative tabulation report of all sources (including pre-Convention specimens), terms, and export and import Parties for the trade in all *Hippocampus* species for all years, extracting a total of 4,531 records. We then filtered the data for the terms “live”, “fingerlings” and “eggs (live)” which are known to be associated with the live trade in seahorses (Foster *et al.* 2016). Delays in reporting mean that the most recent year for which comprehensive trade statistics are available is normally two years before the present one (UNEP-WCMC 2013). As such, we only used data up to and including 2018, producing a total of 2,856 records for our analysis – 2,801 “live”, 54 “fingerlings” and 1 “eggs”.

We used records from net importer and net exporter Parties in our analysis, calculating the gross trade output (as per UNEP-WCMC 2013). The vast majority of records (2,825 of 2,831) were reported without units, which should be assumed to be individuals (UNEP-WCMC 2013). We further assumed the six records expressed as a measure of weight to be in individuals, as the trade in live seahorses is known to be measured in individuals, and not by weight (Vincent 1996).

CITES Parties are required to report the “source” of any traded seahorses, with “source” in this context referring to “the management system used to produce specimens and thus which provisions of the Convention apply” (Lyons *et al.* 2017). The most commonly used source codes for the live trade in seahorses were W (individuals extracted from the wild), F (individuals born in captivity to wild caught parents; F1 generation, hereafter “captive born”), and C (individuals born to captive bred parents; F2 generation and higher; hereafter “captive bred”). We use the term “tank raised” to refer to cultured seahorses for which we could not differentiate between source codes F and C.

Finally, in order to prevent double counting, we focused the majority of our analysis on direct trade records, excluding records for re-exports.

Geographic and taxonomic distinctions

We need to make a number of notes about geographic distinctions. The geographical designations employed in this document do not imply the expression of any opinion whatsoever concerning the legal status of any country,

territory, or area, or concerning the delimitation of its frontiers or boundaries. Second, mainland China, Hong Kong SAR and Taiwan Province of China are reported separately in the CITES trade data and so are presented as three separate jurisdictions in our analyses. Third, the UK was an EU member State during the entire time period being analysed for this report so is included in our analyses for the EU. Fourth, CITES data on seahorse trade among EU member States were not available, as they are not reported to CITES.

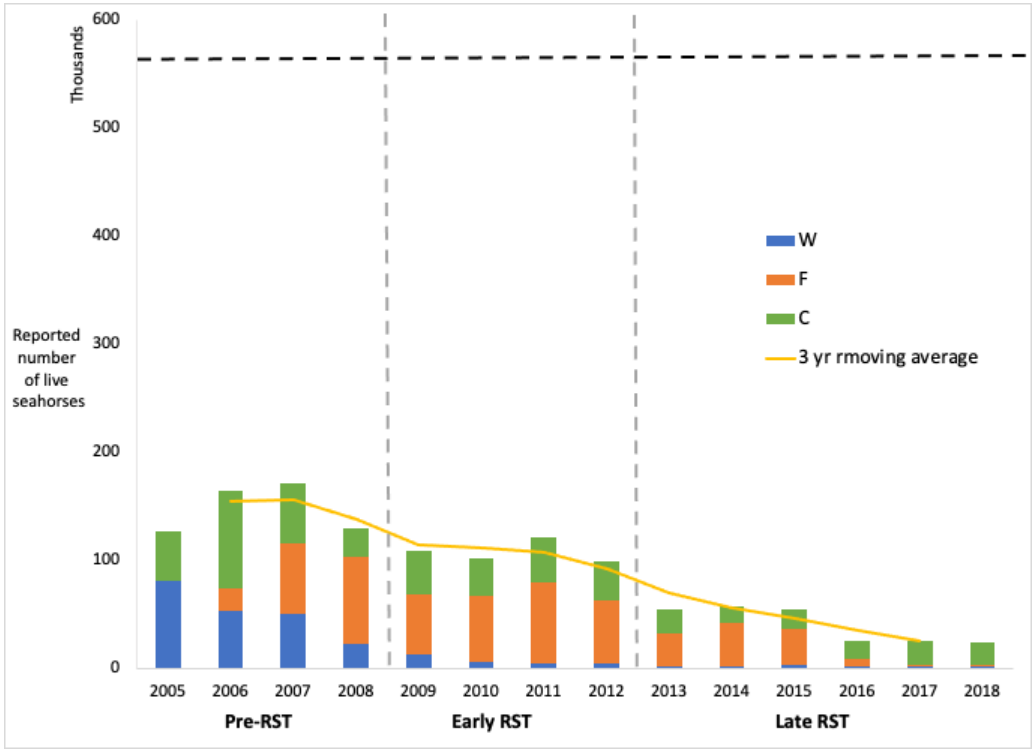
All species distinctions should be regarded cautiously, primarily because many seahorse species look alike, especially to a rushed Customs officer (see Foster *et al.* 2021). In addition, seahorse taxonomy is constantly evolving, and CITES last updated their accepted taxonomy for *Hippocampus* in 2019 based on the taxonomic revision in Lourie *et al.* (2016; CITES 2019a). Where species reported prior to 2019 are now synonymized, we indicated the accepted name in brackets. Likewise, when summing numbers of reported species, we indicate the number of currently valid species in brackets.

In the results, countries / jurisdictions and species are always listed in descending order of importance by volume, unless otherwise noted.

Results

Volumes

Globally, we found that reported exports of seahorses from the Parties that served as primary origins before the Appendix II listing dwindled significantly in the first few years after the listing (Figure 1). Documented exports dropped yet more with the onset of the RST process, such that official trade volumes in 2018 were just 7% of what they probably were before CITES. Documented live trade volumes were highest before the listing came into effect in 2004 (at about 500,000 seahorses per annum) but had decreased by about 75% in the post-listing/Pre-RST period, after which mean annual live trade volumes declined at a rate of about 50,000 individuals per post-listing time period (Table 1). The documented decline in traded volumes was primarily driven by two changes: (i) a decrease in reported wild sourcing from the Pre-CITES to Pre-RST periods and (ii) a decrease in reported volumes of captive born seahorses in the years after RST was initiated (Table 1, Figure 1). The most recently available CITES trade data suggest almost all live seahorses in international trade are now captive bred. Combined patterns in procurement volumes reported by traders during our 2020/2021 interviews echoed what the official data sets said about trends in global trade. The interviews also revealed an increased reliance on intra-EU and/or domestic sourcing over time (Table A2 and Figure A1 for the EU; Table A3 and Figure A2 for the US).



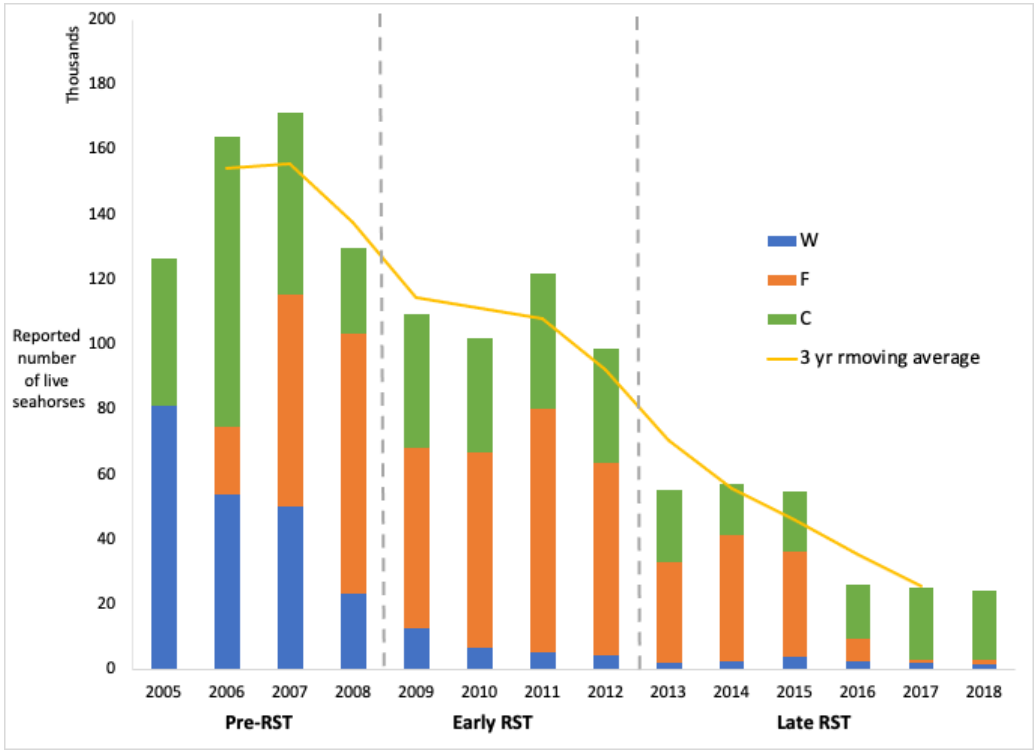


Figure 1. Global volumes of trade in live seahorses (*Hippocampus* spp.), as reported in the CITES trade database, across Pre-RST (2005–2008), Early RST (2009–2012) and Late RST (2013–2018) periods; vertical dashed lines delineate the three time periods; seahorses were not monitored by CITES before 2004. Figure 1a includes a horizontal dashed line indicating the estimated annual volume of live seahorse in international trade Pre-CITES (1998–2002) based on in-country trade surveys. Figure 1b presents only the CITES data. W = wild sourced; F = captive born; C = captive bred; RST = CITES Review of Significant Trade. See methods for details on data sources, source codes and time periods.

Table 1. Global trade in live seahorses. We present data across different time periods on (i) sources, (ii) species, (iii) origins, and (iv) destinations. Percentages in brackets represent each species' or country/jurisdiction's proportion of the total volume for the specific source code and time period indicated, where we had volume information on which to base this analysis. W = wild sourced; F = captive born; C = captive bred; tank raised = raised in captivity but not known if F or C; RST = CITES Review of Significant Trade. * denotes a EU member State. See methods for details on data sources, source codes and time periods. Where once valid species have since been synonymized, the total number of currently valid species is in brackets after the total number of reported species. Taiwan PoC = Taiwan Province of China.

			Mean annual volume – # individuals	Species – total number	Species – top five ranked by volume (if ≥ 5%)	Origins – total number	Origins – top five ranked by volume (if ≥ 5%)	Destinations – total number	Destinations – top five ranked by volume (if ≥ 5%)
Pre-CITES (1998-2003)	**Historic trade surveys**	All sources	**569,272**	20 (19)	*H. kuda* *H. erectus* *H. reidi* *H. barbourin* *H. zosterae*	24	Philippines Indonesia Brazil Mexico Australia	32	United States European Union** Thailand India Australia
		W	vast majority of all sources volume was wild sourced	19 (18)	*H. kuda* *H. erectus* *H. reidi* *H. barbourin* *H. zosterae*	24	Philippines Indonesia Brazil Mexico Australia	32	United States European Union** Thailand India Australia
		Tank raised	very small amounts	7	*H. abdominalis* *H. barbourin* *H. kuda* *H. whitei* *H. ingens*	4	Australia United States Mexico United Kingdom	Unknown	United States (?) European Union**

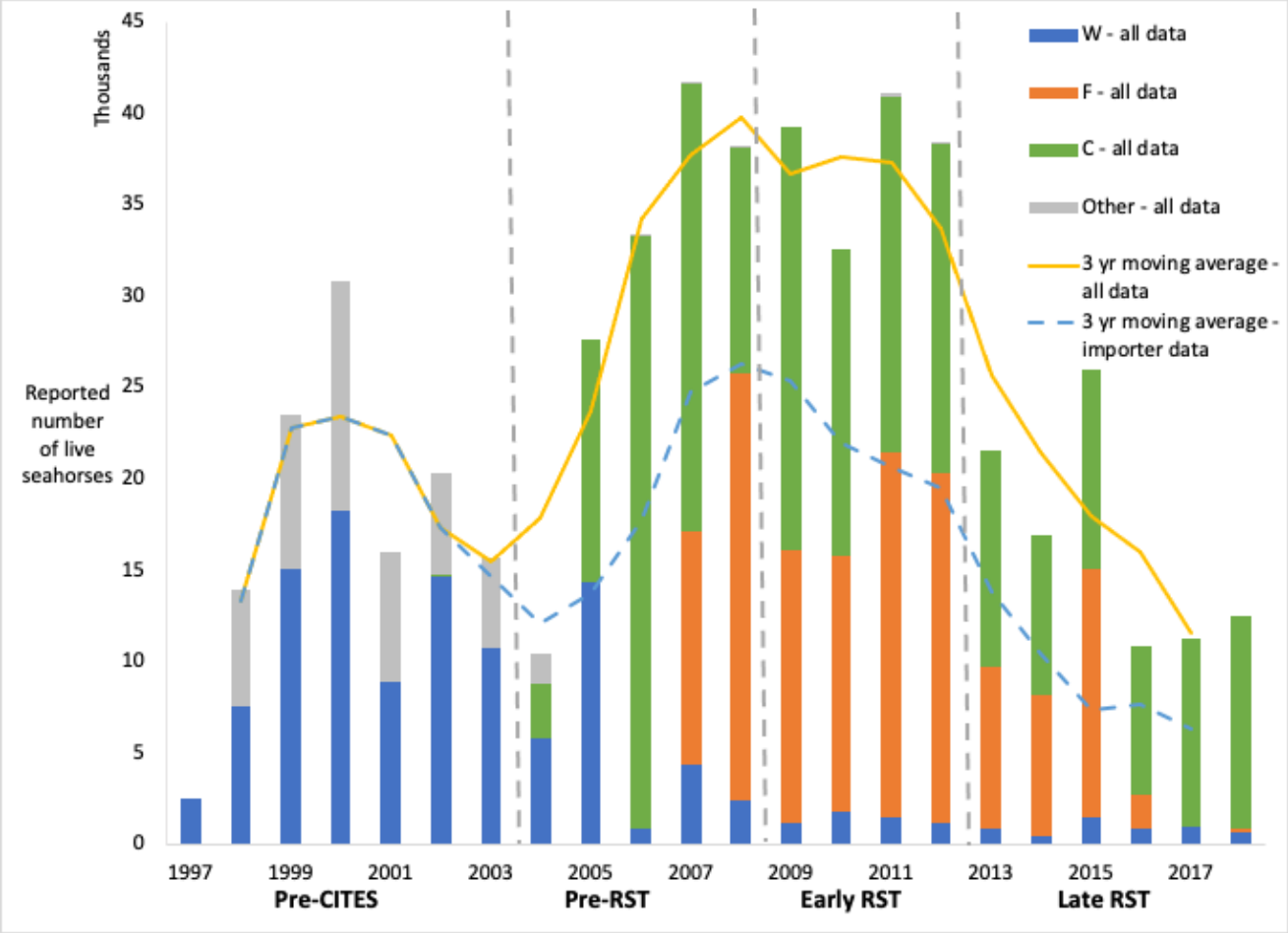
			Mean annual volume – # individuals	Species – total number	Species – top five ranked by volume (if ≥ 5%)	Origins – total number	Origins – top five ranked by volume (if ≥ 5%)	Destinations – total number	Destinations – top five ranked by volume (if ≥ 5%)
Pre-RST (2004-2008)[+]	**CITES trade data**	All sources	**148,370**	22	*H. kuda* (51%) *H. reidi* (29%)	23	Viet Nam (53%) Sri Lanka (27%) Indonesia (14%)	45	United States (62%) France* (9%) Canada (5%)
		W	52,162	21	*H. kuda* (50%) *H. kelloggi* (9%) *H. barbouri* (8%) *H. histrix* (8%) *H. comes* (7%)	17	Viet Nam (50%) Indonesia (39%) Brazil (5%)	25	United States (78%)
		F	41,478	3	*H. kuda* (96%)	3	Viet Nam (>99%)	19	United States (69%) France* (15%) Canada (5%)
		C	54,173	14	*H. reidi* (73%) *H. kuda* (20%)	13	Sri Lanka (70%) Viet Nam (19%) Australia (6%)	42	United States (44%) France* (10%) United Kingdom* (9%) Canada (8%) Netherlands* (6%)

			Mean/median annual volume - # individuals	Species - total number	Species – top five ranked by volume (if ≥ 5%)	Sources - total number	Origins – top five ranked by volume (if ≥ 5%)	Destinations - total number	Destinations – top five ranked by volume (if ≥ 5%)
Early RST (2009-2012) CITES trade data		All sources	**108,244**	19	*H. kuda* (60%) *H. reidi* (21%) *H. comes* (11%)	21	Viet Nam (60%) Sri Lanka (22%) Australia (8%)	49	United States (46%) France* (11%) United Kingdom* (9%) Canada (6%) Netherlands* (6%)
		W	7,313	18	*H. kuda* (36%) *H. reidi* (34%) *H. ingens* (12%) *H. erectus* (6%)	11	Viet Nam (38%) Brazil (34%) Mexico (12%) Sri Lanka (6%)	18	United States (67%) United Kingdom* (8%) Germany* (7%) Japan* (6%)
		F	62,409	10	*H. kuda* (88%) *H. comes* (10%)	9	Viet Nam (99%)	26	United States (58%) France* (15%) United* Kingdom (6%) Canada (5%)
		C	38,246	13	*H. reidi* (53%) *H. kuda* (19%) *H. comes* (14%) *H. abdominalis* (9%)	17	Sri Lanka (61%) Australia (20%) Indonesia (12%)	44	United States (22%) United Kingdom* (12%) Germany* (10%) Netherlands* (10%) Japan (8%)
Late RST (2013- CITES trade data		All sources	**40,620**	19	*H. comes* (39%) *H. reidi* (30%)	26	Viet Nam (45%) Sri Lanka (29%)	48	United States (37%) United Kingdom* (15%)

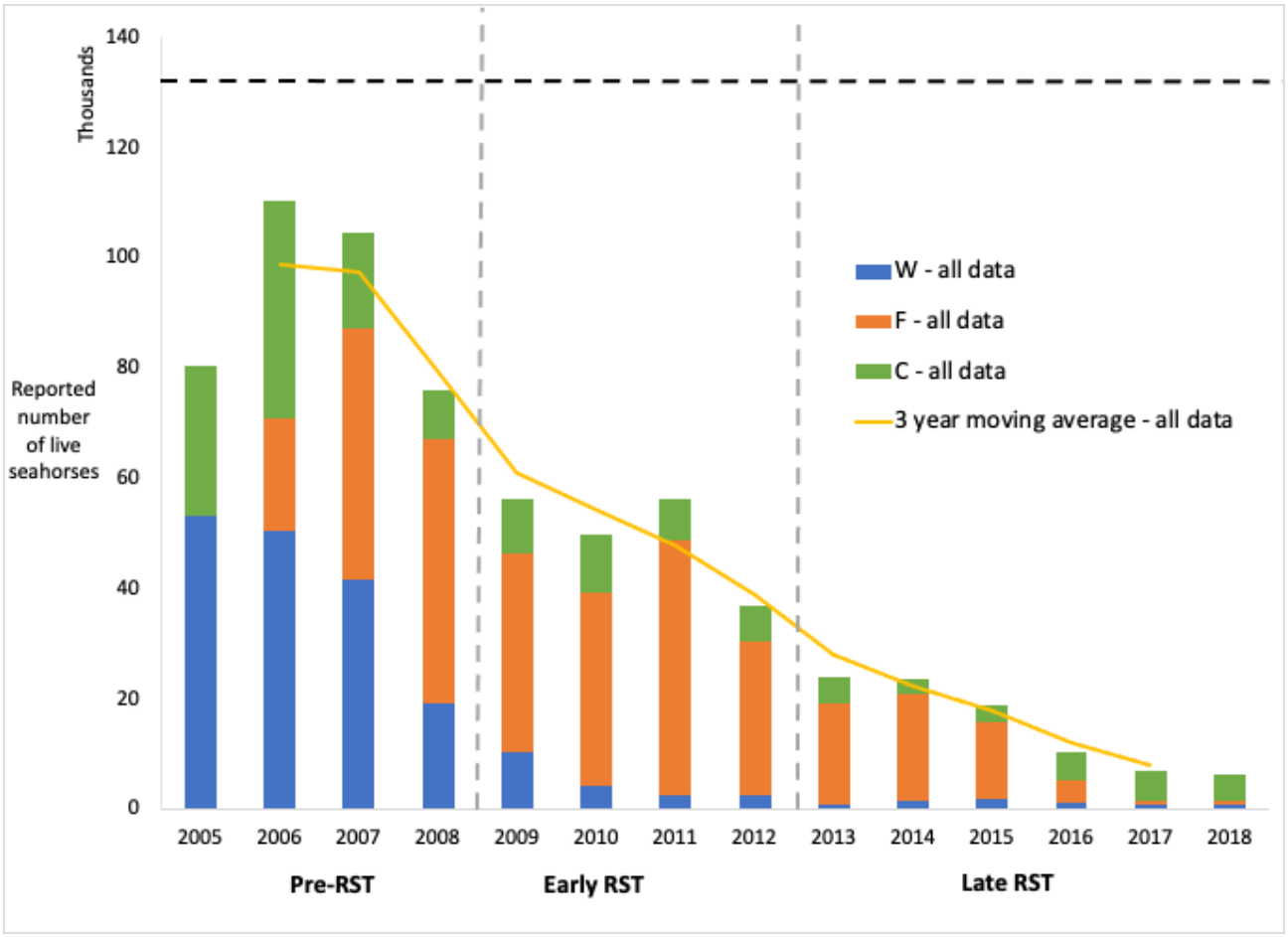
			H. kuda (15%)		Australia (7%)		Netherlands* (10%)
					Taiwan PoC (6%)		France* (9%)
							Canada (5%)
W	2,490	14	*H. reidi* (52%)	11	Brazil (51%)	18	United States (49%)
			H. zosterae (14%)		United States (15%)		United Kingdom* (15%)
			H. kuda (10%)		Australia (12%)		Netherlands* (11%)
			H. comes (8%)		Viet Nam (9%)		Japan (6%)
			H. subleongatus (7%)		Taiwan PoC (8%)		Denmark* (5%)
F	18,605	11	*H. comes* (74%)	10	Viet Nam (96%)	34	United States (51%)
			H. kuda (16%)				United Kingdom* (11%)
			H. histrix (5%)				Netherlands* (7%)
C	19,353	16	*H. reidi* (56%)	20	Sri Lanka (61%)	41	United States (22%)
			H. kuda (14%)		Australia (13%)		United Kingdom* (18%)
			H. comes (8%)		Taiwan PoC (11%)		France* (14%)
			H. ingens (8%)		Mexico (8%)		Netherlands* (13%)
			H. abdominalis (6%)				Canada (7%)

[+]Pre-RST volumes were calculated from 2005-2008

Trends in total EU live seahorse import volumes differed from the trends in global data in three key ways. First, we found an initial increase in import volumes of seahorses after the CITES listing (Figure 2). Much of this apparent change is probably the result of increased availability of data from exporting Parties. In contrast, data reported by EU members did not really change. Second, reported import volumes of live seahorses into the EU only began to decline in the Late RST period. This is explained by the third observation, that the EU apparently stopped sourcing wild animals fairly soon after the listing came into effect. Instead, the documented EU imports primarily comprised tank raised seahorses, initially from international origins (Figure 2), and then increasingly from elsewhere in the EU or domestic origins (as reported by EU traders; Figure A1). Very few seahorses are now imported to the EU, which our 2020/2021 industry interviews indicated are primarily for broodstock.

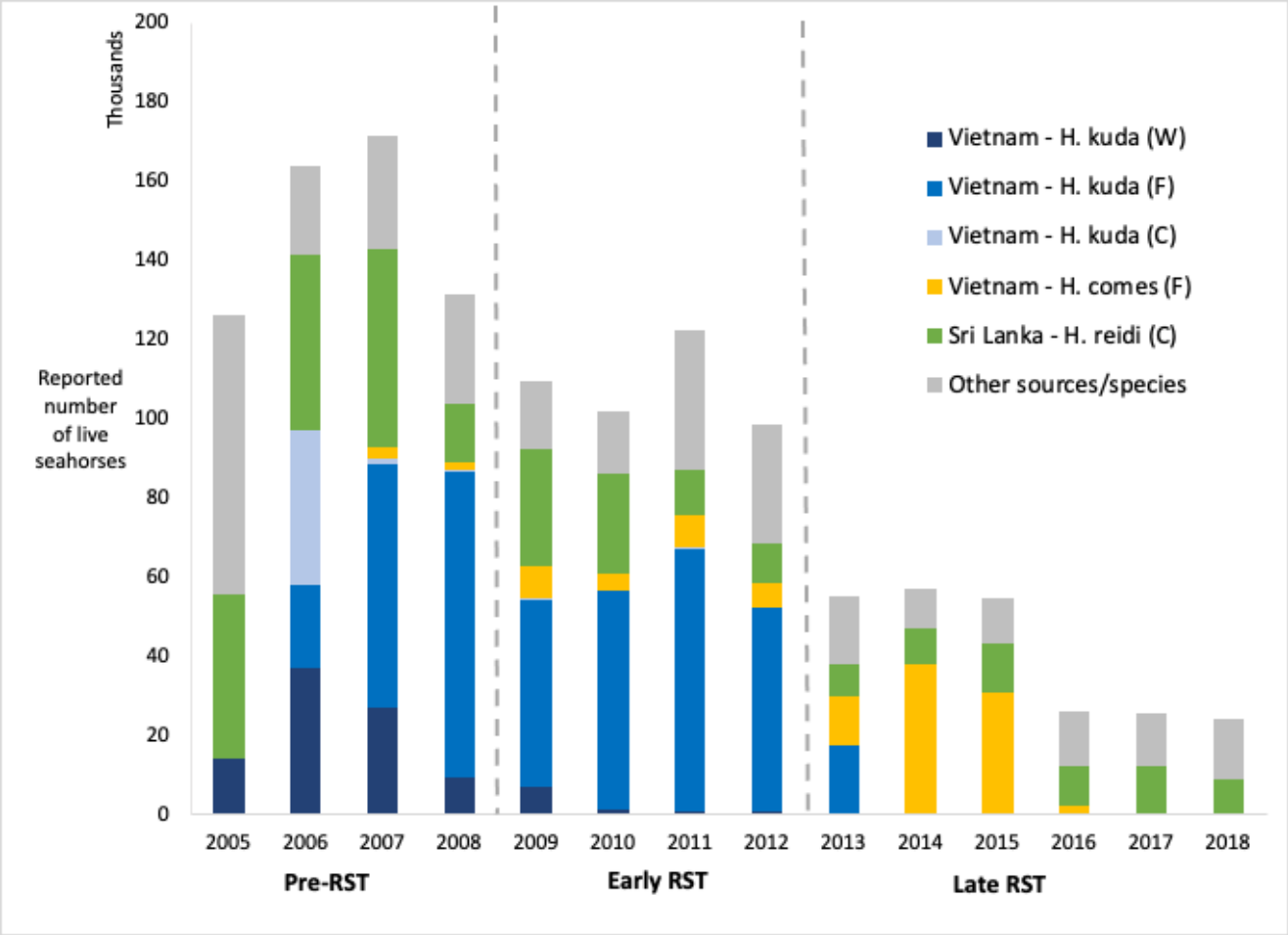


For the US, we found that changes in trade in recorded import volumes matched the global trends (Figure 3), as might be expected given that the US held about half the market share of the international trade in live seahorses.


Thousands
140
120
100
80
60
40
20
0
Reported number of live seahorses
W - all data
F - all data
C - all data
3 year moving average - all data
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
Pre-RST
Early RST
Late RST

Species

The total number of species reportedly involved in the international live seahorse trade was relatively steady over time, but the composition of species varied somewhat across time periods (Table 1). The number of wild sourced species declined over time, whereas the number of tank raised species increased. In spite of fluctuations in the number and composition of species involved in live seahorse trade, two species dominated the reported trade across all time periods: *H. kuda* (across all source codes, but especially captive born) and *H. reidi* (for captive bred specimens, but also wild; Table 1, Figure 4). *Hippocampus kuda* was supposedly replaced in prevalence by *H. comes* among captive born trade in the Late RST years.



By source code, the species composition of reported wild trade was most variable across time, whereas *H. kuda* (followed by *H. comes*) and *H. reidi* dominated captive born and captive bred trade data across all time periods, respectively. Wild live seahorse trade reported to the species level was dominated by two Indo-Pacific species (*H. kuda*, *H. barbouri*) and three western Atlantic species (*H. erectus, H. reidi* and *H. zosterae*) during the Pre-CITES period, but entirely by Indo-Pacific species during the post-listing/Pre-RST period (Table 1). Then, in the RST periods, all Indo-Pacific species except *H. kuda* were replaced in Early RST by two western Atlantic species (*H. reidi* and *H. erectus)* and one eastern Pacific species (*H. ingens*) and in Late RST by *H. reidi* and *H. zosterae*. That being said, *H. comes* – an Indo-Pacific species – does fall among the top five wild sourced species reported in the Late RST period, where it was joined by the Australian species *H. subelongatus*. Finally, with respect to captive bred seahorses (in addition to *H. reidi* and *H. kuda*), *H. abdominalis* was reported in significant numbers in both RST periods and *H. ingens* emerges in notable volumes in Late RST years.

Trends in species reportedly imported into the EU (Table A4) and US (Table A5) more or less corresponded to the global trade patterns (Table 1), and our 2020/2021 interview data largely supported these global trends in CITES data (Tables A2 and A3).

Origins

The total number of countries reported to export live seahorses remained fairly stable over time, although the number of countries supplying wild seahorses apparently decreased, whereas the number supplying tank raised (especially captive bred) seahorses increased (Table 1). The main change in terms of key origins was from pre- to post-listing time periods. Pre-CITES, most live seahorses were documented to come from Philippines, Indonesia, Brazil, Mexico and Australia – almost all of which were wild sourced. In comparison, Viet Nam and Sri Lanka were the main reported origins for live seahorses over all post-listing time periods. Brazil and Viet Nam were the only constant origins of wild live seahorse trade across all post-listing time periods, whereas the US, Australia and Taiwan Province of China were reported as key origins for wild trade in the Late RST period. In terms of tank raised seahorses, Viet Nam was the only notable origin of documented captive born live seahorses on a global scale across all time periods. But while Sri Lanka was a key origin for captive bred live seahorse trade, a variety of other countries were also reported to contribute specimens to captive bred trade over time – including Australia, Viet Nam, Taiwan Province of China and Mexico.

For the EU, Sri Lanka and Viet Nam were reported as key origins of live seahorses over time, though Viet Nam only showed up in post-listing data, and seahorses from both origins moved from supplying wild sourced to tank raised after the CITES listing came into effect (Table A4). The EU also imported seahorses from Indonesia (across all time periods, first for wild trade and then captive bred), Brazil (for wild trade across all time periods), US (for wild trade in both RST periods), and Taiwan Province of China (for captive bred trade in Late RST years; Table A4). Respondents in our interviews with EU companies in 2020/2021 identified similar patterns except they did not report Indonesia as an origin in the RST periods or Sri Lanka as an origin in Late RST years (Table A2).

For the US, the origins of imported live seahorses more or less corresponded to global trade patterns, importing many seahorses from Sri Lanka across all periods and notable numbers from Viet Nam across all post-listing periods (Table A5). Some Pre-CITES origin of live seahorses dropped off after the CITES listing, whereas others remained but in different forms. Our 2020/2021 interview data from the US corroborated these findings (Table A3).

Finally, interviews with informants from both major destination markets, the EU and US, indicated a decreased reliance on international imports and an increased reliance on intra-EU and/or domestic trade for their business dealings with seahorses by the Late RST period, the vast majority of which consisted of tank raised animals (Table A2, Figure A1 for the EU; Table A3, Figure A2 for the US).

Destinations

We found an overall increase (from Pre-CITES to post-listing years) in the number of countries known to be importing live seahorses, but that number stayed relatively constant once the CITES listing came into effect (Table 1). That said, the number of countries/jurisdictions reported to have imported wild seahorses decreased, whereas the number of countries documented to have imported captive born seahorses increased, over time. Although tens of countries were reported to import live seahorses both pre- and post-listing, EU member States and the US were always the main reported destinations. Over time, the EU share of the global reported trade volumes increased while the US

share declined. There was considerable consistency in key EU players across all four time periods, with Germany, the UK and the Netherlands as notable importers (Table A4).

By source code, key destinations for wild seahorses were the US, UK and Japan (Table 1). In comparison, key destinations for captive born seahorses were the US, France, Canada, UK and the Netherlands. Finally, key destinations for captive bred seahorses were the US, the UK and the Netherlands. Most captive bred seahorses went to the EU instead of the US, in spite of the latter having a greater share of the overall import market for seahorses. Other than the EU and US, a few countries that were reportedly key destinations Pre-CITES never featured in CITES data (including Australia, India and Thailand). In contrast, Canada – which was not considered among the top five Pre-CITES – was a notable destination across all CITES time periods. Our 2020/2021 interviews with both EU and US companies supported all trends reported in CITES data, particularly that the US imported substantial volumes of wild seahorses for longer than the EU after the CITES listing (Tables A3 and A2, respectively).

Discussion

Effects of CITES on international live trade

The international trade in live seahorses has very clearly changed in two significant ways since all seahorse species were added to CITES Appendix II in 2002, with implementation in 2004. First, overall volumes of seahorses in international trade have declined considerably over time. Second, there has been a shift from wild to tank raised seahorses (source codes F & C), and particularly to individuals that are reported as captive bred (source code C). These changes are reflected in CITES data and also in our 2020/2021 interviews with major seahorse importers and wholesalers in the main destination jurisdictions for the live trade (the EU and US). It thus seems that trade data reported to CITES offer a reasonable means of tracking trends in live seahorse trade over time. This is in sharp contrast to the trade in dried seahorses where CITES data do not reflect what is happening with international trade on the ground (Foster *et al.* 2019a, Foster and Vincent 2021). The decline in overall volumes in international live trade and the switch to tank raised seahorses are not independent of one another. Rather, the first finding is probably largely explained by the second. Changes were initially precipitated by the CITES listing in 2004, and then by the RST engagement with seahorses that started in 2009.

The initial decline in the reported volume of live seahorses in international trade, in the first few years following implementation of the CITES listing, was due to a significant decline in reported exports of wild seahorses from notable Pre-CITES origins. The Philippines, for example, was the main reported origin of live trade in Pre-CITES years, but its Fisheries Code imposed automatic bans on even extraction of species listed on any CITES Appendix, thus making all seahorse catch and trade illegal from 2004 (Foster *et al.* 2019b). Dried trade has continued outside CITES processes but it appears that live exports did stop (Foster *et al.* 2019b). Wild trade from other key Pre-CITES origins continued after the CITES listing but in much smaller volumes. For example, the number of wild seahorses being extracted for export in Brazil (a key origin Pre-CITES) declined immediately after implementation of the CITES listing, as regulation of wild catches and exports came under a quota system (Rosa *et al.* 2011). At the same time, there was an increase in culturing activity in Brazil because cultured seahorses were exempt from national quotas. Indeed, we see the emergence of Brazil as a notable origin of cultured seahorses into the US in the two RST periods.

The overall global decline in seahorses from the wild after listing is deduced from CITES data and from stakeholder information for both major destination markets for the live trade, the EU and the US. In both cases, the decline could be the result of (i) greater scrutiny of wild trade by CITES Authorities and/or (ii) industry shying away from wild imports because of logistic challenges and costs associated with obtaining permits for wild specimens. During interviews we carried out in 2020/2021, companies reported that international imports became too expensive (in both time and money) and the risk of confiscations by Authorities on import too high. This, coupled with ever increasing transportation costs, led industry to increase its reliance on intra-EU and/or domestic captive breeding operations to meet consumer demand. The fact the EU requires import permits, in addition to export permits, for Appendix II species (EC nd) could have precipitated the market's more immediate post-listing switch to tank raised sources, as dealers sought to minimise logistic hurdles.

The continued decline in reported volumes of trade in wild seahorses since listing is probably explained by RST engagement with seahorse trade, and the resulting actions taken by two key exporting Parties whose trade was scrutinized by CITES (Foster and Vincent 2021). RST examined wild trade in three species in the first round for seahorses: *H. kuda, H. kelloggi* and *H. spinosissimus*. In response, Indonesia – a key origin of wild trade before CITES and during the Pre-RST period – declared an end to wild live (and all dried) seahorse exports (CITES 2011).

Indonesia had reportedly exported a total of ~20,000 live individuals during the Pre-RST period. An end to these exports would account for half the overall drop in global wild trade volumes from Pre- to Early RST years. Viet Nam's exports of wild seahorses, which accounted for half of all wild trade reported Pre-RST, also came under scrutiny during the first round of RST. That country, too, then declared an intention to end wild exports (CITES 2011), and the country's supposed export volumes of wild live seahorses declined to 10% of its Pre-RST levels. Inexplicably, Indonesia was let out of the RST process on the basis of its declaration, whereas Viet Nam was retained in RST (Foster and Vincent 2021).

Changes in the international trade in captive born seahorses (source code F) explain most of the trends in live trade during the two RST periods, and was entirely driven by Viet Nam's inclusion in the RST. Trade in captive born seahorses (F1 generation) appeared in global CITES data half way through the Pre-RST period, in 2006, after which such sourcing made up almost three-quarters of the trade through to 2015. Globally, and particularly into the US, a great deal of total trade through the Early RST period was in captive born *H. kuda* reportedly from Viet Nam. This trade was not initially impeded by RST processes, because the process does not – to this day – scrutinize trade in source code F, only specimens considered wild sourced (CITES 2019b). This is a problematic gap in RST surveillance given that (i) NDFs must be made for the wild caught parents before export permits can be issued for the captive born individuals (CITES 2017), and (ii) there is no evidence that Viet Nam ever made NDFs for such wild broodstock (Foster *et al.* 2017). That said, the RST process did eventually bring an end to Viet Nam's exports of *H. kuda* in the Late RST period when, in 2013, CITES recommended Parties suspend trade in *H. kuda* from Viet Nam for failure to meet the RST recommendations by the deadlines (CITES 2013; Foster and Vincent 2021). CITES data show almost no exports of *H. kuda* from Viet Nam after 2013. Instead, Viet Nam supposedly switched to exporting *H. comes*. This reported switch in species is questionable. First, in-country surveys carried out in late 2016 observed only *H. kuda* in breeders' commercial facilities (Foster *et al.* 2017). Second, one trader interviewed for this study commented that the species coming in from Viet Nam as *H. comes* in the Late RST period did not look like *H. comes,* suggesting that perhaps they were a "*H. kuda*/*H. comes* hybrid".

Exports of live seahorses that were captive bred (source code C) became proportionally more important – although absolute numbers declined – while volumes of wild and, eventually, captive born seahorses declined after CITES listing and then effectively ended. Sri Lanka was the most notable reported origin of captive bred seahorses over time, most of which was reported as *H. reidi* – a western Atlantic species. The breeder in Sri Lanka apparently chose a non-native (exotic) species in order to facilitate CITES paperwork, as it would be easy to prove exports were indeed captive bred and so exempt from NDFs (Vincent *et al.* 2011). Initial exports of captive bred *H. reidi* from Sri Lanka were reported in very large volumes, but such quantities have declined over time. During our recent industry interviews, two respondents suggested the quality (health/robustness) of specimens from Sri Lanka had declined significantly over time, perhaps due to a low turnover of the breeding stock. Australia was the other consistent origin of captive bred seahorses over time, but its exports were small volume and consisted only of species native to Australia's waters. Other reported key countries varied, probably reflecting the challenges of breeding seahorses through closed life cycles (Koldewey and Martin-Smith 2010). Our 2020/2021 interviews with EU and US traders also indicated that sourcing of captive bred live animals from global markets had been variable (EU) or had declined (US) in time, with imports offset by intra-EU and/or domestic sourcing of captive bred individuals, thus avoiding the challenges posed by CITES regulations.

Convention outcomes

When it comes to live trade, the CITES listing for seahorses appears to have reduced pressure of international trade on some wild populations in some places. CITES data and company interviews indicated a significant decrease in wild sourcing of seahorses for live trade. Wild live seahorse exports from all historically important origin countries – Australia, Brazil, Indonesia, Mexico and the Philippines – declined significantly in number after the CITES listing, or stopped altogether. It also seems that the very limited exports of live wild seahorses from at least two key countries still reported in trade may be sustainable. Australia and the US have both reported on their means of making defensible, positive, NDFs for their wild live seahorse exports, which they note were also legally sourced (CITES 2020). We do not have information on NDFs for recently reported wild exports of *H. kuda* from Taiwan Province of China, or on its legal acquisition findings.

The reduction in international trade in wild live seahorses that resulted from the CITES Appendix II listing probably arises from a series of attributes: the live trade is relatively small scale; live seahorses are usually target-caught; culture is a viable option for the small volume live trade; live seahorses cannot be smuggled easily; consumers prefer captive bred fish; live seahorses fetch good prices; and live seahorses usually go to countries with good regulatory

capacity (Cohen *et al.* 2018; Foster *et al.* 2016; Koldewey and Martin Smith 2010; Vincent *et al.* 2011). The trade in dried seahorses, which remains deeply problematic after the CITES listing, is rather different: it is huge scale; seahorses are caught primarily in nonselective fishing gear (especially bottom trawls); dried animals are easily smuggled; and the seahorses are traded very cheaply (Foster *et al.* 2016; Lawson *et al.* 2017; Moreau *et al.* 1998; Vincent *et al.* 2011).

Implications for conservation

While the CITES listing has shifted live seahorse sourcing away from wild populations, we hesitate to declare a conservation gain for wild seahorses for five key reasons:

1. A widespread lack of national monitoring means it is not clear how wild populations have fared since the CITES listing (Stanton *et al.* 2021).
2. It is notable that, even as CITES saw reduced exports of wild seahorses, we know of only two Parties that actually made NDFs (see above).
3. Seahorse populations in formerly important origin countries for wild live trade are still being damaged by nonselective fisheries and by illegal, unreported and unregulated fisheries (Foster *et al.* 2017; Foster *et al.* 2019b). Most of these seahorses find their way into a vast illegal dried trade (Foster *et al.* 2019a).
4. We have concerns about Parties' declarations that aquaculture serves as a wider conservation strategy for seahorses. First, they are implying that increasing culturing activities will reduce pressure on wild populations primarily threatened by nonselective fishing and habitat degradation. Second, plans around aquaculture are often coupled with proposals for "restocking" areas of the ocean which has the potential to severely damage existing wild seahorse populations (CTSG 2021; Vincent *et al.* 2011).
5. Some Parties are not making legal acquisition findings (LAFs), and need advice on how to address illegal sourcing of specimens in trade.

We have no information on possible socio-economic implications associated with changes to the live seahorse trade brought about by the CITES listing. Such considerations might have consequences for CITES effectiveness in securing the sustainability of wild populations of listed species. The shift to captive breeding means that fishers will have either lost income and/or switched to supplying the dried trade, as we have observed in the Philippines (Foster *et al.* 2019b). Arguably, it may also reduce incentives for conservation of wild seahorse populations and habitats. There needs to be an analysis of the relative benefits of wild versus cultured sourcing for long term conservation of the species.

Moving forward for seahorses

As CITES strives to improve implementation of the Convention for the live trade in seahorses, Parties will need to ensure that they meet requirements to make NDFs for wild sourced and captive born seahorses. In seeking to make NDFs, Parties are recommended to consider all extraction of the species under consideration, regardless of the animals' eventual use or destination (as per NDF guidance in Foster and Vincent 2016). The validity of such NDF declarations hangs on Parties' effectiveness at monitoring wild populations, for which pragmatic guidance exists (Foster *et al.* 2014; Loh *et al.* 2014). They must also certify the sourcing (mode of production) of putatively captive bred seahorses. Moreover, Parties need to confirm the legal sourcing of specimens in trade (LAFs), ensuring – for example – that animals for trade or broodstock are not caught using gears or in places that are off limits, such as marine protected areas or trawl exclusion zones, and satisfy requirements for humane transport of live animals. CITES might further wish to review The International Air Transport Association (IATA) regulations for seahorses, which are the basis of its guidelines for air transport of live wild animals and plants (CITES 2013a), to ensure they are clear and appropriate to minimize unnecessary confiscations of live seahorse shipments. A further consideration is to address possible socio-economic considerations associated with the move from wild sourced to captive bred seahorses, and identify how legal and sustainable trade might contribute to both species' conservation and livelihoods of rural communities (as per CITES Resolution Conf. 16.6 (Rev. CoP17)).

Conclusions

Our study of how CITES has affected the export trade in live seahorses documents an overall decline in international trade volumes, and a shift from wild to cultured animals. Globally, we found that the CITES Appendix II listing, and subsequent implementation processes – notably the Review of Significant Trade (RST) – led to a dramatic decline

in wild sourcing and overall export volumes of seahorses for live trade. Instead, the diminishing global volume of exports was increasingly supplied by a growing trade in captive born seahorses (source code F). The next transition was to a greater proportion of the live seahorses being captive bred (source code C). This is in stark contrast to the much larger volume dried trade, for which RST engagement led to a vast illegal trade in wild specimens. The changes to the live trade we detected may well have reduced direct fishing pressure on some wild populations but monitoring is needed to explore conservation implications of the transitions. Implementation of adaptive management plans appropriate to the national situation should ensure that trade in live seahorses for aquaria becomes/remains sustainable and legal, particularly as it is commonly targeted and small scale compared to trade in dried seahorses, which remains deeply problematic.

Recommendations

Our analysis of the international live trade in seahorses supports the following recommendations, successful implementation of which will improve conservation outcomes for seahorses.

Directed to CITES

Working in collaboration with species experts, CITES should establish the following tools and training materials to help Parties implement the Appendix II listing for live seahorses. The tools and materials should be simple and pragmatic to facilitate their application in a wide range of national situations.

- Guidance on how to make NDFs for wild and source code F live seahorse exports. This can be based on existing guidance for making NDFs for seahorses (Foster and Vincent 2016) and recommendations from a previous CITES workshop (Bruckner *et al.* 2005).
- Guidance on how to make LAFs for wild and source code F live seahorse exports. Such guidance is needed for seahorse trade generally (dried and live).
- Guidance on how to monitor wild populations in support of adaptive management. This can be based on existing guidance on monitoring seahorse populations *in situ* and through seahorse fisheries (Foster *et al.* 2014; Loh *et al.* 2014).
- Guidance on tracking extraction of wild broodstock for culture operations, and its implication for wild populations, whether F or C. This can be derived from existing guidance developed for Viet Nam (Project Seahorse 2015).
- Guidance on how to distinguish between seahorses that are wild source, source code F and source code C, using recommendations from a previous CITES workshop as a starting point (Bruckner *et al.* 2005).
- Identification guides for live trade in multiple languages. These can be based on existing identification tools for seahorses (Project Seahorse 2021).

In addition, CITES needs to enhance its own guidance to support the App II listing for seahorses. CITES should:

- Update its annual reporting guidelines to specify that live seahorses are to be reported as individuals (and dried seahorses in weight; Foster *et al.* 2016; Foster 2021).
- Review the IATA regulations for seahorses, which are the basis of CITES own guidelines for air transport of live wild animals and plants (CITES 2013a), to ensure they are clear and appropriate to minimize unnecessary confiscations of live seahorse shipments.

CITES should further:

- Invite Parties to provide information on how they are making taxon specific NDFs to be shared with other CITES Parties for their consideration (in support of Decision 18.230).
- Invite Parties to provide information on how they are making taxon specific LAFs to be shared with other CITES Parties for their consideration.
- Invite Parties to inform the Secretariat of any national management measures that regulate or restrict international trade in seahorses (e.g. quotas, trade suspensions); and how they are implementing and enforcing such measures for seahorses (in support of Decision 18.230).
- Communicate the existence of national quotas, including any zero quotas, and trade suspensions to CITES Authorities through a Notification to the Parties and through its website.
- Require that Parties report import quantities of Appendix II listed species in their annual reports to CITES for including in the CITES trade database.
- Formalise a process by which the need for NDFs for source code F exports can be scrutinised and Parties held accountable. This might mean including source code F in the Review of Significant Trade (Res. Conf. 12.8 (Rev. CoP18)) or expanding the captive breeding resolution (Res. Conf. 17.7 (Rev. CoP18)) to include scrutiny of NDFs for wild caught parents of source code F exports.
- Work with the IUCN SSC Conservation Translocation Specialist Group (CTSG, iucn-ctsg.org) to establish guidance on the risks of aquaculture and releases to wild populations of CITES listed species.

Directed to Parties

Parties exporting, or planning to export, live seahorses should:

- Use existing tools as appropriate for effective CITES implementation and enforcement that are relevant to seahorses (in support of CITES Decision 18.231). These are available on the IUCN SSC Seahorse, Pipefish and Seadragon website (www.iucn-seahorse.org/cites-toolkit).
- Meet their obligations to the Convention by making NDFs and LAFs for wild and source code F exports.
- Share copies of their NDFs for wild and source code F live seahorse exports with the Secretariat for posting on the CITES website to assist other CITES Parties (in support of CITES Decision 18.230).
- Share copies of their LAFs for wild and captive born live seahorse exports with the Secretariat for posting on the CITES website to assist other CITES Parties.
- Inform the Secretariat of any national management measures that regulate or restrict international trade in seahorses (e.g. quotas, trade suspensions); and how they are implementing and enforcing such measures for seahorses (in support of Decision 18.230).
- Develop and execute long-term monitoring programmes for seahorses in their national waters to guide adaptive management (in support of CITES Decision 18.231).
    - Monitoring *in situ* usually consists of underwater surveys of seahorse populations (using SCUBA or snorkel). Fisheries monitoring includes documentation of catch and effort data along with basic information on population status and trends obtained via fishery-independent programs, or by sub-sampling commercial landings. Both types of programmes can be based on existing guidance for seahorse monitoring (underwater – Loh *et al.* 2014; fisheries – Foster *et al.* 2014).
- Enforce existing laws (e.g., trawling bans in specific areas, MPAs) which benefit the conservation of seahorses.
- Inventory and assess seahorse aquaculture operations to determine their production capabilities, degree of reliance on wild populations, and any environmental concerns.
- Ensure that any releases of tank raised seahorses only occurs according to guidelines established by the IUCN Conservation Translocation Specialist Group (https://iucn-ctsg.org/policy-guidelines/conservation-translocation-guidelines/). Never release exotic species.

Importing Parties should:

- Voluntarily report import quantities in their annual reports to CITES for including in the CITES trade database.
- Request information on NDFs and LAFs when there are concerns about the validity of export permits, particularly for wild or captive born seahorses.
- Verify species identification on import. Identification can be done on a subset of individuals if a shipment is sufficiently large to preclude identification of all individuals.

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Table A.1. Countries/jurisdictions identified during Project Seahorse trade surveys as involved in the live trade of seahorses. Trade surveys were carried out from 1998 to 2002, but data were often obtained for earlier years. Countries/jurisdictions indicated with a * were not directly surveyed themselves but were detected during our surveys of other countries/jurisdictions. Grey shading indicates countries for which only dried trade was documented. I = countries/jurisdictions that were an origin/destination (source/consumer) of live seahorses in international trade. D = countries/jurisdictions that were an origin/destination (source/consumer) of live seahorses in domestic markets.

Country/jurisdiction	Origin	Destination	Years for which data were obtained	Reference
Argentina		I	1999–2001	Baum & Vincent 2011
Australia	I/D	I/D	1999–2001	Martin-Smith & Vincent 2011
Austria		I	1997–2001	LaFrance & Vincent 2011
Bangladesh			1999	Perry & Vincent 2005
Belgium		I	1997–2001	LaFrance & Vincent 2011
Belize	I		2000	Baum & Vincent 2011
Bolivia*			2000	Baum & Vincent 2011
Brazil	I/D	I	1999–2001	Baum & Vincent 2011
Canada		I	1997–2001	LaFrance & Vincent 2011
Chile*			1997–2000	Baum & Vincent 2011
China		?	1995, 1999–2000	Kwan & Vincent 2006
Costa Rica	I/D	I/D	1996–2000	Baum & Vincent 2011
Cuba*	I		1997–2001	LaFrance & Vincent 2011
Denmark		I	1997–2001	LaFrance & Vincent 2011
Ecuador			2000	Baum & Vincent 2011
Egypt*	I		1997–1999	McPherson & Vincent 2011
Fiji*	I		2000	Baum & Vincent 2011
France		I	1997–2001	LaFrance & Vincent 2011
The Gambia*			1999	McPherson & Vincent 2011
Germany		I	1997–2001	LaFrance & Vincent 2011
Guatemala			2000	Baum & Vincent 2011
Guinea*			1998–2001	McPherson & Vincent 2011
Honduras			2000	Baum & Vincent 2011
Hong Kong SAR		I	1998–2000	Kwan& Vincent 2006
Hungary*		I	1997–2001	LaFrance & Vincent 2011
India	I/D	I/D	1999	Perry *et al.* 2020

Country/jurisdiction	Origin	Destination	Years for which data were obtained	Reference
Indonesia	I/D	D	1999-2002	Perry *et al.* 200
Ireland		I	1997–2001	LaFrance & Vincent 2011
Italy		I	1997–2001	LaFrance & Vincent 2011
Japan		I	2001	Kwan& Vincent 2006
Kenya	I		2000	McPherson & Vincent 2011
Korea		I	2000	Kwan & Vincent 2006
Malaysia	I	I	1998–1999	Perry *et al.* 2010
Mali*			1997	McPherson & Vincent 2011
Mexico	I/D	I/D	2000	Baum & Vincent 2011
Mozambique	I		2000	McPherson & Vincent 2011
Netherlands		I	1997–2001	LaFrance & Vincent 2011
New Zealand		I	2001	Martin-Smith & Vincent 2011
Nicaragua	I/D	D	2000	Baum & Vincent 2011
Nigeria*			1997	McPherson & Vincent 2011
Pakistan	I/D	I/D	1999	Perry & Vincent 2005
Panama	I	I/D	2000	Baum & Vincent 2011
Peru	I		1997–2000	Baum & Vincent 2011
Philippines	I	I	1998–2001	Pajaro & Vincent 2015
Portugal		D	1997–2001	LaFrance & Vincent 2011
Senegal*			1998–2001	McPherson & Vincent 2011
Seychelles*			2000	McPherson & Vincent 2011
Singapore	I/D	I/D	1998, 2000	Perry *et al.* 2006
Solomon Islands	I		1996–2001	Martin-Smith & Vincent 2011
South Africa		I	1998–2001	McPherson & Vincent 2011
Spain		I	1997–2001	LaFrance & Vincent 2011
Sri Lanka*	I		1999	Perry *et al.* 2020
Suriname*			2000–2001	Baum & Vincent 2011
Sweden		I	1997–2001	LaFrance & Vincent 2011
Switzerland		I	1997–2001	LaFrance & Vincent 2011

Country/jurisdiction	Origin	Destination	Years for which data were obtained	Reference
Taiwan Province of China		I	2000	Kwan & Vincent 2006
Tanzania			2000	McPherson & Vincent 2011
Thailand	I/D	I/D	1998–1999	Perry *et al.* 2010
Togo*			1998–2001	McPherson & Vincent 2011
United Kingdom	I	I	1997–2001	LaFrance & Vincent 2011
United States	I/D	I/D	1997–2001	LaFrance & Vincent 2011
Venezuela*			1998, 2000	Baum & Vincent 2011
Vietnam	D	D	1995–1998	Giles *et al.* 2006
Zimbabwe*			1996–2000	McPherson & Vincent 2011

Table A.2. Trade in live seahorses as reported by two **European Union** companies during interviews carried out in late 2020 and early 2021. We present data across different time periods on (i) source, (ii) species, and (iii) origins. Percentages in brackets represent each species' or country/jurisdiction's proportion of the total volume for the specific source code and time period indicated, where we had volume information. W = wild sourced; tank raised = cultured but not known if captive born or captive bred; RST = CITES Review of Significant Trade. See methods for details on data sources, source codes and time periods. Where once valid species have since been synonymized, the valid name is in brackets after the species name, and the total number of currently valid species is in brackets after the total number of reported species. Taiwan PoC = Taiwan Province of China.

		Prop. of total trade	**# companies contributing to reported statistics (N)**		**Mean annual volume – # of individuals**	**Species – total number**	**Species – top five ranked by volume (if ≥ 5%)**	**Origins – total number**	**Origins – top five ranked by volume (if ≥ 5%)**
Early RST period (2009-2012)	**Internationally**	43%	2	All sources	**1,910**	5	*H. reidi* (43%) *H. kuda* (40%) *H. zosterae* (16%)	6	Viet Nam (41%) Sri Lanka (24%) United States (16%) Brazil (13%) Taiwan PoC (5%)
				W	566	3	*H. zosterae* (53%) *H. reidi* (45%)	3	United States (53%) Brazil (45%)
				Tank raised	1,334	3	*H. kuda* (57%) *H. reidi* (42%)	3	Viet Nam (58%) Sri Lanka (34%) Taiwan PoC (7%)
	Intra-EU	57%	2	All sources	**2,513**	6	*H. kuda* (63%) *H. reidi* (19%) *H. erectus* (6%) *H. abdominalis* (5%)	2	France (66%) Portugal (9%)

		Prop. of total trade	# companies contributing to reported statistics (N)		Mean annual volume – # of individuals	Species – total number	Species – top five ranked by volume (if ≥ 5%)	Origins – total number	Origins – top five ranked by volume (if ≥ 5%)
				W	N/A	N/A		N/A	
				Tank raised	2,513	6	*H. kuda* (63%) *H. reidi* (19%) *H. erectus* (6%) *H. abdominalis* (5%)	2	France (66%) Portugal (9%)
	Domestic-ally sourced	~0%	2	All sources	N/A	N/A		N/A	
				W	N/A	N/A		N/A	
				Tank raised	N/A	N/A		N/A	
Late RST period (2013-2019)	**Internationally sourced**	44%	2	All sources	**1,468**	6	*H. kuda* (41%) *H. comes* (23%) *H. zosterae* (19%) *H. reidi* (16%)	6	Viet Nam (64%) United States (19%) Brazil (10%) Taiwan PoC (6%)
				W	444	3	*H. zosterae* (65%) *H. reidi* (33%)	3	United States (65%) Brazil (33%)

		Prop. of total trade	# companies contributing to reported statistics (N)	Mean annual volume – # of individuals		Species – total number	Species – top five ranked by volume (if ≥ 5%)	Origins – total number	Origins – top five ranked by volume (if ≥ 5%)
				Tank raised	1,024	4	*H. kuda* (58%) *H. comes* (36%) *H. reidi* (9%)	2	Viet Nam (91%) Taiwan PoC (9%)
	Intra-EU			All sources	**1,236**	5	*H. reidi* (50%) *H. erectus* (16%) *H. hippocampus* (16%) *H. abdominalis* (10%) *H. zosterae* (8%)	2	Portugal (33%) Spain (13%)
		37%	2	W	N/A	N/A		N/A	
				Tank raised	1,236	5	*H. reidi* (50%) *H. erectus* (16%) *H. hippocampus* (16%) *H. abdominalis* (10%) *H. zosterae* (8%)	2	Portugal (33%) Spain (13%)
	Domestically sourced			All sources	**922**	3 (2)	*H. kuda* (67%) *H. erectus* (26%) *H. fuscus* (*H. kuda*) (7%)	N/A	
		16%	2	W	N/A	N/A		N/A	

		Prop. of total trade	# companies contributing to reported statistics (N)	Mean annual volume – # of individuals	Species – total number	Species – top five ranked by volume (if ≥ 5%)	Origins – total number	Origins – top five ranked by volume (if ≥ 5%)
				Tank raised 922	3 (2)	*H. kuda* (67%) *H. erectus* (26%) *H. fuscus* (*H. kuda*) (7%)	N/A	

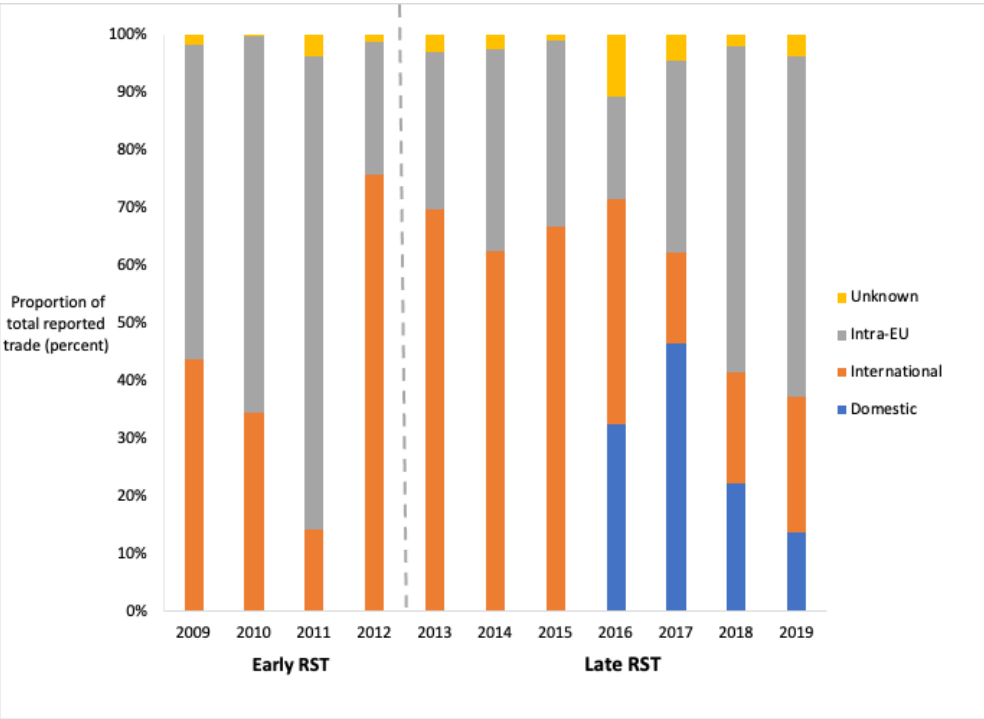

Figure A.1. Proportion of live seahorse sales during the Early RST (2009–2012) and Late RST (2013–2018) periods from international origins vs those from within the EU vs domestic production as reported by two companies in the **European Union** during interviews we conducted in late 2020 and early 2021. Vertical dashed lines delineate the two time periods.

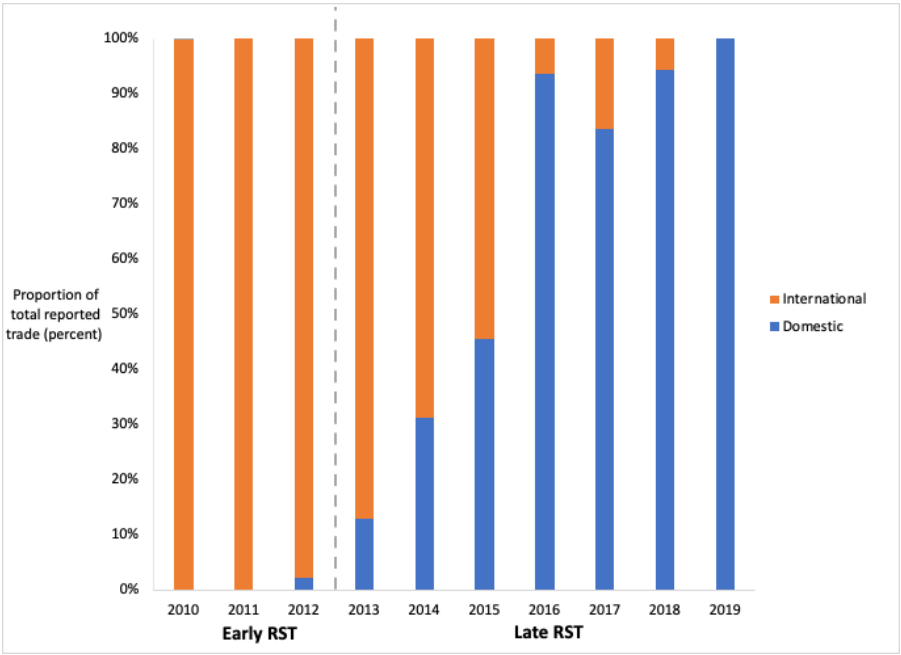

Figure A.2. Proportion of live seahorse sales during the Early RST (2010–2012) and Late RST (2013–2018) periods from international origins vs domestic production as reported by one company in the **United States** during interviews conducted in early 2021. Vertical dashed line delineates the two time periods.

Table A.3. Trade in live seahorses as reported by two **United States** companies during interviews carried out in early 2021. We present data across different time periods on (i) source, (ii) species, and (iii) origins. Percentages in brackets represent each species' or country/jurisdiction's proportion of the total volume for the specific source code and time period indicated, where we had volume information. W = wild sourced; tank raised = cultured but not known if captive born or captive bred; RST = CITES Review of Significant Trade. See methods for details on data sources, source codes and time periods. *Detailed domestically sourced seahorse volumes were only provided by one company interviewed. Taiwan PoC = Taiwan Province of China.

		Proportion of total trade in seahorses for the period	Number of companies contributing to the reported statistics (N)		Mean annual volume – # of individuals	Species – total number	Species – top five ranked by volume (if ≥ 5%)	Origins – total number	Origins – top five ranked by volume (if ≥ 5%)
Early RST period (2010-2012)	Internationally sourced	>99%	2	All sources	11,002	10	*H. kuda* (61%) *H. kelloggi* (26%)	7	Viet Nam (48%) Indonesia/Philippines (26%) Australia (19%)
				W	2,954	5	*H. kelloggi* (99%)	4	Indonesia/Philippines (99%)
				Tank raised	8,048	7	*H. kuda* (83%) *H. ingens* (6%) *H. comes* (5%)	4	Viet Nam (66%) Australia (25%) Mexico (6%)
	Domestically sourced	<1%	1*	All sources	32	1	*H. erectus* (100%)	N/A	N/A
				W	32	1	*H. erectus* (100%)	N/A	N/A
				Tank raised	N/A			N/A	N/A
Late RST period (2013-2019)	Internationally sourced	74%	2	All sources	3,287	7	*H. comes* (33%) *H. kuda* (24%) *H. reidi* (21%) *H. ingens* (10%) *H. spinosissimus* (6%)	9	Viet Nam (28%) Australia (22%) Indonesia/Philippines (11%) Sri Lanka (11%) Taiwan PoC (11%)
				W	30	1	*H. reidi* (100%)	1	Brazil (100%)
				Tank raised	3,257	7	*H. comes* (33%) *H. kuda* (24%) *H. reidi* (21%) *H. ingens* (10%) *H. spinosissimus* (6%)	8	Viet Nam (28%) Australia (23%) Indonesia/Philippines (12%) Sri Lanka (11%) Taiwan PoC (11%)

Domestically	26%	1*	All sources	659	2	*H. erectus* (99%)	N/A	N/A
			W	145	2	*H. erectus* (96%)	N/A	N/A
			Tank raised	514	1	*H. erectus* (100%)	N/A	N/A

Table A.4. Trade in live seahorses into the **European Union**. We present data across different time periods on (i) source, (ii) species, (iii) origins, and (iv) destinations. Percentages in brackets represent each species' or country/jurisdiction's proportion of the total volume for the specific source code and time period indicated, where we had volume information on which to base this analysis. W = wild sourced; F = captive born; C = captive bred; tank raised = raised in captivity but not known if F or C; RST = CITES Review of Significant Trade. See methods for details on data sources, source codes and time periods. Taiwan PoC = Taiwan Province of China.

		Mean annual volume - # individuals	Species - total #	Species - top five ranked by volume (if ≥5%)	Origins - total #	Origins - top five ranked by volume (if ≥5%)	Destinations - total number	Destinations - top five ranked by volume (if ≥5%)
Pre-CITES (1997-2004) Annex D data (from CITES	All sources	**20,046**	21	*H. kuda* (42%) *H. erectus* (22%)	28	Indonesia (30%) Sri Lanka (21%) Brazil (18%) Philippines (18%) Singapore (8%)	12	Germany (35%) Italy (23%) Netherlands (16%) United Kingdom (10%) Austria (9%)
	W	12,537	19	*H. kuda* (38%) *H. erectus* (26%) *H. reidi* (5%)	23	Indonesia (36%) Brazil (19%) Philippines (19%) Sri Lanka (14%) Singapore (8%)	10	Germany (54%) Netherlands (17%) Austria (13%) Belgium (7%) United Kingdom (7%)
	F	0	0	N/A	0	N/A	0	N/A
	C	20	3	*H. barbouri* (33%) *H. spinosissimus* (33%) *H. whitei* (33%)	1	Australia (100%)	1	Ireland (100%)
Pre-RST [illegible] CITES trade data	All sources	**35,197**	18	*H. reidi* (49%) *H. kuda* (40%)	11	Sri Lanka (48%) Viet Nam (37%)	15	France (39%) United Kingdom (18%)

	Mean annual volume - # individuals	Species - total #	Species - top five ranked by volume (if ≥5%)	Origins - total #	Origins - top five ranked by volume (if ≥5%)	Destinations - total number	Destinations - top five ranked by volume (if ≥5%)
					Indonesia (10%)		Germany (11%) Netherlands (10%) Italy (6%)
W	5,482	14	*H. kuda* (39%) *H. barbouri* (25%) *H. erectus* (9%) *H. histrix* (9%) *H. reidi* (5%)	7	Indonesia (63%) Viet Nam (22%) Brazil (11%)	11	France (39%) Germany (23%) Poland (13%) United Kingdom (9%) Italy (6%)
F	9,038	2	*H. kuda* (97%)	1	Viet Nam (100%)	7	France (71%) Italy (14%) United Kingdom (8%)
C	20,658	8	*H. reidi* (82%) *H. kuda* (16%)	7	Sri Lanka (82%) Viet Nam (15%)	15	France (26%) United Kingdom (25%) Netherlands (16%) Germany (12%) Spain (7%)

		Mean annual volume - # individuals	Species - total #	Species - top five ranked by volume (if ≥5%)	Origins - total #	Origins - top five ranked by volume (if ≥5%)	Destinations - total number	Destinations - top five ranked by volume (if ≥5%)
Early RST (2009-2012) CITES trade data	All sources	**37,847**	13	*H. kuda* (44%) *H. reidi* (36%) *H. comes* (15%)	8	Viet Nam (44%) Sri Lanka (41%) Indonesia (7%)	20	France (31%) United Kingdom (25%) Netherlands (17%) Germany (13%)
	W	1,392	9	*H. reidi* (61%) *H. erectus* (13%) *H. angustus* (7%) *H. zosterae* (7%)	5	Brazil (72%) Australia (17%) United States (7%)	6	United Kingdom (44%) Germany (36%) Netherlands (8%) Ireland (8%)
	F	17,052	5	*H. kuda* (83%) *H. comes* (15%)	4	Viet Nam (97%)	9	France (54%) United Kingdom (23%) Netherlands (13%)
	C	19,347	10	*H. reidi* (65%) *H. comes* (16%) *H. kuda* (13%)	7	Sri Lanka (79%) Indonesia (14%)	19	United Kingdom (24%) Netherlands (21%) Germany (19%) France (13%) Spain (6%)
Late RST (2013-2018) CITES trade data	All sources	**16,524**	14	*H. reidi* (45%) *H. comes* (33%) *H. kuda* (13%)	11	Sri Lanka (49%) Viet Nam (31%) Taiwan PoC (8%)	14	United Kingdom (36%) Netherlands (24%) France (22%) Germany (9%)

W	888	9	*H. reidi* (38%) *H. zosterae* (35%) *H. subelongatus* (17%)	3	Brazil (37%) United States (35%) Australia (27%)	6	United Kingdom (43%) Netherlands (30%) Denmark (12%) France (9%) Germany (5%)
F	5,367	6	*H. comes* (78%) *H. kuda* (16%)	5	Viet Nam (94%)	9	United Kingdom (39%) Netherlands (24%) France (16%) Germany (9%)
C	10,270	12	*H. reidi* (69%) *H. kuda* (12%) *H. comes* (11%)	9	Sri Lanka (79%) Taiwan PoC (13%)	13	United Kingdom (34%) France (26%) Netherlands (24%) Germany (9%)

Table A.5. Trade in live seahorses into the **United States**. We present data across different time periods on (i) source, (ii) species, and (iii) origins. Percentages in brackets represent each species' or country/jurisdiction's proportion of the total volume for the specific source code and time period indicated, where we had volume information on which to base this analysis. W = wild sourced; F = captive born; C = captive bred; tank raised = raised in captivity but not known if F or C; LEMIS = US Fish and Wildlife Service's Law Enforcement Management Information System; RST = CITES Review of Significant Trade. See methods for details on data sources, source codes and time periods. Where once valid species have since been synonymized, the total number of currently valid species is in brackets after the total number of reported species.

			Mean/median annual volume - # of individuals	Species - total number	Species – top five ranked by volume (if ≥5%)	Origins - total number	Origins – top five ranked by volume (if ≥5%)
Pre-CITES (2000-2003)	**Historic trade surveys (Los Angeles survey)***	All sources	**135,269**	12 (11)	*H. reidi* (35–49%) *H. kuda* (0–29%) *H. barbouri* (15–20%) *H. comes* (2–28%) *H. spinosissimus* (0–26%)	7	Brazil Philippines Indonesia Sri Lanka Australia
		Wild	vast majority of "All sources" volume was wild sourced	10 (9)	*H. reidi* (35–49%) *H. kuda* (0–29%) *H. barbouri* (15–20%) *H. comes* (2–28%) *H. spinosissimus* (0–26%)	6	Brazil Philippines Indonesia Sri Lanka "The Caribbean"
		Tank raised	very small amounts	3	*H. abdominalis* *H. barbouri* *H. whitei*	1	Australia
	LEMIS trade data (2000-2003)	All sources	**N/A**	15 (13)	*H. kuda* (30%) *H. abdominalis* (25%) *H. hippocampus* (7%)	14	Australia (50%) Philippines (24%) New Zealand (12%)
		W	N/A	12 (10)	*H. kuda* (33%) *H. abdominalis* (27%) *H. hippocampus* (12%)	11	Philippines (45%) Australia (38%) Brazil (8%)
		F	N/A	4	*H. ingens* (60%) *H. capensis* (11%) *H. abdominalis* (7%) *H. reidi* (6%)	5	Mexico (60%) United Kingdom (12%) Germany (11%) Canada (10%)

			Mean/median annual volume - # of individuals	Species - total number	Species – top five ranked by volume (if ≥5%)	Origins - total number	Origins – top five ranked by volume (if ≥5%)
							Australia (10%)
		C	N/A	10	*H. abdominalis* (27%)	8	Australia (68%)
					H. kuda (25%)		New Zealand (23%)
Pre-RST (2004-2008)	**Historic Surveys (2005 only)***	All sources	**36,667**	8	*H. kelloggi*/*H. kuda* (25–26%)	5	Viet Nam
					H. comes (23–25%)		Sri Lanka
					H. kuda (18–19%)		Sri Lanka
					H. reidi (13–15%)		"The Caribbean"
					H. barbouri (4–6%)		Brazil
		Wild	18,351	8	*H. comes* (45–52%)	4	Indonesia
					H. kuda (35–40%)		Viet Nam
					H. barbouri (8–12%)		"The Caribbean"
					H. spinosissimus (8–34%)		Brazil
					H. histrix (unknown)		
		Tank raised	18,316	4	*H. kelloggi*/*H. kuda* (70–74%)	2	Viet Nam
					H. reidi (26–30%)		Sri Lanka

*note species, sources are not ranked by volume as data was incomplete - instead order represents general ranking of most to least traded based off the best information available; volume ranges were calculated by summing definitively reported species volumes and (where applicable) the minimum and maximum volumes of the same species found in mixed-species shipments. This accounts for the discrepancy in the overall ranking of most traded species and the upper bounds of some species' trade percentages by volume.

IMPLEMENTATION OF CITES APPENDIX II LISTING FOR SEAHORSES IN THE CONTEXT OF EXPORT BANS AND SUSPENSIONS

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About Project Seahorse

Project Seahorse (www.projectseahorse.org) is an award-winning team that has made measurable gains in marine conservation around the world. Visit our website to learn more about our efforts to endure sustainable and legal seahorse trade: https://projectseahorse.org/regulating-trade/. See also our toolkit for supporting Parties in implementing CITES for seahorses, available at: https://www.iucn-seahorse.org/cites-toolkit#ndf. Project Seahorse manages the IUCN SSC Specialist Group for Seahorses, Pipefish and Seadragons (SPS SG; www.iucn-seahorse.org).

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Summary
This study analyses implementation of the CITES Appendix II listing for dried seahorses (*Hippocampus* spp.). Our focus is on (i) six jurisdictions that have long been net exporters of seahorses but have declared national bans or suspensions for such exports and (ii) four jurisdictions that have long been key importers for dried seahorses. This study complements work on live trade in seahorses (Foster *et al.* 2021) and is underpinned by a volume of ten jurisdiction reports (Foster 2022).

As of November 2018, exports had been banned or suspended from Party/species combinations that together comprised 98% of declared legal wild seahorse exports across all species in the CITES database from 2004-2011 (Foster & Vincent 2021). Jurisdictions appear to have declared such bans/suspensions and then turned their attention away from seahorses, with no active enforcement. As a consequence, most exports appear to have gone underground and smuggling is now the norm.

Authorities in most jurisdictions felt the illegal trade is so pervasive primarily because of a lack of government prioritization. Other reasons included the fact that most seahorses are obtained as bycatch in nonselective gears, perceived benefits from trade outweigh perceived risks, the challenge of addressing the huge scale of the dried trade, a lack of communication with key stakeholders, and ongoing demand from consumer markets. In addition, most respondents knew little about the considerable resources available to support implementation of the seahorse listing.

Respondents across jurisdictions understood that restrictions on trade alone will not achieve sustainable seahorse populations, even if fully implemented; they must be coupled with measures to reduce fishing pressure. Because most seahorses are caught in nonselective fishing gear, particularly bottom trawls, supply is actually often independent of demand. In addition, it is difficult to regulate seahorse trade: dried seahorses are small and easy to hide; seahorses are often exported in mixed shipments with other species; fishers land seahorses caught in other countries' waters; and seahorses in trade may take very circuitous routes (e.g. West Africa to Peru to Hong Kong SAR to Vietnam).

Most jurisdictions indicated a dearth of national conservation assessments for seahorses, and poor implementation of national protective measures for seahorses. Only one Party reported tracking seahorse population trends over time. The most commonly reported general regulations that might also benefit seahorses were marine protected areas and trawl exclusion zones. Worryingly, many jurisdictions highlighted *ex situ* culture coupled with "restocking" as conservation measures for seahorses, when such ventures are actually commonly deeply problematic for wild populations (CTSG 2021).

To meet their obligations under the Convention, Parties essentially have a choice; they can end rampant illegal international trade or they can ensure that seahorses being traded are sourced sustainably and legally. If Parties choose to retain export bans or suspensions, then they must implement them with determination and vigilance. Given the real difficulties in ending seahorse trafficking, Parties might find it better to revert to the spirit of a CITES Appendix II listing and restrict exports to levels that do not damage wild populations. The challenge, then, is to rein in bottom trawling to reduce pressure on wild populations, and to ensure that seahorses in trade will be legally sourced. This can be achieved by implementing existing laws against bottom trawling in coastal areas and by establishing more protected areas, in line with existing international commitments.

1. Background and rationale

Seahorses are among the most threatened marine species, partly as a consequence of international trade, with more than 30 species traded among more than 80 countries (Foster *et al.* 2016). The vast majority of seahorses in trade were sourced from the wild then dried to supply demands for traditional Chinese medicine (TCM) (Vincent 1996, Vincent *et al.* 2011). Much smaller numbers of seahorses are sourced from the wild or tank-reared then traded live for aquarium display (Vincent *et al.* 2011, Foster *et al.* 2021). Approximately 98% of the 5.7 million individual seahorses reported in the CITES trade database from 2004 to 2011 consisted of dried specimens, with 93% reportedly imported by China, including Hong Kong SAR and Taiwan, Province of China (Foster *et al.* 2016). International trade patterns for both dried and live seahorses have shifted since their listing on CITES Appendix II in 2004, and particularly since their first inclusion in the CITES Review of Significant Trade (RST) in 2009 (Foster & Vincent 2021, Foster *et al.* 2021). The dried trade has become increasingly illegal in nature, now essentially occurring outside CITES processes, and is therefore not reflected in CITES data (Foster *et al*. 2019a, Foster & Vincent 2021). Indeed, a survey carried out in Hong Kong SAR in 2016-17 revealed that 95% of imports by volume had come from countries with trade suspensions (Foster *et al.* 2019). For the live trade, reported volumes have decreased over time and declared sourcing has shifted from wild capture to captive breeding (Foster *et al.* 2021, Koning & Hoesksema 2021).

At CoP18 (July 2019), CITES Parties noted difficulties implementing the Appendix II CITES listing for seahorses. These included challenges with making non-detriment findings, monitoring trade, and enforcing established trade controls, *inter alia*. Parties also adopted a set of Decisions at CoP18 that would help them move toward effective implementation of the Convention for trade in seahorses (Decisions 18.228-18.233). Our study is in support of Decision 18.229(c)(i), which directs the Secretariat to "commission a study on trade in *Hippocampus* spp., including applicable regulations, to understand shifts in international trade patterns since the inclusion of seahorses in Appendix II and the Review of Significant Trade of *Hippocampus* spp., as well as the implementation challenges and possible solutions." The study was funded by the National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service of the United States, and the Principality of Monaco and NOAA's National Marine Fisheries Service through the Secretariat. The findings and recommendations resulting from this study will feed into a technical workshop or consultation process conducted in the second half of 2022 by Project Seahorse, under Decision 18.229. The consultation aims to address the implementation and enforcement of CITES for trade in *Hippocampus* spp., including the recommendations and outcomes from the RST process, and propose practical steps to address implementation and enforcement challenges, as outlined in paragraph (c)(ii) of that Decision.

This study, carried out by Project Seahorse, as host of the IUCN SSC Seahorse, Pipefish and Seadragon Specialist Group (SPS SG), analyses implementation of Appendix II and CITES enforcement mechanisms. Our focus is on (i) jurisdictions (Parties and regions) in Asia that have suspended seahorse exports and (ii) jurisdictions that are key importers for dried seahorses. Our objective is to generate recommendations to assist Authorities in improved implementation of the Convention for dried seahorses. This study complements focused work on the live trade in seahorses available as Foster *et al.* (2021). Most jurisdictions that historically exported large numbers of seahorses now report having suspended exports for this taxon, yet high levels of illegal dried trade clearly persist (Maldives, Monaco, Sri Lanka and the United States 2018, Foster *et al.* 2019, Foster & Vincent 2021). There is an urgent need to raise awareness of and address such smuggling. This study, focused in Asia, documents trade bans/suspensions for seahorses, investigates how such controls are being implemented and/or enforced, and explores the roles of government agencies in implementation and/or enforcement. The study highlights strengths and challenges jurisdictions face in meeting their obligations to seahorses, with an aim of generating recommendations for improved implementation of the Convention. Though limited to Asia, our study's findings and recommendations will be of relevance to key seahorse exporters in other regions of the world, most notably those in West African and Latin America. Indeed, Guinea and Senegal are currently subject to CITES recommendations to suspend trade in seahorse species as a result of the RST.

To generate the information for the study, a series of national experts were contracted by Project Seahorse to elicit information from government, line agencies, non-governmental organizations, community groups and academic institutions within key exporting and importing jurisdictions of dried seahorses in Asia. Net exporters of dried seahorses included India, Indonesia, Malaysia, the Philippines, Thailand and Vietnam. Net importers of dried seahorses included China, China – Hong Kong SAR, China – Taiwan, Province of China and Singapore. Each expert synthesized information into an individual report that included key recommendations, and we then compiled all ten reports into an edited volume available at https://projectseahorse.org/resources/national-implementation-of-cites-for-seahorses (Foster 2022).

This document summarises the findings of the ten individual reports, highlighting common challenges and opportunities, and makes overarching recommendations in support of CITES implementation for dried seahorses. It is intended to create positive momentum for improving the sustainability and legality of the dried seahorse trade, while at the same time enhancing CITES engagement with all marine taxa listed on Appendix II.

2. Methods/Strategy

Jurisdictions

- Net exporters (jurisdictions that have been documented to export far more dried seahorses than they import) included India, Indonesia, Malaysia, the Philippines, Thailand and Vietnam. Net importers (jurisdictions that have been documented to import far more dried seahorses than they export) included China, China – Hong Kong SAR, China – Taiwan Province of China and Singapore (Vincent *et al.* 2011, Foster *et al.* 2016).
- The geographical designations employed in this document do not imply the expression of any opinion whatsoever on the part of the authors concerning the legal status of any country, territory, or area, or concerning the delimitation of its frontiers or boundaries.
- We present information for China, including Hong Kong SAR and Taiwan, Province of China. Hong Kong SAR of China has its own implementing CITES Authorities that are designated by China, and submits separate annual reports to CITES (such that trade with Hong Kong SAR is recorded separately in the CITES trade database). China, as a Party to CITES, has not designated a separate Management Authority in its Taiwan Province.

Project management

- This project was led by Project Seahorse, which hosts the IUCN SSC Seahorse, Pipefish and Seadragon Specialist Group.
- The CITES Secretariat has drawn on Project Seahorse technical and scientific expertise since 2000, with Project Seahorse serving as Chair of the CITES Syngnathid Working Group and the CITES Seahorse Working Group for their entire durations. Working in partnership with national CITES Authorities, Project Seahorse staff have carried out research on seahorse distribution, biology, fisheries and trades; they developed the first guidelines to making non-detriment findings (NDFs) for any marine fish under CITES (with EC funding through the CITES Secretariat); they co-organized three workshops on making NDFs for seahorses (in the Philippines, Thailand and Vietnam – the latter two with EC funding through the CITES Secretariat). They have also been key technical advisors on all seahorse Decisions adopted by the Parties, including those adopted at CoP18.

Data collection

- To generate information for the study, Project Seahorse worked with national experts in net exporting and importing jurisdictions for dried seahorses in Asia to document trade controls and understand how such controls are being implemented and/or enforced. The experts and their affiliations are listed in Table 1. All experts were nationals of their respective jurisdictions, spoke one or more national languages, and had extensive experience in investigating and/or managing exploitation and trade of marine species, whether seahorses or other taxa.
- The expert consultants elicited information (in person or through teleconferencing, much of it informal or narrative) from individuals based in government, line agencies, non-governmental organizations, community groups and academic institutions. Interviews are summarised in Table 1. The vast majority of interviews were carried out remotely because of restrictions resulting from the COVID 19 pandemic.

- Interviews were semi-structure in nature. Expert consultants were guided in their questioning by a report outline generated by Project Seahorse in consultation with the CITES Secretariat. This synthesis is structured according to that same outline.
- Experts supplemented information from interviews with information obtained through their own experience – many had previously worked with seahorse fisheries and/or trade – and that garnered from available data and/or reports.
- Each expert synthesised all available information into a jurisdiction-specific report that included key recommendations. Our project thus generated ten reports, one for each of China, China – Hong Kong SAR, China – Taiwan, Province of China, India, Indonesia, Malaysia, the Philippines, Singapore, Thailand and Vietnam. Each completed report averaged about 11,000 words each, and provided insights into government approaches to CITES implementation for seahorses, and other marine species, in each jurisdiction. The ten reports have been compiled into an edited volume available at https://projectseahorse.org/resources/national-implementation-of-cites-for-seahorses.

Table 1. The experts contracted to carry out the jurisdiction-specific analyses of CITES implementation for seahorses, and the number of interviews they carried out within each of the CITES Management Authorities (MA), CITES Scientific Authorities (SA), CITES Enforcement Focal Points (EFP) and other relevant stakeholder groups.

Jurisdiction	Expert & affiliation	Expert biography	Number of interviews			
			MA	SA	EFP	Other
NET EXPORTERS						
India (IN)	**Tanvi Vaidyanathan, PhD** Project Seahorse, The University of British Columbia, Canada	Dr. Vaidyanathan is an Indian from Tamil Nadu, who has worked extensively on marine management and conservation in India over the past 15 years. Over nearly the last decade, her focus has been on understanding the seahorse fisheries and trade along mainland India, with a focus on the southern state of Tamil Nadu. She earned her PhD with Project Seahorse at The University of British Columbia and is a member of the IUCN SSC Seahorse, Pipefish & Seadragon Specialist Group.	1	4	0	2 (NGO) 1 (lawyer) 2 (scientists)
Indonesia (ID)	**Yudi Herdiana** Independent consultant	Mr. Herdiana is an Indonesian with more than 17 years of experience working on marine and fisheries issues in Indonesia, especially on marine protected areas and sustainable fisheries management. He was involved in assisting the development of Wildlife Conservation Society Indonesia's sharks and rays program, developing conservation actions and supporting CITES management for listed species.	4	2	1	0
Malaysia (MY)	**Adam Lim Chee Ooi, PhD** Save our Seahorses Malaysia	Dr. Lim is a Malay national with 13 years expertise in syngnathid research and conservation. He is the Chairperson for Save Our Seahorses (SOS) Malaysia, and is a member of IUCN SSC Seahorse, Pipefish and Seadragon Specialist Group for which he serves as the Regional Focal Point for Southeast Asia and Focal Point for *Hippocampus kuda* and *Hippocampus comes*.	8 (individuals represented both MA and SA)		0	1 (NGO)

Jurisdiction	Expert & affiliation	Expert biography	Number of interviews			
			MA	SA	EFP	Other
Philippines (PH)	**Charity Mae Apale, MSc** Zoological Society of London – Philippines	Ms. Apale is a Filipina biologist based at the Zoological Society of London (ZSL) - Philippines. She has eight years of experience in marine and terrestrial conservation in the Philippines, including building a national network of community seahorse scientists (with Project Seahorse), supporting national implementation of CITES for seahorses, contributing to community-based marine protected area establishment, and serving as a member of the Philippines Aquatic Red List Committee. She is also a member of the IUCN SSC Seahorse, Pipefish and Seadragon Specialist Group.	6 (one of which also represented an SA and EFP, and one of which also represented an EFP)	1	1	1 (NGO) 1 (IGO)
Thailand (TH)	**Petch Manopawitr, PhD** Technical Advisor, Zoological Society London – Thailand; Secretary-General, Green World Foundation; Advisor, Department of Marine and Coastal Resources	Dr. Manopawitr is a Thai scientist with over 20 years of experience working in biodiversity conservation, environmental protection and sustainability with both national and international organisations in Thailand and Southeast Asia. He has worked with WCS Thailand as Deputy Director, WWF Thailand as Conservation Director, IUCN as Deputy of Southeast Asia Group and currently serves as technical advisor for ZSL Thailand, WCS Thailand, and the Department of Marine and Coastal Resources on the issue of marine protected areas and marine conservation.	4	7	0	3 (government representatives) 3 (academia)
Vietnam (VN)	**Nguyen Manh Ha, PhD** Center for Nature Conservation and Development, Hanoi, Vietnam	Dr. Ha is a Vietnamese national with extensive experience in wildlife trade and combatting wildlife crimes in the region. In the last 20 years, he has been involved in the planning and management of Vietnam's protected area system and involved in the development of Vietnam's key laws and policies on biodiversity and forestry. In last five years, he has actively worked to support the government and NGOs to improve natural resource governance, biodiversity conservation, protected areas management, and especially to counter wildlife and forest crimes. He has led more than 20 research and conservation projects focused on endangered species.	3	5	6	3 (government representatives) 2 (fisheries experts) 7 (industry representatives)
NET IMPORTERS						

Jurisdiction	Expert & affiliation	Expert biography	Number of interviews			
			MA	SA	EFP	Other
China (CN)	**Xiong Zhang, PhD** Project Seahorse, The University of British Columbia, Canada	Dr. Zhang is a Chinese scientist who has conducted research on the biology and trade of seahorses and on bottom-trawl fisheries in China for more than eight years. He earned his PhD with Project Seahorse at The University of British Columbia, where he was also a postdoctoral fellow, and is a member of the IUCN SSC Seahorse, Pipefish & Seadragon Specialist Group.	1	2	4	1 (academia)
China – Hong Kong SAR (HK)	**Anita Kar Yan Wan** Sun Yat-sen University, Guangzhou, China	Ms. Wan is a Chinese native from Hong Kong SAR, with a background in wildlife conservation and anthropology. Over the past decade, she has conducted demand-side research of wildlife markets for the ornamental and traditional Chinese medicine trades in Southeast Asia and into/from China. She explores opportunities to encourage positive behaviour change for sustainable use. In 2017, Ms. Wan worked with Project Seahorse to conduct a market study in Hong Kong SAR, exploring the impact of international export bans on domestic supplies of dried seahorses.	3 (individuals from department that serves as the MA, SA and EFP)			2 (NGOs) 2 (foundations) 2 (academia)
China – Taiwan, Province of China (TW)	**Ting-Chun Kuo, PhD** Assistant Professor, Institute of Marine Affairs and Resource Management, National Taiwan Ocean University	Dr. Kuo is a fisheries scientist from Taiwan, Province of China, whose research interests include bycatch issues, mixed fisheries, fisheries ecography and wildlife trade. She has conducted research on the local and international trade of seahorses. Dr. Kuo serves on the endangered marine wildlife advisory committee of Taiwan, Province of China's Ocean Affairs Council and is a scientist delegate for ecologically related species in tuna-RFMOs. She earned her PhD with Project Seahorse at The University of British Columbia and is a member of the IUCN SSC Seahorse, Pipefish & Seadragon Specialist Group.	NA	NA	NA	4 (government representatives) 1 (industry representative) 1 (academia)

Jurisdiction	Expert & affiliation	Expert biography	Number of interviews			
			MA	SA	EFP	Other
Singapore (SG)	**Christina Choy** Independent consultant **Mei Lin Neo, PhD** Senior Research Fellow, Tropical Marine Science Institute, National University of Singapore	Ms. Choy is a Singaporean national who is passionate about sustainable, legal and equitable wildlife trade, and aspires to take an interdisciplinary approach to understand issues and inform management. Her award winning MSc dissertation was on the trade and supply chain of wedgefishes and giant guitarfishes in Singapore. She undertook a consultancy role for shark and ray conservation at Wildlife Conservation Society Singapore and has five years of experience as a Conservation Manager with the National Parks Board. Dr. Neo is a Singaporean marine ecologist, whose research mainly uses experimental approaches to study the interactions of marine organisms with the marine environment. She has been enamoured with the giant clams as her model species for the past decade, and remains steadfast in her mission to champion their conservation in Singapore and the region. Dr. Neo is also an avid science communicator of marine conservation issues in Singapore. Dr. Neo serves on the IUCN SSC Marine Conservation Committee.	3 (all three also represented the SA and EFP)	see MA	see MA	2 (Customs) 3 (government representatives) 3 (academia) 2 (NGOs)

Notes about the results

- This report is focused on the trade in dried seahorses, which comprises the vast majority of the seahorse trade. Complementary work on the trade in live seahorses is available as Foster *et al*. (2021).
- We have used ISO Alpha-2 country codes throughout the results, as these are familiar in the CITES context: CN – China; ID – Indonesia; IN – India; HK – Hong Kong SAR; MY – Malaysia; PH – Philippines; SG – Singapore; TW – Taiwan, Province of China; TH – Thailand; VN – Vietnam.
- Individual reports by jurisdiction are indicative rather than exhaustive in their exploration of CITES implementation for seahorses. We anticipate many challenges and opportunities that are not included in the individual reports. As a result, this summary raises issues even if they were only mentioned in one or two reports, where it was reasonable to assume that the issues might apply more widely.
- It is particularly important to note that the list of legislation specific to seahorses and the list of other relevant legislation in the tables supporting Sections 6.4 and 6.5, are not exhaustive. These lists provide a starting point for understanding the national situation in each jurisdiction, but the information needs to be expanded in further dialogue with governments.
- The recommendations in this report are intended to complement the Decisions adopted at CoP18 (Annex I). We have generated a continuous list of recommendations (compiled in Annex II), responding to challenges as they arise in each section, but have highlighted a short list of priority recommendations in Section 7.
- Overall, the individual reports and this summary are intended to support future action by CITES on seahorses, in the form of *inter alia* Decisions to be adopted at CoP19, future capacity building efforts, tool development and research efforts. It is also envisaged that the results of this study will be discussed at a technical workshop or consultation process to be held in the latter half of 2022.

Results

Throughout the results we provide summary comments, each section supported by direct quotes that we have extracted from the reports on the ten jurisdictions. These reports can be found in Foster (2022). We have chosen not to attribute the quotes in this summary to particular jurisdictions. Our intention here is to improve implementation in general rather than to single out individual jurisdictions.

3. The actors

Summary

CITES Management Authorities (MAs), Scientific Authorities (SAs), Enforcement Focal Points (EFPs) and other bodies relevant to CITES implementation are summarized by jurisdiction in Table 2. The table only includes those Authorities and other relevant bodies included in the jurisdiction specific reports, so the information for each jurisdiction may not be exhaustive. CITES lists national Authorities on its website at https://cites.org/eng/parties/country-profiles/national-authorities. ***The information in this report is intended to complement, not replace, the information available on the CITES website***.

Most national CITES Authorities responsible for seahorses were positioned either within terrestrially-focused government bodies, or within government bodies whose main mandate is fisheries production. Other key challenges included competing priorities within single Authorities – this was particularly true for Enforcement Focal Points (EFPs) which focused on human and drug trafficking as well as illegal wildlife trade – along with insufficient human and financial capacity, poor coordination among Authorities within a single jurisdiction, and poor coordination among Authorities and key stakeholders (fishers, traders, consumers).

Details

Management Authorities (MAs)

- Five jurisdictions included in this study were reported to have MAs with marine expertise: CN, ID, MY, PH and TH.
- The MA reported for the other four jurisdictions has its main mandate in terrestrial affairs: HK, IN, SG, VN.
- Only two jurisdictions, PH and TH, were reported to have an independent MA with marine expertise.
- Reports indicated that the marine-focused MAs within CN, ID and MY played a supporting role to the principal MA, which retains ultimate decision-making authority. In all three cases the principal MA has its main mandate in terrestrial affairs.
    - For one Party this "means aquatic/marine species are being given less concern in management, and leads [the main MA] to pass the buck to [the marine MA] which lacks the true authority or capacity to implement CITES policies and mainly provides technical support."
- All five jurisdictions with a marine focused MA (CN, ID, MY, PH, TH) reportedly have the MA positioned within agencies/departments where the main mandate is fisheries production and not ocean/marine species conservation. We present some extracts from the reports to highlight this point, as captured by the expert consultants:
    - "So far, seahorses have not become a priority species to be managed [in country] either through CITES mechanism or capture fisheries management because of (i) overlapping Authority in the management of seahorses between the [two management Authorities]; (ii) the large number of species that must be managed through the CITES mechanism under the [primary MA] meant that they put less priority to marine species; and (iii) limited data and information of seahorse population status and its trade."
    - "[The MA] is responsible for all aspects of marine governance… – extraction, species protection, protected areas – each with varying priorities. Hence as a problem, it can be difficult to prioritize species protection within such capacity."
    - "The government should reconsider placing protection-based management under an independent agency to increase efficiency and communication."
    - "[The CITES MAs] have several mandates which mean that people working in the agencies are focused on numerous priorities simultaneously. Unless it's a personal priority for someone working at the agency, championing seahorse conservation will not be a top priority. Thus, external factors are needed to push the conservation agenda for seahorses."

Scientific Authorities (SAs)

- Six jurisdictions included in this study were reported to have SAs with marine expertise: IN, MY, PH, SG, TH and VN. Only two were documented to have more than one SA with marine expertise: MY and PH.
- Only one Party, PH, was reported to have an SA with marine expertise that is independent of government; the SA is within an academic institution.
- No Party was reported to have an SA whose main mandate lay in ocean conservation (even though such bodies exist within some jurisdictions, e.g., ID, TH). Instead, all marine focused SAs were reported to have their main mandate in fisheries production.
- A dearth of SA capacity for marine species in general, and seahorses in particular, was highlighted as a concern in three reports:

- "The lack of an officially established, separated marine/fisheries SA is also a limitation. Addressing this limitation may facilitate technical support for decision making related to marine species by [the] MA."
- "No dedicated researcher or staff in [the SA is] working on seahorse. There is an urgent need to build capacity within the country to fulfil information gaps."

Enforcement Focal Points (EFPs)

- Seven jurisdictions included in this study were reported to have EFPs with marine expertise.
- All seven were reported to have multiple EFPs, and six reports claimed the multiple EFPs have overlapping mandates and lack coordination. This challenge was deemed especially problematic for marine species, for which extraction is policed by one set of bodies while trade is policed by another.
    - "After seahorses have entered the country, the illegal trade is managed by different authorities depending on the transportation approach (post package vs. freight) and trade mode [traditional vs. e-commerce]."
- The existence of several EFPs was declared a challenge in consolidating data on wildlife crimes (e.g. seizures) for four jurisdictions (see also Section 6.6).
- The issue of competing priorities within a single EFP was raised in one report. Competing priorities posed a challenge in prioritizing illegal wildlife trade (IWT) over drug trafficking, for example, and/or in prioritizing marine IWT over terrestrial IWT.
    - "Some divisions within agencies do not prioritise wildlife crime, including marine species, and do not treat it as a serious crime. As a consequence, enforcing wildlife laws is just a second priority next to enforcing laws of other commodities such as drugs or human trafficking."
- The mandate of EFPs with marine species expertise was reportedly centered on enforcing laws around extraction (i.e. fisheries regulations; CN, ID, MY, PH, TH, VN).
- For one Party with a legislated catch and trade ban, the fisheries agencies reportedly played no role in enforcement of the law.
    - "The [fisheries department] has no role whatsoever with regards to the implementation of the ban. The [fisheries department] only enforces rules of the [fisheries laws] and increasing fish production. The [seahorse catch] ban is technically enforced by the [forest department]."

Other CITES relevant bodies

- Six jurisdictional reports included information on other bodies relevant to national CITES implementation. Three of the six included fisheries/marine resource agencies/departments: HK, PH, TW.
- Four jurisdictions were reported to have coordination bodies/committees that support national CITES implementation: HK, IN, TH, VN. Marine representation was noted to be lacking in the membership for at least two of these (IN, VN).
    - For example, "The Vietnam-WEN [Wildlife Enforcement Network] serves as a coordination unit of the inter-agency network for combating wildlife trafficking in the country…Vietnam-WEN focuses on all wildlife and timber, including terrestrial and marine species, but it lacks representatives from fisheries authorities such as Vietnam Fisheries Resources Surveillance (a key force for Fisheries Resources protection) and the Coast Guard which is the key enforcement body on the sea. It is critical that these bodies be included in the WEN for it to be effective in combatting illegal trade in marine species."
- TW has agencies that act as equivalents to an MA, SA and EFP. The management and enforcement bodies reportedly do not have marine expertise, but the scientific body does.

Other relevant bodies

- Six jurisdictional reports included information on other bodies relevant to national CITES implementation. Five of the six included fisheries/marine resource agencies/departments: ID, IN, SG, TW, VN. One jurisdiction was reported to have a government body whose main mandate is marine conservation (TH) but highlighted that there could be greater cooperation with CITES Authorities.
- Just one jurisdictional report (HK) included NGOs as relevant to national CITES implementation, even though the contractors were explicitly asked about the role of NGOs in that respect.
- In HK, the Chinese Medicine Merchants Association collaborated with Project Seahorse to recommend voluntary standards and industry pledges to support sustainable legal trade of dried seahorses (e.g. size restrictions).

Capacity

- Human capacity within implementing Authorities was raised as a challenge in four jurisdictions. In some cases, inadequate staffing meant Authorities had to prioritize certain species and issues over others.
    - "…follow up actions for corrective measures have been slow due to limited capacity of the CITES Authorities."
    - "[There is a] need for awareness and training programs in marine species with EFPs."
- Financial capacity within implementing Authorities was raised as a challenge in three jurisdictions. This also meant Authorities had to prioritize certain species and issues over others.
    - "[Gaps include] human resource capacity and funding to build an effective CITES implementation under [the MA], including data collection, monitoring, surveillance and law enforcement."
    - Currently, there is no dedicated researcher or staff in [the CITES SA] working on seahorses. There is an urgent need to build capacity within the country to fulfil information gaps."
    - "[The CITES MA] does not have an internal plan for seahorses. They are relying on external catalysts…to provide funding and expertise... The reliance on external funding is a roadblock for moving the [country's] seahorse trade towards sustainability."

Coordination

- Coordination among Authorities was reported to be an issue when jurisdictions were divided into multiple regions with multiple Authorities (as in ID, IN, MY, PH). All four reports raised the question as to how these jurisdictions could reconcile national with state/provincial/municipal responsibilities, as appropriate.
    - "Given the number of agencies involved…there must be greater coordination between these agencies."
- A lack of communication among Authorities, especially EFPs, was raised in three reports.
    - "[Authorities] work in silo."
- A lack of communication between Authorities and other stakeholders (fishers, traders, and/or consumers) was raised in nine reports.
    - "Awareness of the conservation status of seahorses is low among [national] citizens, and policies regarding them were sometime ambiguous with little protection and trade management occurring in local areas."
- Coordination may have been less of a challenge in smaller jurisdictions, such as HK and SG, where one government body played multiple roles in CITES implementation. Coordination was also not raised as a challenge in TH, which has one government body serving as the MA, SA and EFP for marine species.

- In one jurisdiction, CN, coordination among Authorities used to be considered a challenge but the global COVID19 pandemic had reportedly led to “unprecedented cooperation” among authorities to prohibit IWT.
- Coordination among CN, HK and TW was raised as a challenge with respect to CITES implementation in each of those individual reports.
    - At present, trade from HK to CN and Macau SAR is subject to CITES regulations and licensing. HK Authorities reported that they regularly coordinate with Chinese governing bodies in both CN and Macau SAR to strengthen enforcement efforts. Joint capacity building workshops were reported to take place in order to share insights on latest efforts, intelligence, priorities and ways to strengthen border surveillance and coordination between agencies for improved CITES implementation. However, respondents from outside government suggested that coordination among Authorities is not systematic but sporadic in nature.
    - CN and TW were reported to manage CITES species independently. The intention is to hold annual coordination meetings but these appear not to have taken place since 2017. Seahorses have not been discussed in those meetings, according to published meeting reports.
    - In CITES data, imports into TW are reported by the exporting Party, and exports out of TW are reported by the importing Party.

Recommendations

1. Jurisdictions should take note of IUCN Resolution WCC-2020-Res-107 (Annex III) which calls on governments to “establish/strengthen a national ministry/department/agency with an explicit mandate for marine biodiversity conservation.” These bodies should play a central role in implementing CITES for marine species, or supporting the implementation of CITES for marine species if they are not the designated national CITES Authorities.
2. Existing national MAs and SAs with marine expertise need to have higher levels of staffing and funding to meet their obligations to the Convention.
3. EFPs that play a role in enforcing CITES should be fully trained in the identification and legal requirements applicable to marine species.
4. All jurisdictions need to improve inter-agency cooperation with respect to CITES implementation and data gathering.
5. CITES Authorities should formalize the role of species experts from civil society (academia, NGOs etc.) in implementing CITES at the national level.
6. CITES Authorities should raise awareness of seahorse trade and its role in conservation of the species with all stakeholders: fishers, traders, consumers, policy makers, enforcement agencies, judiciaries etc.

Table 2. CITES Management Authorities (MAs), Scientific Authorities (SAs), Enforcement Focal Points (EFPs) and other bodies relevant to national CITES implementation, as included in expert reports for net exporting and importing jurisdictions for dried trade in seahorses. Authorities are reported in the order they appeared in the reports. **Authorities/bodies in blue were reported to have a mandate related to marine fisheries and/or ocean conservation**. **The information in this table is not exhaustive**. CITES lists national Authorities on its website at https://cites.org/eng/parties/country-profiles/national-authorities. ***The information in this report is intended to complement, not replace, the information available on the CITES website.***

Jurisdiction	MAs	SAs	EFPs	Other CITES relevant bodies	Other relevant bodies
NET EXPORTERS					
India (IN)	Directorate of Wildlife Preservation, Ministry of Environment, Forests and Climate Change Wildlife Crime Control Bureau (north, east, south and west)	**Central Marine Fisheries Research Institute** Wildlife Institute of India Zoological Survey of India	Wildlife Crime Control Bureau	"CITES cell"	State Forest Departments **State Departments of Fisheries** Customs Directorate of Revenue Intelligence Central Bureau of Investigation
Indonesia (ID)	Directorate of Biodiversity Conservation, Ministry of Environment and Forestry (MoEF) **Directorate of Marine Biodiversity Conservation, Ministry of Marine Affairs and Fisheries (MMAF)** (MA since 2020, coordinates with MoEF)	Secretariat for the Scientific Authority of Biodiversity, Indonesian Institute of Sciences (LIPI)	Directorate General of Environment and Forestry Law Enforcement, MoEF **MMAF (Directorate General of Marine and Fisheries Resource Surveillance, MMAF** **Fish Quarantine Agency, MMAF** Agriculture Quarantine Agency, Ministry of Agriculture Directorate General of Customs		Natural Resources and Conservation Agency, MoEF **Coastal and Marine Resources Management Agency, MMAF**
Malaysia (MY)	Ministry of Energy and Natural Resources (KeTSA) **Department of Fisheries Malaysia (DOFM;** peninsular Malaysia) Sarawak Forestry Corporation (SFC) **Department of Fisheries Sabah** Johor Biotechnology & Biodiversity	KeTSA **DOFM** **Department of Fisheries Sabah** **Fisheries Research Institute** (peninsular Malaysia) SFC **Fisheries Research Institute Sarawak**	KeTSA Interpol Malaysia, Royal Malaysian Police **Fishery Capture & Licensing Division, DOFM** SFC		**Fisheries Development Authority of Malaysia** Malaysian Quarantine & Inspection Services Royal Malaysian Customs Malaysian Maritime Enforcement Agency

Jurisdiction	MAs	SAs	EFPs	Other CITES relevant bodies	Other relevant bodies
MY cont.	Perak States Park Corporation	**Department of Fisheries Sabah** Johor Biotechnology & Biodiversity Perak States Park Corporation			
Philippines (PH)	Biodiversity Management Bureau, Department of Environment and Natural Resources **Aquatic Wildlife Regulatory Section, Bureau of Fisheries and Aquatic Resources (BFAR), Department of Agriculture** Palawan Council for Sustainable Development Staff	**BFAR** **National Fisheries Research and Development Institute, Department of Agriculture** **Marine Science Institute, University of Philippines** University of Philippines Visayas National Museum	**BFAR** PCSDS (Palawan only) Environmental Crime Division, Department of Justice-National Bureau of Investigation (DOJ-NBI) Environmental Protection Unit, Department of Finance-Bureau of Customs **Aquatic Wildlife Enforcement Officers** **Aquatic Wildlife Traffic Monitoring Units** Wildlife Traffic Monitoring Units (Palawan only)	**Regional Fisheries Inspection and Quarantine Service, BFAR – 15 regional field offices** **Philippines Aquatic Red List Committee (PARLC)**	
Thailand (TH)	Department of National Parks (DNP), Wildlife and Plant Conservation, Ministry of Natural Resources and Environment **Fisheries Resources Management and Measures Division, Department of Fisheries (DOF)**, Ministry of Agriculture and Cooperatives	**Fisheries Resources Conservation and Convention Group, Fisheries Resources Management and Measures Division, DOF**	**Fish Quarantine and Inspection Division, DOF** Royal Customs Department Natural Resources and Environmental Crimes Suppression Division of the Royal Thai Police Bureau DNP	National committee to oversee CITES implementation	Department of Marine and Coastal Resources (DMCR)
Vietnam (VN) **VN cont.**	Vietnam Administration of Forestry, Ministry of Agriculture and Rural Development (MARD)	Vietnamese Academy of Forest Sciences, MARD **Research Institute for Marine Fisheries (RIMF), MARD** Vietnam University of Forestry, MARD Institute for Ecology and Biological Resources	Forest Protection Department, Forestry Administration, MARD **Department of Fishery Surveillance, Fisheries Administration, MARD** Customs, Ministry of Finance	Vietnam Wildlife Enforcement Network	**Fishery Administration, MARD** **Marine Surveillance Department, Fisheries Administration, MARD** Forest Protection Department, Forestry Administration, MARD **Provincial Fishery Departments**

Jurisdiction	MAs	SAs	EFPs	Other CITES relevant bodies	Other relevant bodies
			Environment Police, Ministry of Public Security Border Guard, Ministry of National Defense **Coast Guard, Ministry of National Defense** Market Surveillance Department, Ministry of Industry and Trade		
NET IMPORTERS					
China (CN)	Endangered Species Import and Export Management Office, National Forestry and Grassland Administration **Division of Fishery Resource and Environment Protection, Ministry of Agriculture and Rural Affairs**	Endangered Species Scientific Commission), Institute of Zoology, Chinese Academy of Sciences Judicial Expertise Centers for wildlife identification	Anti-smuggling Inspection Bureau, General Administration of Customs & Ministry of Public Security **Integrated Marine Law-Enforcement Team, China Coast Guard,** **Chinese Armed Police Force** Law-enforcement & Inspection Bureaus, State Administration for Market Regulation Cyber Police & Traffic Police & Criminal-law Enforcement Team of Forest Police, Ministry of Public Security People's Procuratorates People's Courts		

Jurisdiction	Mas	SAs	EFPs	Other CITES relevant bodies	Other relevant bodies
China – Hong Kong SAR (HK)	Endangered Species Protection Division, Agriculture, Fisheries and Conservation Department (AFCD)	Endangered Species Protection Division, AFCD	Endangered Species Protection Division, AFCD Customs and Excise Department	Inspection & Quarantine, AFCD **Fisheries Branch, AFCD** Hong Kong Police Force Hong Kong Department of Justice	Country and Marine Parks, AFCD Endangered Species Advisory Committee (government committee for all threatened species, not just CITES) HK Wildlife Trade Working Group (experts from civil society – NGOs and academia) TCM associations such as the Chinese Medicine Merchants Association
China – Taiwan, Province of China (TW)	NA	NA	NA	Bureau of Foreign Trade (management agency) Council of Agriculture (Conservation Division, Forestry & **Ocean Affairs Council, Ocean Conservation Administration**) (scientific agencies) Examination Agency (enforcement agency)	Fisheries Agency Society for Wildlife and Nature (NGO)
Singapore (SG)	Wildlife Trade, National Parks Board (Nparks)	National Biodiversity Centre, Nparks (**has a Coastal and Marine branch**)	Singapore Customs Immigration & Checkpoints Authority		Singapore Food Agency (operates two fishery ports and administers the Fisheries Act)

4. History of trade research and CITES activity

- The documented engagement of these ten jurisdictions in seahorse trade, pre-CITES and post-RST, is summarised in Table 3.
- All jurisdictions played a major role in the dried seahorse trade before the CITES listing, hence their inclusion in this report.
- One jurisdiction, ID, took out a reservation on the seahorse listing in 2002, although they must still meet CITES obligations except when they trade with other Parties with reservations (Japan, Norway, Palau and South Korea) or with non-Parties.

- **Net exporters**
    - All net exporting jurisdictions have trade bans/suspensions in place (further details in Section 5), but illegal exports have been detected from all six sources, as follows:
        - ID (volumes unknown)
        - IN (large volumes recently documented, also large-scale catch violations)
        - MY (volumes unknown)
        - PH (large volumes recently documented, also large-scale catch violations)
        - TH (volumes unknown)
        - VN (large volumes recently documented, also catch violations)
    - In-country trade surveys have been carried out by Project Seahorse post-listing and within the last ten years, in four countries: IN (2015-2017), PH (2019), TH (2012-2014) and VN (2016-2017). Such surveys were after the national trade bans for IN and PH, and before the declared national trade suspensions for TH and VN.
    - We do not have post-listing in-country trade survey data for ID or MY.
    - Traders surveyed in HK in 2017 reported all six net exporters in our study as among the top ten important sources of dried seahorses in trade (Foster *et al.* 2019).
    - Experts summarized the history of seahorse research, capacity building, national and CITES action, for all net exporting jurisdictions (Figure 1).
        - There has been prolonged intervention in most jurisdictions. Most research and capacity building has been driven by external actors.
        - The timelines support the need for updated research on seahorse fisheries and trade in ID, in particular.

- **Net importers**
    - Illegal imports have been detected into CN (volumes unknown) and HK (large volumes recently documented).
    - The recent role of SG and TW in the dried seahorse trade is unknown, as there has been no local trade research carried out since 2000.

Recommendations

7. Given the unreliability of formal data, jurisdictions should ensure access to up-to-date trade research in collaboration with species experts. The following jurisdictions need new trade field surveys: CN, HK, ID, MY, SG and TW. Sufficient baseline information exists in the other jurisdictions on which to base adaptive management plans in support of CITES implementation.

Table 3. Engagement of net exporting and importing jurisdictions in the **dried** seahorse trade just before the genus was listed on CITES Appendix II, and the most recent understanding. *Details of trade suspensions/bans in Table 4.

Jurisdiction	Pre-CITES	Most recent understanding
NET EXPORTERS		
India (IN) Catch and trade banned since 2002*	Pre-CITES, India was amongst the top four exporters of seahorses in international trade, most of them derived from non-selective fishing gears operating in Tamil Nadu state, particularly in the Palk Bay and Gulf of Mannar regions. Dried seahorse exports were estimated to be as high as 12 t (~3.1 million individuals) in 1999-2000 (Perry *et al.* 2020) and 9.75 t (~2.5 million individuals) in 2001-2002 (Salin *et al.* 2005). Across all time periods, most seahorses in India were exported, with few consumed domestically.	Studies carried out between 2015 and 2017 revealed that seahorse extraction continued in large numbers after the CITES App II listing. Estimates placed national seahorse catches at 13 million seahorses annually at that time, almost all from non-selective fishing gears (Vaidyanathan *et al.* 2021a). Catch and trade was largest in the state of Tamil Nadu, primarily in the Palk Bay region with around 10 million seahorses caught annually, between 2015 and 2017, from that state alone. While tracking the trade is challenging because it is illegal, trader interviews suggested at least 1.6 t (~740,000 individuals) and as much as 11- 30 t (~3.4 to 9.2 million individuals) were exported from India each year in 2015-2017 (Vinod *et al.* 2020, Vaidyanathan *et al.* 2021b). Hong Kong SAR Customs data report dried seahorse imports from India as recently as 2012. Traders surveyed in Hong Kong SAR in 2017 reported India among the top ten most important sources of dried seahorses in trade (Foster *et al.* 2019a).
Indonesia (ID) Exports suspended in 2009*	The pre-CITES seahorse trade was large and complex, both domestically and for export. In-country surveys were used to assess the seahorse trade in Indonesia from 1999 to 2001 (Perry *et al.* 2005). Indonesia was a significant consumer of dried seahorses, using an estimated 21.9 tonnes annually for traditional medicines (~8 million individuals), mostly for traditional Indonesian Jamu medicine, but also for traditional Chinese medicine (TCM). Seahorses were caught by fishers throughout Indonesia, in both target and incidental fisheries. Dried seahorses were exported to Hong Kong SAR, South Korea and likely Malaysia and Singapore, with additional exports of seahorse-based Jamu medicines to the latter two countries. Hong Kong SAR Customs data reported importing a total of ~280,000 dried seahorses from Indonesia during 2000-2002, Taiwan, Province of China Customs data reported importing a total of ~390,000 dried seahorses from 1988-2003, and China Customs data indicate total imports of ~760,000 dried seahorses and pipefish from 1993-1999.	Hong Kong SAR Customs data reported total imports from Indonesia of ~275,000 dried individuals across three years (2004, 2007 and 2009) and Taiwan, Province of China Customs data reported importing a total of ~300,000 dried seahorses from 2004-2007. Traders surveyed in Hong Kong SAR in 2017 reported Indonesia as the third most important source of dried seahorses in trade (Foster *et al.* 2019a).

Jurisdiction	Pre-CITES	Most recent understanding
Malaysia (MY) Exports suspended in 2009*	In 1998, exports of dried seahorses from peninsular Malaysia primarily went to Thailand while exports from Sabah were destined for China (including Hong Kong SAR and Taiwan, Province of China) and Singapore (Perry *et al.* 2010). While the survey could not estimate the overall export volume of seahorses from Malaysia, Customs statistics from Hong Kong SAR and Taiwan, Province of China suggested Malaysia's importance as a source of dried seahorses: Hong Kong SAR data indicated imports of 40 kg (~12,500 individuals) of dried seahorses from Malaysia in 2003 and 985 kg (~310,000 individuals) in 2004; Taiwan, Province of China reported importing 64 kg (~20,000 individuals) of dried seahorses in 1997 and 302 kg (~95,000 individuals) in 1998. In addition to being a notable exporter of seahorses in 1998, Malaysia was reported to consume approximately 3000 kg of seahorses in TCM (~960,000 individuals). All seahorses captured in Malaysia were obtained as bycatch in non-selective and destructive fishing gears (Choo & Liew 2005, Perry *et al.* 2010).	Hong Kong SAR Customs data report dried seahorse imports from Malaysia as recently as 2018. Traders surveyed in Hong Kong SAR in 2017 reported Malaysia as among the top ten most important sources of dried seahorses in trade (Foster *et al.* 2019a).
Philippines (PH) Catch and trade banned since 2004*	Fisheries and trade surveys were carried out across the Philippines in the early 2000s (Pajaro & Vincent 2015). Fishers in the survey areas were estimated to land 5 million seahorses (2 – 8 million) annually. The vast majority of seahorses (~4.2 million individuals) were caught by small-scale fishers targeting seahorses, collecting them by hand while free diving or compressor diving, or in scoop or push nets. An estimated 800,000 seahorses were also caught each year in non-selective gears, especially bottom trawls. Annual exports of dried seahorses were estimated at 4 million seahorses (2 – 6 million). Hong Kong SAR Customs data reported average annual imports of 3.1 million dried seahorses (range 1.5-6.2 million) from the Philippines between 1998-2004. Dried seahorses were most commonly exported from the Philippines for TCM, usually to China (including Hong Kong SAR and Taiwan, Province of China) and Singapore.	A survey of seahorse fisheries and trades carried out in 2019 estimated a total national catch of ~1.7 million individual seahorses per year across the surveyed gear type/province combinations (Foster *et al.* 2019b). The study found compressor diving – an illegal form of fishing in the Philippines – to be the primary source of seahorse landings in the Philippines, landing 54% of the total estimated catch. This was more than micro-trawls (also illegal, ~260,000 individuals), push nets (217,000 individuals) and spear/skin divers (~214,000 individuals) combined. Most landed seahorses were thought to be exported. Hong Kong SAR Customs data reported imports from the Philippines in 2006 (56,000 individuals) and 2010 (14,000 individuals; Foster *et al.* 2019b). Hong Kong SAR Customs data report dried seahorse imports from the Philippines as recently as 2015. Traders surveyed in Hong Kong SAR in 2017 reported the Philippines as the second most important source of dried seahorses in trade (Foster *et al.* 2019a).

Jurisdiction	Pre-CITES	Most recent understanding
Thailand (TH) Exports suspended in 2016*	Seahorse fisheries and trades were documented in Thailand in 1998-1999 (Perry *et al*. 2010). Seahorses were found to be landed primarily as trawl bycatch. Thailand's estimated catch of 6,600 kg year-1 (~ 2.5 million individuals) apparently far exceeded domestic consumption (~520 kg year-1 = 190,000 individuals). Thailand imported seahorses from and exported to other Asian nations. Trade surveys indicated that Thailand exported at least 5,000 kg annually (similar to the estimation of catch), but national Customs records reported 10,500 kg per year in exports (~1.9 million individuals), supported by official import records from Hong Kong SAR and Taiwan, Province of China which indicated that Thailand was the source of up to 11,400 kg year per year (4.2 million individuals).	In-country surveys carried out in 2012-2014 estimated that annual catches were more than threefold larger than previously documented, approximating 29 million individuals from all gears (Aylesworth *et al.* 2017). Three fishing gears – two commercial (otter and pair trawl) and one small-scale (gillnet) – caught the most individuals. Even though most seahorses were incidentally caught, dried seahorses were estimated to be worth US$26.5 million per year for Thai fishers (Kuo *et al.* 2018). While official data showed the export volume decreased after the implementation of CITES listing in 2005, stakeholders did not report a similar trend. The prices of seahorses were reported to be increasing. Traders surveyed in Hong Kong SAR in 2017 reported Thailand as the most important source of dried seahorses in trade (Foster *et al.* 2019a).
Vietnam (VN) Exports suspended in 2018*	Catch monitoring and surveys were used to assess the seahorse trade in Vietnam from 1995-1999 (Lourie *et al.* 1999, Giles *et al.* 2006, Meeuwig *et al.* 2006). Despite low daily catch rates, potentially 6.5 t of dried seahorses (~2.2 million seahorses) were taken annually as bycatch by trawlers operating out of five coastal provinces of Vietnam. Individual seahorse catches were collated by a few local buyers, who supplied wholesalers in three major markets: Ho Chi Minh City, Hai Phong City and Da Nang. Domestic consumption was small and most seahorses were exported, generally through unofficial and unregulated channels across the northern border into Guangxi province of China. Overall, the seahorse trade was of low economic value to Vietnam, but may have constituted an important source of income to upper level buyers and exporters.	Fisheries and trade surveys were conducted across eight coastal provinces from November 2016-January 2017 (Foster *et al.* 2017). Fishers reported catching seahorses from seven different types of fishing gear. Some divers and single trawls reported targeting seahorses directly, but most catch was incidental. Total national catch was estimated at ~16.7 million individual seahorses per annum with 85% from the southernmost province, Kien Giang. Pair trawls were estimated to land approximately 75% of Vietnam's total catch. Landed seahorses entered a complex trade, with large domestic consumption of seahorses in Vietnam for seahorse wine and tonics and considerable export. Traders surveyed in Hong Kong SAR in 2017 reported Vietnam as among the top ten most important sources of dried seahorses in trade (Foster *et al.* 2019a).

Jurisdiction	Pre-CITES	Most recent understanding
NET IMPORTERS		
China (CN)	Surveys carried out from 1999-2000 indicated that China was the largest consumer of seahorses, predominantly for use in traditional Chinese medicine (TCM; Kwan & Vincent 2006). Most seahorses were imported, and annual consumption of dried seahorses was estimated at 20-30 t (~7.4-11.1 million individuals). In the past, most seahorse imports reportedly passed through Hong Kong SAR, but by 2000 the importance of Hong Kong SAR as an entrepôt had diminished: supplies were increasingly received directly from source countries and particularly through cross-border trade with Vietnam. Export volumes were small compared to imports, varying from 0-2 t (0-~740,000 individuals) annually.	As there have been no on-the-ground trade surveys carried out since the CITES listing, information on China's trade in seahorses post-listing can only be deduced from the CITES trade database. According to CITES Trade Database for 2004-2011, mainland China was among the top consumers of dried seahorses (together with Hong Kong SAR and Taiwan, Province of China), with an annual reported import of 280,000 – 1.3 million individual dried seahorses (Foster *et al*. 2016). Although the top sources of seahorses imported into the region have been Asian countries (e.g. Thailand, Malaysia, Vietnam), a growing volume of seahorses (*H. algiricus*) were being imported from West Africa (Guinea, Senegal) to China, as Chinese commercial interests increased in the region. However, CITES data only reflect legal trade that is reported to CITES by Parties in their annual reports (UNEP WCMC 2013), which makes the true figure for China's seahorse consumption uncertain but likely much higher than the above estimation.
China – Hong Kong SAR (HK)	Surveys carried out from 1999-2000 indicated that Hong Kong SAR was a major entrepôt for ingredients of TCM, including seahorses. Hong Kong Customs began recording seahorse imports and exports in 1998. Local seahorses were apparently not targeted but obtained as bycatch and sold into the TCM market. Most seahorses for sale in Hong Kong SAR, however, were imported. According to Customs records, the territory imported 25 t (~9.3 million individuals) annually of dried seahorses from a variety of source countries between 2000 and 2004. Surveys suggest the official data provided a reasonable estimate of annual import volume, although most re-exports were not recorded. The vast majority of seahorses apparently came from Thailand and the Philippines, although a number of sources were cited in surveys and recorded in official data. A survey conducted in 2000 estimated annual domestic consumption of dried seahorses to be 6-7 t (~2.2-2.6 million individuals). The majority of imported seahorses were reportedly re-exported to mainland China.	Hong Kong SAR, is the largest known reported importer of dried seahorses (Foster *et al.* 2016). Hong Kong SAR is reported to have imported an annual mean of 6.2 million dried seahorses (range = 2.5 – 5.2 million) across 2004-2011 (Foster *et al*. 2019a). Hong Kong traders reported 22 countries as sources of dried seahorses in 2016–17; of these, traders most frequently reported Thailand as a source (Foster *et al.* 2019a). The Philippines, Australia, China (including Taiwan, Province of China), Indonesia, Vietnam, India, Malaysia and "Africa" [sic] rounded out the top ten most reported sources of dried seahorses.

China – Taiwan, Province of China (TW)	Taiwan, Province of China is a historically important consumer of dried seahorses, predominantly for use in traditional Chinese medicine (TCM). Project Seahorse trade research carried out in 2000 documented that although some consumed seahorses were obtained locally as bycatch, the majority were imported, primarily from Southeast Asia and mainland China (Kwan & Vincent 2006). Volume estimates obtained from traders suggested that annual domestic consumption may have exceed 10 tonnes (~37,000 individuals). Taiwan, Province of China's own Customs records analysed at that time suggested that between 1983 and 1987, 4-6 tonnes of dried seahorses were imported annually (~15,000 – 22,000 individuals). Recorded annual imports then increased to 7-12 tonnes between 1988 and 1998 (~26,000 – 45,000 individuals). Recorded exports were much lower, indicating that most imported seahorses were consumed locally.	As there have been no on-the-ground trade surveys carried out since the CITES listing, information on Taiwan, Province of China's trade in seahorses post-listing can only be deduced from the CITES trade database and Taiwan, Province of China's own Customs data. After seahorses were listed on CITES, Parties began to report their trade with Taiwan, Province of China – and the CITES trade data from 2004-2011 suggested much higher imports of dried seahorses into Taiwan, Province of China than documented in the 1980s and 90s. Indeed, Taiwan, Province of China ranked the second-largest importer of dried seahorses based on the declared trade volume in CITES trade database – supposedly importing between 179,000 and 1.8 million individual per year across the eight-year period (Foster *et al.* 2016). In contrast, Taiwan, Province of China's own Customs data, analysed in support of this study, report that the weight of declared seahorse imports has decreased dramatically since 2006, from about 7734 kg (~2.9 million individuals) per year before then to a mean of 483 kg (~180,000 individuals) per year from 2008-2018 (Kuo 2022). Thailand was recorded as the biggest source country of seahorses imported to Taiwan, Province of China, followed by the Philippines and Hong Kong SAR (presumably from re-exports). It is probable that the real trade volumes are higher than those in official datasets as seahorses are easily smuggled. However, TCM retailers reported that more recent import volumes are indeed much lower than in the past.
Singapore (SG)	Singapore was a major trade hub for seahorses, according to data from a trade study carried out by Project Seahorse in 1998 and 2000 (Perry *et al.* 2006). Singapore had a pivotal position as a distribution centre where dried seahorses may undergo re-packing before exiting the country. The study reported that Singapore imported dried whole seahorses from India, Indonesia and the Philippines, although one trader reported selling seahorses sourced from Singapore itself. According to the trade surveys, local businesses were also found to purchase dried seahorses from independent agents who had possibly hand-carried small quantities (about 1-2 kg) across borders from Indonesia to supply the retail stores and wholesale businesses in Singapore as often as every few months. Only a small proportion of the dried seahorses imported into Singapore were estimated to support domestic consumption (e.g., between 1,300 and 3,500 kg) while the remainder were reportedly re-exported to other jurisdictions such as China (including Hong Kong SAR and Taiwan, Province of China), and the United States.	As there have been no on-the-ground trade surveys carried out since 2000, information on Singapore's trade in seahorses post-listing can only be deduced from the CITES trade database (which were analysed in support of this study, Choy and Neo 2022). On the trade data regarding seahorses, Singapore has submitted its annual reports to CITES for all years through to 2019, comprising data between 2004 and 2018. Compared to earlier information, CITES recent data suggest that the country's importance as a seahorse trade hub has greatly diminished; for instance, there were no trade records for direct imports of dried seahorses between 2015 and 2018. Between 2016 and 2018, dried seahorses were reportedly not imported and there was only one documented re-export for commercial purposes.

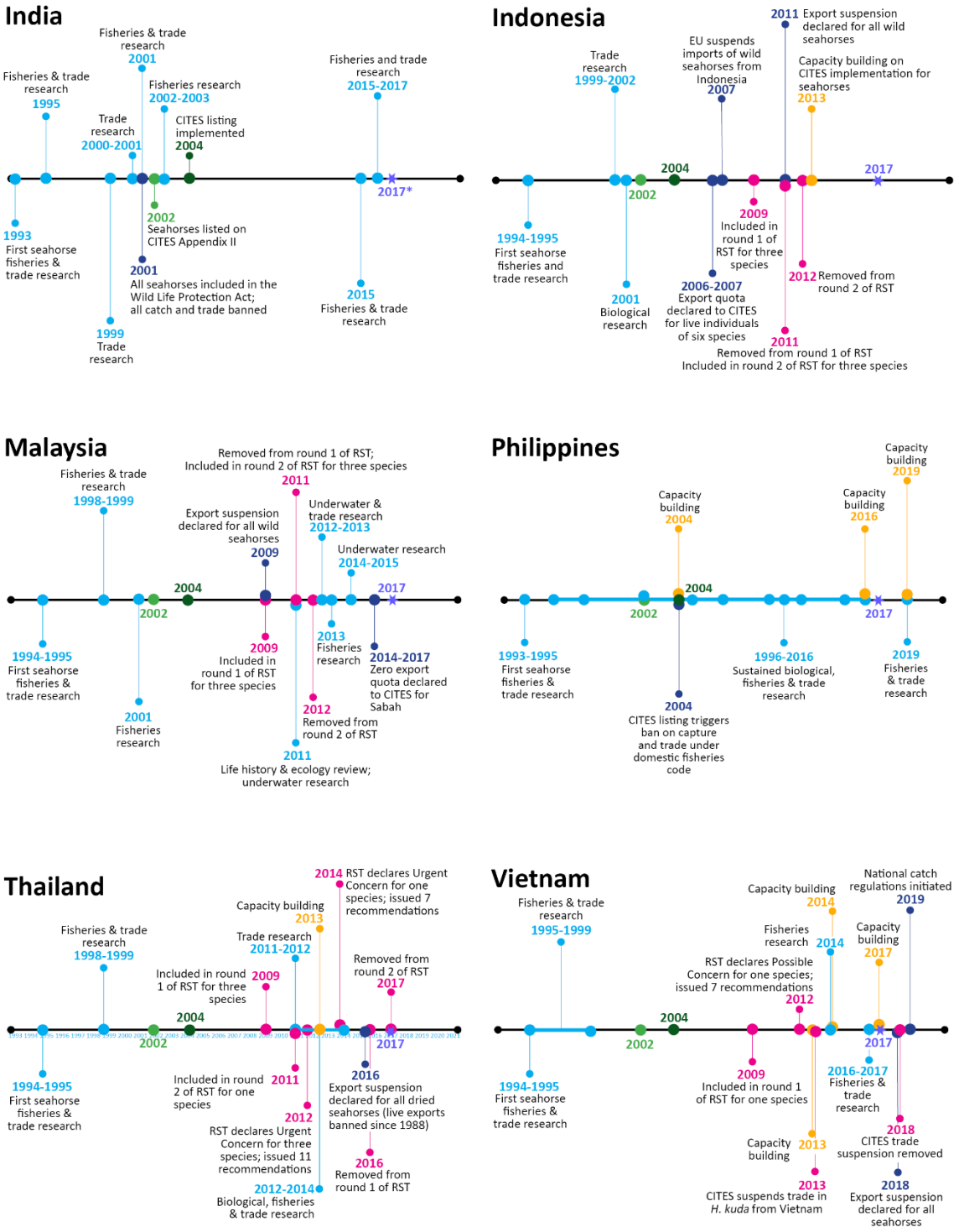

Figure 1. The history of seahorse activities and actions for all net exporting jurisdictions of dried seahorses. Light blue = research; dark blue = country interventions; pink = CITES interventions/decisions; yellow = capacity building; green = related to CITES listing; purple * = jurisdiction reported to be among top ten sources of dried seahorses into Hong Kong SAR (Foster *et al*. 2019).

5. Nature of export bans/suspensions

Summary

For each jurisdiction, we have compiled a partial list of rules relating to seahorse exports, their scope, and the reasons they were put in place (Table 4). Importing jurisdictions should find it valuable to consult these lists – which are not otherwise available – when deciding whether to accept shipments of seahorses. All net exporting jurisdictions included in this report have either banned (by law) or suspended (by declaration) seahorse exports.

- Two jurisdictions, IN and PH, have regulations banning both exploitation and trade of seahorses (all species, and all forms of catch and trade).
- One Party, TH, has a regulation banning export of live, wild seahorses (all species). TH also has a suspension on dried seahorse exports (all species).
- Three jurisdictions, ID, MY and VN, have declared export suspensions. For ID, export of wild live and all dried seahorses is suspended, but export of cultured live seahorses is allowed – although it is not clear if this includes CITES source codes F and C (F1 and F2+ generation, respectively), or just source code C. For MY and VN, the suspension applies to all seahorse species in all forms. All national suspensions were declared in response to the Party's inclusion in the CITES RST.

No jurisdiction was reported to be actively enforcing rules around seahorse fishing or trade. Indeed, jurisdictions appear to have declared the bans/suspensions and then turned their attention away from seahorses. Consequently, the main impact of the bans/suspensions has been on the legal trade, whereas illegal trade continued or increased (see also Section 4).

Table 4. Seahorse export bans/suspensions in effect for net exporting jurisdictions. For the purposes of this study a ban is by law, whereas a suspension is by declaration.

Jurisdiction	Rules	Date	Scope	Supporting regulations	Comments
SOURCES					
India (IN)	Export ban *Exploitation (all forms) and trade (all forms) banned*	2001	All species, dried and live, wild and cultured	Wild Life Protection Act (WLPA), 1972 – seahorses are listed on Schedule I, Part II(a) (marine fishes)	Seahorses added to the WLPA in response to early discussions of a CITES listing for seahorses.
Indonesia (ID)	Export suspension *Exports suspended until further notice*	2009	All species, dried and wild live	None	Suspension declared in response to Party's inclusion in the CITES Review of Significant Trade.
Malaysia (MY)	Export suspension *Exports suspended until further notice*	2009	All species, dried and live, wild and cultured	None	Suspension declared in response to Party's inclusion in the CITES Review of Significant Trade.
Philippines (PH)	Export ban *Exploitation (all forms) and trade (all forms) banned*	2004	All species, dried and live, wild and cultured	Republic Act 8850 Section 97: 2004-2015	Republic Act (RA) 8550 banned exploitation and trade in all CITES listed species, irrespective of the Appendix. It was revised in 2015 as RA10654, which restores the potential to legalize fisheries and trade if scientific assessment show such activities to be sustainable and a legal framework is put in place.

Jurisdiction	Rules	Date	Scope	Supporting regulations	Comments
				Republic Act 10654 Section 102b: 2015-present	
Thailand (TH)	Export ban	1988	All species, live, wild	Thai Goods Export and Import Act B.E. 2522	Act bans export of all wild live marine fishes and sea snakes.
	Export suspension *Exports suspended until further notice*	2016	All species, dried	None	Suspension eventually declared in response to Party's inclusion in the CITES Review of Significant Trade after its initial efforts to meet recommendations.
Vietnam (VN)	Export and import suspension *Exports and imports suspended until further notice*	2018	All species, dried and live, wild and cultured	None	Suspension declared in response to Party's process in the CITES Review of Significant Trade after CITES recommended a trade suspension of one species (*H. kuda*) in 2013.

Details

Export bans

- In 2001, IN added seahorses to Schedule I Part II(a) of its Wild Life Protection Act (WLPA) 1972. The inclusion of seahorses under Schedule I of the WLPA came at a time CITES was actively considering including seahorses under Appendix II, and while IN was part of the CITES Syngnathid Working Group during 2000-2002. Removing the current catch and trade bans would require removing seahorses from Schedule I of the WLPA. According to the IN report, this has only been done once before; edible-nest swiftlets were down listed from Schedule I with the objective of allowing local communities, whose livelihoods were dependent on the collection of these nests, to harvest the nests commercially, thereby preventing the poaching of the nests which often resulted in the death of the fledglings therein. The local collectors were employed by the government to monitor and protect nests from poachers until the end of the breeding season. Nests from protected caves could be harvested only after fledgling of at least one brood, in contrast to the multiple times they were harvested before the ban was lifted.
- When seahorses were listed on CITES Appendix II, the PH Fisheries Code (RA 8550) banned exploitation and trade in all CITES listed species – irrespective of Appendix. Thus, this law took effect for seahorses as soon as the CITES listing was implemented, in May 2004. In 2015, PH updated its fisheries law to include provisions for legalizing catch and trade of Appendix II listed CITES species if scientific assessments can show they are sustainable, and a legal framework is put in place. At the time of writing, this had not yet been done for seahorses… and catch and trade remained illegal.
- The export of live, wild seahorses has been banned in TH since 1988. Research in support of this study suggested this is in line with the Thai Goods Export and Import Act B.E. 2522, which – according to a legal officer within the Thai CITES Management Authority – prevents the live export of all wild-caught marine fishes and snakes.

Export suspensions

- All four jurisdictions with suspensions (ID, MY, TH, VN) put them in place in response to the Party's inclusion in the CITES RST.

- Respondents interviewed for this study reported that the rationale for all suspensions was the jurisdictions' inability to make NDFs, due to a lack of information and capacity, but also because the NDF framework for seahorses was considered too onerous.
    - "This policy was taken due to limited data on population, trade, and mechanisms for seahorse trade surveillance at that time."
    - "During interviews, [CITES MA] respondents reported that the key challenge they face in implementing CITES for seahorses lies in the limited capacity of the CITES Management and Scientific Authorities to conduct a detailed study of seahorse populations, which [the MA] sees as an important baseline for NDF to allow sustainable trade."
    - "There was some discussion between CITES MA and [fisheries authorities] on implementing an NDF for seahorse – but there is no concrete plan [to collect information on seahorse catch and trade] and there is no funding available for NDF implementation."
- In all cases the suspension could be lifted by the jurisdiction's own CITES MA without that Party re-entering RST, although both TH and VN must obtain agreement from the Secretariat and AC Chair for any proposed change in its export suspension, providing a justification, as per Resolution Conf. 12.8 (Rev. Cop17) paragraph 1(k)(i): "in the case where a species/country combination was removed from the review process on the basis of the establishment of an interim precautionary export quota (including a zero export quota) in the place of implementing the recommendations, any change to this quota should be communicated to the Secretariat and Chair of the relevant Committee along with a justification, for their agreement."

Other findings

- Respondents interviewed from four jurisdictions, ID, PH, TH and VN, expressed an interest in lifting the export bans/suspensions. However, this position wasn't shared across all Authorities or bodies within each jurisdiction.
- No jurisdiction was reported to be putting an explicit focus on enforcing rules around seahorse fishing or trade. Instead, for all jurisdictions, enforcement was reported to be opportunistic or happenstance.
- No jurisdiction was reported to be monitoring trade to ensure the ban/suspensions were being implemented to good effect.
- Only one jurisdiction, TH, was reported to be monitoring seahorse populations (through fisheries dependent and independent means), though results of the monitoring program have not been made available, and perhaps not even analysed.
- Jurisdictions appear to have declared the bans/suspensions and then turned their attention away from seahorses. As such the main impact of the bans/suspensions was on the legal trade, whereas illegal trade continued or increased (as has been recently documented for four net exporting jurisdictions, see Section 4).
- The bans/suspensions were reported to have led jurisdictions to set aside responsibilities for seahorse conservation, relying too heavily on the supposed benefits from a presumed end to trade:
    - "[The trade ban] has given a false sense of security to the conservation of these threatened marine fishes. In spite of widespread violations of the [regulations] for seahorse, three of the respondents interviewed stated that seahorses were afforded the strongest protection under [the regulations], which has stringent provisions, and therefore there was no need for any other measures."
    - "The ban is a double-edged sword, in which the illegal dried seahorse trade still occurs due to limited capacities of surveillance and law enforcement agencies, and the absence of specific regulation for seahorses."
    - "The ban has simply driven the trade from above ground to underground. In this way the ban creates more confusion and make seahorse populations more vulnerable because of unreported and unregulated trade that continues unrestricted because of poor enforcement."

Although we focused this section on net exporters, CN was also invited to respond to two rounds of the CITES RST for four seahorse species. In response to that review, CN declared an end to wild exports of all seahorse species starting in 2011 (UNEP WCMC 2012). It does not appear this ban was implemented, however, with both CITES data (www.trade.cites.org) and on the ground trade surveys (Foster *et al*. 2019) indicating that China continues as a source of dried seahorses in international trade.

Recommendations

8. Parties should inform the Secretariat of any national management measures that regulate or restrict international trade in seahorses; and how they are implementing and enforcing such measures for seahorses (in support of Decision 18.230a). The Secretariat should make a list of national measures available on the CITES website (in support of Decision 18.229b).
9. Jurisdictions should actively enforce any seahorse trade bans/suspensions they declare.
10. CITES should promote meaningful export regulation by scrutinizing and tracking all declarations of export suspensions made during the RST process, imposing sanctions for failures to enforce these suspensions.
11. Parties should share copies of their NDFs for seahorse exports with the Secretariat for posting on the CITES website to assist other CITES Parties (in support of CITES Decision 18.230).
12. Parties should ideally share copies of their LAFs for seahorse exports with the Secretariat for posting on the CITES website to assist other CITES Parties.

6. Understanding of seahorse fisheries, trade and bans

6.1. What do respondents understand/know about seahorse fisheries and trade?

Summary

We wanted to find out what respondents knew about seahorse fisheries and trade in their respective jurisdictions. This would help us understand whether Authorities had actually encountered and absorbed information, while also guiding us on what more was needed to help implement CITES effectively for seahorses. In our experience this understanding can be limited, as seahorses are neither considered a priority for CITES implementation among CITES Authorities, nor a fish of national importance among fisheries authorities.

National understanding about seahorse fisheries and trade seemed limited, even in jurisdictions where Project Seahorse had recently partnered with the CITES Authorities on research and planning (PH, TH and VN). Nonetheless, Authorities in most jurisdictions acknowledged the challenge of the illegal trade in dried seahorses, and provided insight into why it is so pervasive. The most commonly reported reason was a lack of government prioritization. Other reasons included the fact that most seahorses are obtained as bycatch, assumed benefits from trade outweigh perceived risks, the challenge of addressing the huge scale of the dried trade (in terms of volumes and traders), a lack of consultation/communication with key stakeholders (especially fishers/traders and enforcement bodies), and ongoing demand from consumer markets. It seemed that the bans/suspensions might not affect seahorse exporters either because they continued exports as usual or because they could export many other species to Chinese markets, like sea cucumbers and geckos.

Details

- CITES Authorities interviewed for eight jurisdiction reports recognized the challenge of the illegal trade in dried seahorses (CN, HK, ID, IN, MY, PH, TH and VN).
- SG CITES Authorities and TW trade authorities considered that their roles as a transit hub and net importer of seahorses, respectively, had diminished over time.
- Trade surveys for HK, IN, PH, TH and VN had been carried out in the last ten years, providing data in addition to formal trade records (see also Section 4).
- Trade survey for CN, ID, MY, SG and TW were last conducted before seahorses were listed on CITES, so that Authorities had to rely on official data and anecdotal understanding.
- Authorities in HK were aware of the trade suspension in TH specifically – as TH had always been the main source of seahorses into HK.

- Respondents for the jurisdiction reports provided insight into why the illegal trade in dried seahorses is so pervasive (more on this topic in Section 6.3):

- Lack of government prioritization (n = 7 jurisdictions).
  - Because seahorses are "bycatch species and don't contribute significant income for the community or value for the fishery sector, so the government has paid very little attention and dedicated very few resources for this group of fishes."
  - "Much of the discussed wildlife crimes tend to center on the high-profile wildlife such as elephant ivory and pangolin scales but there has been lesser attention on CITES-listed marine species (with the exception of sharks and rays). It is important that [the country] continues to enhance capabilities of detecting other smuggled wildlife."
  - "Enforcement authorities seemed more concern about the protected sea cucumbers than seahorses, and he could often fly under the radar."
  - "[Seahorses were of] low enforcement priority at a species level, due to the backlog of work needed for other endangered marine fish species."
- Most seahorses are obtained as bycatch (n = 3 jurisdictions). The vast majority of seahorses in dried trade are obtained as bycatch in nonselective fishing practices such as bottom trawls and gillnets. Indeed, target fisheries are the main threat in only one of the six net exporters (PH).
  - "[According to fishers,] seahorses were normally caught incidentally in their fishing gear, and were often dead by the time they pulled their net up, and therefore they did not see the point of throwing seahorses back."
- Benefits from engaging in illegal trade outweigh risks (n = 3 jurisdictions; see also Section 6.6).
  - "Poverty is main diver for continued catch and trade in spite of ban – [the money earned from] 1 kg dried seahorses [is] worth 75 kg [of] food fish; 6 sacks of rice."
  - "Trade was highly lucrative, and in the few years he had been part of the trade there had been a drastic increase in the export value of seahorses."
  - "Seahorse sales provided quite a sizeable supplemental income, particularly when target [species] catches were low, and therefore fishers were not willing to throw seahorses back despite the ban."
- Large scale trade is hard to manage (n = 1 jurisdictions).
  - "Illegal trade happens without the permits because local authorities are outnumbered by traders engaged in the business."
- Lack of consultation/communication with key stakeholders, especially fishers/traders and enforcement bodies (n = 4 jurisdictions).
  - "[Fishers] questioned legitimacy because… they had not been consulted prior to the imposition of a ban."
  - "Export suspension [has] never been publicly announced; fishers and local fishery departments [were] not made aware of the decision to suspend trade…; fisheries experts did not know about the suspension – only CITES Authorities."
- Ongoing demand from consumer markets (n = 5 jurisdictions).
  - "Trade ban might only be effective if China and other East Asia Markets also move to strengthen their enforcement to stop the illegal trade."
  - "Demand reduction campaign for seahorse consumption should be implemented at the consuming countries….to help reduce demand from source countries."
  - "Local enforcement forces are often outnumbered by illegal traders and thus the 'black market' will most certainly persist and may indeed grow. Such a problem could largely be addressed through raising awareness of consumers."

- In two jurisdictions, respondents commented on the consequences of the export bans/suspensions for fishers and/or traders.

- Respondents in one jurisdiction commented that the export suspension had not affected exporters as they continued to export many other species to Chinese markets, like sea cucumbers and geckos.
- Respondents in another jurisdiction reported the suspension had no consequences for exporters of dried seahorses who continued business as usual – the main impact was on seahorse culturists who exported live seahorses for the aquarium trade.

Recommendations

13. CITES Authorities should address their responsibilities to seahorses as for other taxa listed on the Appendices.
14. To address the management challenges associated with seahorse bycatch that largely drives illegal trade, jurisdictions should: enforce existing laws around nonselective fishing gears; establish, expand and strengthen national inshore exclusion zones in which bottom trawling is prohibited; constrain non-selective gears in MPAs to ensure vulnerable habitats and ecosystems are effectively protected and recovered; end harmful subsidies for bottom trawling; and limit expansion of bottom trawling.

6.2. What is respondent awareness of, and use of, existing information and tools for seahorses?

Summary

Respondents across ten jurisdictions knew little about the information, tools and expertise available to support implementation, despite the considerable array of materials that have been produced since the CITES listing and, especially, in response to the RST process (Foster & Vincent 2021). For seahorses, the road map is there, the tools are in place and the available protocols should allow good progress in CITES implementation for most Parties. Trade survey data have been published for both pre- and post-CITES periods for a number of jurisdictions. However, CITES Authorities still expressed a need to carry out their own studies on which to base NDFs, and some respondents commented that existing research on seahorse biology, fisheries and trade was anecdotal, out of date, or irrelevant because it had not been generated by the government.

All products that fill information gaps and help build capacity are available for Parties on the SPS SG website (www.iucn-seahorse.org/cites-toolkit). A step-by-step framework for the development of adaptive management programs and making sound NDFs for seahorses was developed by Project Seahorse in consultation with CITES Authorities, government agencies and national experts in ID, PH, TH and VN (Foster & Vincent 2016). Protocols have been developed that allow Parties to deduce seahorse population trends (underwater – Loh *et al*. 2014; in fisheries – Foster *et al*. 2014), and regional identification guides – bifurcating keys – have been produced and translated into six national languages. In addition, a community science website, iSeahorse.org, collects valuable information on seahorse distributions around the world. Moreover, members of the SPS SG serve as its regional, thematic and species focal points who can support Parties as needed (https://www.iucn-seahorse.org/who-we-are).

Details

- Respondents' awareness of the information and tools available to support national CITES implementation for seahorses (research, NDF guidelines, identification materials, etc.) was generally low across all ten jurisdictions.
  - For one Party "Only one respondent was aware of the existing trade and fisheries studies for seahorses and the identification guides, but they were not aware of the NDF framework. All other respondents were unaware of these tools and information for seahorses."
- Awareness of information and tools was greatest within two jurisdictions that have had recent support from external catalysts on CITES and seahorse issues (research, capacity building etc. – see Figure 1), though the same awareness appeared to be less enduring among Authorities in one other Party that had received similar support. However, in all three jurisdictions where external collaborations had led to robust, recent, baseline information on seahorse exploitation and trade, CITES Authorities still expressed a need to carry out their own studies on which to base NDFs.

- Four jurisdiction reports documented a lack of information/research a main impediment to implementing CITES for seahorses.
    - "[Authorities] have to desire to review the possibility of lifting the export ban on wild and dried seahorses by implementing sustainable management through the CITES mechanisms. However, [Authorities] realizes that currently there are still any gaps that must be filled in order to implement this, namely: (i) research on the status of seahorse population, (ii) research on domestic utilization and trade patterns."
- With respect to existing information (research on seahorse biology, fisheries, trades), respondents felt the information available was anecdotal (n = 2 jurisdictions), out of date (n = 1 jurisdictions), or irrelevant as not generated by the government (n = 1 jurisdictions).
    - "Although [collaboration] has generated a great deal of information on seahorse fisheries and trade, often in partnership with government [e.g., CITES SA], the government [CITES MA] requires its own studies and information before it is willing to take action on improving CITES implementation for seahorses."
- Three jurisdiction reports mentioned a lack of in-country funding as the main impediment to research on seahorses.
- One report mentioned that seahorses' protected status in that jurisdiction made it hard to obtain permission to study seahorses.
- CITES Authorities partnering with civil society (NGOs, academia) was proposed as one way to increase national research capacity in five reports.
    - "The CITES Management Authority for fishes is currently open to potential partnership with NGOs and research institutions, to support the assessments of seahorse population status and strengthen their capacities in CITES implementation."
- With respect to existing tools available to support CITES implementation for seahorses:
    - The identification guides were the most mentioned tools among the ten jurisdictions – they were mentioned by respondents in six jurisdictions.
    - The existing NDF framework for seahorses was considered irrelevant by two jurisdictions' Authorities because they don't allow export, and "too onerous" by another – too challenging to complete in a data poor environment.
    - Authorities interviewed in one jurisdiction said they are not using existing tools because they are not available in their national language.
- The CITES website (www.cites.org) and the Checklist of CITES Species (www.checklist.cites.org) were reported to be Authorities' main source of information for all CITES issues in two jurisdictions.
    - Respondents in two jurisdictions mentioned the lack of clear information on rules around seahorse trade as a major challenge to implementing CITES for seahorses.
- Seven jurisdiction reports mentioned a lack of national seahorse specific expertise, and only one mentioned seahorse expertise (related to seahorse aquaculture) within a CITES Authority. Reported expertise was specific to seahorse aquaculture in three jurisdictions.

Recommendations

15. The Secretariat should create and publicize a repository on its website that includes a wide range of materials to support CITES implementation for seahorses, similar to that provided for sharks (cites.org/eng/prog/shark), for example (in support of Decision 18.228).
16. Governments should engage in-country taxon experts to support CITES implementation, as a way of amplifying capacity by deploying complementary skills and expertise. The corollary is that taxon experts need to partner with government to advance conservation agendas.
17. CITES and its Parties should work with Project Seahorse, host of the IUCN SSC SPS SG, to revise the NDF framework for seahorses to ensure it is applicable in data- and capacity-poor situations. This recommendation could be considered in the context of CITES Decisions 18.132 to 18.134 on NDFs.

18. CITES needs to increase Party awareness of the potential for advice from the IUCN SSC SPS SG, which has a global membership, with regional and thematic focal points. Likewise, jurisdictions should take note of IUCN Resolution WCC-2020-Res-095 (Annex IV) which calls on governments to "take note that the Species Survival Commission (SSC) Seahorse, Pipefish and Seadragon Specialist Group can provide assistance on how to conserve syngnathids."

6.3. Seahorse export/import paths

Summary

Our study found that respondents reported bycatch as the greatest threat to seahorses in five of six net exporting jurisdictions (ID, IN, MY, TH and VN), particularly from bottom trawls. Only a few seahorses are caught at a time but the sheer volume of boats/fishers means cumulative catches are high (Lawson *et al.* 2016). They considered the non-selective nature of seahorse fisheries limited options for management, and meant trade would be ongoing in spite of trade controls. Because most seahorses are caught in extensive nonselective fishing practices, supply is often independent of demand, in contrast with other wildlife trade. Respondents further understood that restrictions on trade alone will not achieve sustainable seahorse populations, even if fully implemented; they must be coupled with measures to reduce fishing pressure.

Target fishing – commonly using illegal methods – was reported as the main pressure on seahorses in PH. This should allow for more targeted fishing management measures – such as the use of minimum size limits and quotas.

Respondents largely appreciated and reinforced understandings of trade routes that had been documented for all of the jurisdictions included in this report. Dried seahorses are sold to/collected by first level buyers, who tend to be local to the fishing communities. They are subsequently collected by middle-traders who travel around visiting first level buyers, and then sold to exporters who often have close ties to the importing jurisdictions. Middle traders/exporters tend to stockpile dried seahorses until they have enough for export. Respondents raised complex issues in regulating seahorse trade: dried seahorses, are small, easy to stockpile and easy to hide while in transit; seahorses are often exported in mixed shipments with other dried seafoods and/or other regulated species (marine and terrestrial); fishers land seahorses caught in other countries' waters; it is difficult to enforce trade regulations across long national borders (particularly for jurisdictions that shared a border with a main consumer market); seahorses in trade may take very circuitous routes.

Details

Reports had some common threads that offer important considerations as jurisdictions ramp up implementation of CITES for seahorses, while also differing in reporting/describing some issues.

- Bycatch was reported as the greatest threat to seahorses in five of six net exporting jurisdictions (IN, ID, MY, TH and VN), particularly from bottom trawls. Respondents in these jurisdictions considered the non-selective nature of seahorse fisheries limited options for management, and meant trade would be ongoing in spite of trade controls. However, one jurisdiction report suggested seahorses could be used as a flagship species to raise national awareness of – and drive solutions for – the wider challenge of nonselective fishing.
    - "Bycatch is a serious problem and a major obstacle to transform [the country's] fisheries to become more sustainable. Given the single most serious threat to seahorses is bycatch from trawling, seahorses could be a flagship species for [the government] to address larger sustainability issues of [the country's] fisheries sector."
- Target fishing was reported as the main pressure on seahorses in PH. This should allow for more targeted fishing management measures – such as the use of minimum size limits and quotas. However, most seahorses are obtained using illegal fishing methods (such as compressor diving), and so any fishing controls on legal gears would need to be coupled with enforcement with respect to illegal gears.
- Respondents in three net exporting jurisdictions suggested that fishers are landing seahorses caught in other countries' waters. This challenge was also mentioned in the report for one net importing jurisdiction.

    - “Most catch [is] from large trawling effort by big vessels that fish offshore and from international waters; it was repeatedly reported that many dried seahorses landed in [country] came from other SE Asian countries – collected at sea from other fishers – [it was] suggested by CITES MA that this contributes a great deal to the trade.”
- Seahorses were reportedly smuggled through a variety of means (n = 4 jurisdictions), including personal luggage, post, air cargo, land cargo, sea cargo and transshipment between fishing boats at marine borders (in no particular order).
    - “The respondents expressed the difficulties in finding smuggled dried seahorses, as they could be carried in the pockets or suitcase easily.”
    - “Enforcement of the bans is very challenging because dried seahorses are easy to be smuggled through various means.”
- Dried seahorses were reported to be smuggled in mixed shipments (n = 2 jurisdictions), along with other regulated species (n = 5 jurisdictions), including shark fins, sea cucumbers, fish maws, marine turtle scutes, pangolin scales and donkey skins (in no particular order).
- The large volumes of trade and long national borders were reported as key challenges in implementing CITES for seahorses (n = 4 jurisdictions), especially if they shared a border with a main consumer market for seahorses (n = 2 jurisdictions).
    - “The major challenges include: 1) large numbers of traders and fishers involved in the ‘black market’ vs. short-handed enforcement force; and 2) large numbers of locations along the coast where smuggling could happen.”
    - “Illegal trade still remains due to [the] vast area to cover by law enforcement agencies and multiple exit points for smuggling.”
    - “Enforcement team lacks human resources, technical expertise and financial resources to enforce the huge area under its jurisdiction.”
- Seahorses can be traded along very circuitous routes to reach their destination (n = 3 reports).
    - One example is of a seizure that took place in VN of a shipment of ~300,000 individual dried seahorses coming from Peru via HK. The species was identified to be *H. algiricus* which is only found in West Africa. The seahorses were hidden within wet donkey skins (which are also often sourced in Africa). Thus, the trade route for these dried seahorses appears to have been from West Africa → Peru → Hong Kong SAR → Vietnam. VN Authorities expected that the seahorses were then to be moved across the land border into CN.
- Two jurisdiction reports suggested that understanding trade paths is useful for understanding potential for monitoring efforts as well as enforcement.
    - “The pathways indicated that local fishery retailers play an important role in facilitating the trade as they purchased seahorse from different sources then sold them to other traders [inter-province and international traders] ... The fishing port authority is also very important as they monitor vessels coming and going. Both these stakeholders could be engaged in monitoring the actual seahorse landing and actual seahorse trade volume in each locality. However, there should be a tool [app] to support them to do the monitoring ... Data from the app could then link directly to a [government] database to support management and reporting or enforcement efforts.”
    - “Specific catch recording and monitoring system for seahorse should also be developed since most of the catch will not be landed in official fishing ports”… “Given the very long coastline of [the country], it is not very common for small-scale fishers to land their catch in official fishing ports. They often landed their catch at their village. Commonly there is at least one fish collector [buyer] in each village who then sells the fish into the supply chain.”

Recommendations

19. To address the main drivers of illegal trade, governments need to constrain the operations of both traditional and mechanized non-selective fishing gear to reduce the impacts on seahorses, and to constrain illegal target methods of fishing seahorses.
20. CITES needs to conduct research on the convergence of seahorse IWT with that of other CITES listed species, with the aim of understanding potential for synergies with respect to improving CITES implementation at national and global levels.
21. Jurisdictions should take note of IUCN Resolution WCC-2020-Res-095 which calls on governments to “ensure that initiatives to combat Illegal Wildlife Trade (including e-commerce) include syngnathids, as appropriate” and “meet all CITES obligations for seahorses.”
22. CITES should collaborate with the TCM industry to provide purchasing guidelines that will advance implementation of the Convention for seahorses.
23. Governments should explore novel techniques for detecting seahorses in trade, such as eDNA or detector dogs.

6.4. Seahorse conservation status and taxon-specific regulations

Summary

The jurisdiction specific reports prepared for this study provided useful information on national conservation assessments (Table 5) and seahorse-specific legislation (Table 6), which complements existing analyses of such tools (Stanton *et al.* 2021). All seahorse species native to the exporting jurisdictions included in this report have global assessments (Annex V), but reports indicate that most jurisdictions still need to complete even the first national conservation assessments for seahorses. Reports further showed that while four of the jurisdictions had developed protective measures for seahorses, there is no evidence of implementation. Only one jurisdiction was reported to be tracking population trends over time in order to determine the effectiveness of their interventions but results were not available.

The reports contained information on seahorse specific initiatives within some jurisdictions to control catch and/or trade of seahorses. Seahorse specific management measures can include catch quotas, size limits (min, max, slot), leaving pregnant males and export quotas (*inter alia*; Foster & Vincent 2016), most of which had been considered in at least some places. However, we are concerned that poorly planned and executed releases of captive bred seahorses were often mistakenly cited as a tool for conservation or management of wild populations.

Table 5. National conservation assessments for seahorses in net exporting and importing jurisdictions for dried trade in seahorses. Jurisdictions marked with a * have a process for national conservation assessments, but have not yet assessed seahorses. Thailand, Vietnam, China and Singapore are reported to use IUCN criteria in their assessments (Stanton *et al.* 2021). EN = Endangered; VU = Vulnerable.

Jurisdiction	National Red List or equivalent
NET EXPORTERS	
India (IN)	None*
Indonesia (ID)	None
Malaysia (MY)	None*
Philippines (PH)	None* (but assessments planned)
Thailand (TH)	*H. comes* – VU (to remain VU in 2022) *H. histrix* – VU (to remain VU in 2022) *H. kelloggi* – VU (to remain VU in 2022) *H. kuda* – VU (to be updated to EN in 2022) *H. mohnikei* – VU (to remain VU in 2022) *H. spinosissimus* – VU (to be updated to EN in 2022) *H. trimaculatus* – VU (to be updated to EN in 2022) (from 2005 in Vidthayanon, 2005, 2022 information from Vidthayanon, pers comm to P. Manopawitr in Manopawitr 2022)
Vietnam (VN)	*H. histrix* - VU *H. kelloggi* - EN *H. kuda* - EN *H. mohnikei* (listed under synonym *H. japonicus*) - EN *H. trimaculatus* – EN (from Vietnam Red Data Book 2007, MSTE2007)
NET IMPORTERS	
China (CN)	*H. histrix* (Threatened) *H. kelloggi* (Threatened) *H. kuda* (Threatened) *H. mohnikei* (Threatened)

	H. spinosissimus (Threatened) *H. trimaculatus* (Threatened) (from Wang & Xie, 2004)
China – Hong Kong SAR (HK)	None*
China – Taiwan, Province of China (TW)	None*
Singapore (SG)	*H. comes* (VU) *H. kuda* (VU) (from Singapore Red Data Book 2008 in Davison *et al.* 2008)

Details

Reports indicate that most jurisdictions still need to complete even the first national conservation assessments for seahorses (Table 5):

- Four of the ten jurisdictions included in this study (CN, SG, TH and VN) have national conservation assessments of seahorse species (details in Stanton *et al.* 2021), though assessments in all cases were from 2005-2008 and in need of updating.
- Only TH had a plan to update its assessments in 2022.
- Five of the six jurisdictions without seahorse specific assessments (HK, ID, MY, PH, and TW) have a process for conducting national assessments, but had not yet included seahorses.
- PH reported plans to assess seahorses in the near future, as a first step in assessing the possibility of legalizing fisheries and trades.

Reports showed that half the jurisdictions had developed protective measures for seahorses, albeit with poor implementation (Table 6):

- Of the ten jurisdictions included in this study, four had legislation specific to seahorses (aside from the obligatory national legislation that implements CITES): CN, IN, PH and VN.
- Two jurisdictions have legislation banning catch and trade (IN since 2001, PH since 2004 – see also Section 5, Table 4).
- VN law prohibits catch of one species (*H. mohnikei*) and ostensibly regulates catches of *H. histrix*, *H. kelloggi*, *H. kuda* and *H. trimaculatus* with minimum size limits and fishing seasons.
- In CN, everything associated with seahorses, from catches to domestic trade to import and export, requires permits. So, for example, fishing boats (of all sizes and gear types) would need a special permit to catch and sell seahorses, merchants need a special permit to be selling seahorses within CN, and traders need a special permit to import seahorses into CN.
- There was no evidence provided to suggest the laws in CN, IN, PH and VN are being implemented on the ground.

Three jurisdiction reports mentioned seahorse specific initiatives (that were not legislated) to control catch and/or trade of seahorses.

- ID developed a national plan of action for seahorses for the years 2016-2020, but it was not implemented due to “internal political and priority changes in the ministry” and “absence of partners with capacity and experience in working with seahorse issue.” Seahorses were further listed as priority

species by the ID CITES MA for marine species. Priority actions for 2020-2024 were reported to include data collection, population monitoring, restocking and management. Finally, ID implemented a quota for wild catch from 2015-2020 to support breeding operations, for three species, ranging from 200-8,000 individuals per year.

- In MY, an MA/SA has reportedly planned activities for seahorses including population assessments in areas outside current MPAs, restocking, and development of breeding technology for commercial purposes.
- TH reportedly implemented an export quota (when exports were legal), and did some outreach about a 10 cm size limit for fishers and traders, and throwing back pregnant males for fisheries. The CITES MA also announced a ban on target fishing to the media, but it was not implemented.

It is notable that three reports cited seahorse *ex situ* culture coupled with "restocking" as measures that would support national implementation of CITES restrictions, when such ventures are commonly deeply problematic (CTSG 2021). In these jurisdictions, respondents from CITES MA, SA and seahorse experts indicated that culturing and releases would support seahorse conservation and management. However, increasing the supply of cultured seahorses does not usually lead to a decrease in illegal trade sourced from fisheries unless it is very carefully planned to do just that, and is coupled with very tight enforcement of fishing regulations. Further, "restocking"/supplementation poses risks to wild populations (disease and genetic issues) with few likely benefits. The IUCN Guidelines for Reintroductions and Other Conservation Translocations[1] recommend against the releases of captive animals except under very specific conditions that are not met in most seahorse ventures. Casual or misguided releases may well threaten wild populations.

Only one jurisdiction reported systematic plans for seahorse monitoring, even though such tracking is vital to implement CITES restrictions meaningfully.

- Only TH was reported to be monitoring seahorses – through fisheries dependent and independent means – but results were not available and so effectiveness of the monitoring program is unknown. No other jurisdiction was reported to know if the measures are benefiting seahorses.
    - "Fisheries improvement measures…have been undoubtedly beneficial to seahorse conservation, but its direct effectiveness is largely unknown due to the lack of an effective seahorse-specific monitoring program."
- Some jurisdictions reported on the use of existing national tools and initiatives that could be adapted to monitor seahorses. For example, the National Stock Assessment Program in PH, and VNFishBase and Tuna Fishing Database in VN. It was suggested in the reports that these programs could be adapted to integrate data collection on threatened marine species including seahorses.

Recommendations

24. Jurisdictions should take note of IUCN Resolution WCC-2020-Res-095 which calls on governments to:
    a. "by 2022, ensure the status of all syngnathids is assessed and included in national/regional Red Lists as warranted;" and "support the work of the Seahorse, Pipefish and Seadragon Specialist Group in keeping the assessments of all syngnathids up to date";
    b. "by 2021, restrict syngnathid culture to operations that have been subject to an appropriate/careful risk analysis prior to proceeding, and where results have concluded that it is reasonable/safe to continue;" and
    c. "by 2021, for any release, apply SSC guidelines for reintroductions and translocations."[1]

[1] https://www.iucn.org/content/guidelines-reintroductions-and-other-conservation-translocations

25. CITES should work with the IUCN SSC Conservation Translocation Specialist Group (CTSG, www.iucn-ctsg.org) to establish guidance on the risks of aquaculture and releases to wild populations of CITES listed species. Guidance within CITES Resolution Conf. 17.8 under Option 2 of Annex 1 provides a good starting point for such an effort.
26. Jurisdictions should collaborate with key stakeholders and species experts to develop national plans of action to advance CITES implementation for seahorses; these could relate to both enforcement and sustainability.
27. Jurisdictions should develop monitoring programmes for seahorses in their national waters to understand effectiveness of their trade rules and any other relevant implementation and enforcement actions for seahorse conservation and management; and share the design and initial results of these programmes to assist other CITES Parties (in support of Decision 18.231b and c).

Table 6. Seahorse specific regulations in net exporting and importing jurisdictions for dried trade in seahorses. **The information in this table is not exhaustive.** *Restocking is very seldom an appropriate response to declines in wild populations and most such ventures need to be reconsidered. See text for further information.

Jurisdiction	Seahorse specific regulations	Date of implementation	Regulation details	Notes	Formal catch or trade monitoring in place?
NET EXPORTERS					
India (IN)	Wildlife Protection Act 1972	2001	All seahorses included on Schedule I, part II(a)	All forms of catch and trade banned, all species	No
Indonesia (ID)	None	NA	NA	National Plan of Action for seahorses developed in 2015, for the years 2016-2020 – but not implemented. Seahorses listed as priority species by MMAF (CITES MA) – priority actions for 2020-2024 include data collection, population monitoring, restocking* and management. Catch quota in place from 2015-2020 to support breeding operations, for three species ranging from 200-8,000 individuals per year.	No
Malaysia (MY)	None	Not reported	Not reported	DOFM (CITES SA) planned activities for seahorses included: • Population assessments in areas outside MPAs • Restocking* • Development of breeding technology for commercial purposes J-Biotech (CITES SA) – studying seahorse genomics	No

Jurisdiction	Seahorse specific regulations	Date of implementation	Regulation details	Notes	Formal catch or trade monitoring in place?
Philippines (PH)	*(Seahorse specific regulation derives from a blanket policy that inadvertently embraced seahorses)* Catch and trade prohibited until regulations can be put in place to ensure sustainability	2004	Republic Act 8850 Section 97: 2004-2015 Republic Act 10654 Section 102b: 2015 to present	Republic Act (RA) 8550 banned exploitation and trade in all species listed on any CITES Appendix. It was revised in 2015 as RA10654, which restores the potential to legalize fisheries and trade if scientific assessment show such activities to be sustainable and legislation is put in place.	No
Thailand (TH)	None	NA	NA	When exports were permitted (before 2016), CITES Authorities explored the use of an export quota, a 10 cm minimum size limit (MSL) for fishers and traders, and the return of pregnant males to the sea. The quotas were reportedly implemented. The MSL/pregnant male measures were reportedly not implemented.	Reportedly for catch (fisheries independent and dependent monitoring though results not made available)
Vietnam (VN)	Catch of *H. mohnikei* is prohibited at all times. Catches of *H. histrix, H. kelloggi, H. kuda* and *H. trimaculatus* are regulated with minimum size limits and fishing seasons.	2019	Decree 26/2019/NĐ-CP	The law is not yet implemented on the ground.	No
NET IMPORTERS					

Jurisdiction	Seahorse specific regulations	Date of implementation	Regulation details	Notes	Formal catch or trade monitoring in place?
China (CN)	All seahorse species are listed as national second class protected animals of China. This means their exploitation and trade (domestic / international) are regulated with permits.	1998 (*H. kelloggi*); 2002 (all species)	Regulations of the People's Republic of China on Concession for Utilization of Aquatic Wild Animals (1999, revised in 2017)	It is forbidden to catch or kill seahorses except for "special circumstances" (such as research, teaching, artificial breeding, exhibition, donation, monitoring, pharmaceutical production, etc). Breeding seahorses for the purpose of commercial trade is allowed but subject to a permit regulation. Domestic trade of seahorses for TCM is allowed but only with special permissions. Import (as well as export) of seahorses requires permits.	No
China – Hong Kong SAR (HK)	None	NA	NA	In 2003 the Hong Kong Chinese Medicine Merchants Association (CMMA) facilitated a voluntary pledge among merchants (members) to comply with the CITES recommended MSL of 10 cm (Decision 12.54). It unknown if this pledge is still in place.	No
China – Taiwan Province of China (TW)	None	NA	NA		No
Singapore (SG)	None	NA	NA		No

6.5. General laws and regulations of benefit to seahorses.

Summary

All jurisdictions had general regulations that, if enforced, would benefit seahorse conservation (Table 7), but information on both enforcement and effectiveness were missing. It is important to note that our list is neither complete nor exhaustive, and depends entirely on what respondents chose to mention and report authors chose to highlight. The most commonly reported regulations were spatial management measures (MPAs and trawl exclusion zones). That said, the MPA coverage in these reports for all net exporting jurisdictions was well below even the Aichi Biodiversity Target 11 for 2020 (10% of coastal and marine areas). Moreover, all six jurisdictions highlighted challenges with enforcement of trawl exclusion zones and other spatial measures. Other fishing gear regulations were reported for some net exporting jurisdictions. Of note, one net exporting jurisdiction and two net importing jurisdictions had trade rules that went beyond the requirements for CITES Appendix II. CN was reported to have the most stringent rules around wildlife trade of the four net importing jurisdictions included in this study while HK traders operate in an environment where wildlife law is taken seriously.

Details

Net exporting jurisdictions were reported to have a number of spatial management measures (MPAs and trawl exclusion zones) that were relevant for seahorses, along with a few other gear restrictions, but faced great challenges in implementation.

- All net exporting jurisdictions have MPAs, though only three jurisdictions provided some evidence that seahorses can be found in at least some MPAs.
    - "Seagrass habitats, where large numbers of seahorses are found, remain largely unprotected, [where non-selective gears] continue to operate, catching these seahorses in large numbers."
- The MPA coverage noted in these reports for all net exporting jurisdictions was well below the Aichi Biodiversity Target 11 for 2020 (10% of coastal and marine areas), never mind the emerging commitments to 30% by 2030.
- Two jurisdiction reports mentioned creation of spatial measures focused on other species that could serve seahorses: a proposed dugong conservation area in IN, and proposed protection zones for sea cucumbers in MY.
- All net exporting jurisdictions exclude bottom trawling from some or all of their national waters. These would offer considerable benefit to some seahorse species if implemented. However, they should not be assumed to serve all species. For example, in TH the known distribution of *H. trimaculatus* is largely outside the zone closed to bottom trawlers.
- Only the PH report mentioned restrictions on other gears that catch seahorses.
- The reports for IN and TH mentioned seasonal gear closures.

- Challenges with enforcement of general measures that could help seahorses were highlighted for all six jurisdictions.
    - "Regulations such as trawl exclusions zones are poorly implemented, and trawlers continue operating in these waters. Furthermore, illegal fishing methods such as the destructive pair-trawling continue, damaging seahorse habitats, and catching seahorses, despite regulations under [fisheries legislation] banning such methods."

One region of one net exporting jurisdiction had trade rules that went beyond the requirements for CITES Appendix II:

- Sarawak, MY, requires permits for all dealings with seahorses, including import and possession.

For net importing jurisdictions, the most relevant restrictions will be those affecting wildlife trade since domestic MPAs and trawl closures have no influence on wildlife populations sourced internationally.

- CN was reported to have the most stringent rules around wildlife trade of the four net importing jurisdictions included in this study. CN reportedly enhanced its law enforcement in combating illegal

wildlife trade in response to the COVID 19 pandemic. Among the related initiatives are the approval of The Decision on Completely Prohibiting the Illegal Wildlife Trade, Putting an End to the Abuse of Wild Animals and Effectively Safeguarding the Life, Health and Safety of the People by The Standing Committee of the National People's Congress of People's Republic of China (since February 2020; NPC, 2020). This legislation reportedly established a ban on wildlife trade as a long-term policy and added a ban on eating wildlife (all kinds) except 'aquatic products.' Protected aquatic animals such as seahorses are considered wildlife and not aquatic products. However, the law does say that 'the non-edible use of wildlife for scientific research, medicine, exhibition and other special purposes should follow existing national laws and under strict examination and quarantine inspection' (NPC, 2020), implying that seahorse can be still traded (through legal processes) as it is commonly used in TCM.

- In HK, traders must comply with domestic measures from AFCD for ***live*** specimens of CITES listed animals (all Appendices). This includes applying for an additional import permit for review before entry, and a license to possess for commercial purposes and trade within HK. In addition, HK applies a policy amended in August 2021. Recognizing the significance of HK as a prime hub for illegal trafficking of high value wildlife into SE Asian countries, and a key location with links to organized crime networks in the region, wildlife crime has been listed under Cap 455 Organized & Serious Crimes Ordinance. This allows authorities from the HK police force to apply their investigative powers tackling wildlife trade, and increase the resources placed on criminal investigation against wildlife syndicates.

Recommendations

28. Jurisdictions should build on the list of seahorse relevant regulations in Table 7 to inform enforcement efforts and provide the basis for making LAFs should they re-open trade.
29. Jurisdictions should take note of IUCN Resolution WCC-2020-Res-095 which calls on governments to "enforce regulations on fisheries, area-based management, habitat protection, wildlife trade and other measures that affect syngnathids".
30. Jurisdictions should take note of IUCN Resolution WCC-2016-Res-050 which calls on governments to "work towards designating and effectively implementing at least 30% of their national waters as MPAs and other effective area-based conservation measures, …, by 2030". In that context, jurisdictions should also take note of IUCN Resolution WCC-2020-Res-095 which calls on governments to "protect and restore freshwater, transitional and coastal habitats that are important for syngnathid species, using best practices."

Table 7. Existing general regulations that, if implemented, could benefit seahorse management and conservation. **The information in this table is not exhaustive** and came from the individual jurisdiction reports unless otherwise specified. We added further information for spatial management that we could glean from published literature, but did not have the capacity to document other regulations; the additional information we added is in *italics* and the source cited.

Jurisdiction	MPAs	Trawl exclusion zones	Other fishing gear regulations	Wildlife trade regulations	Notes
NET EXPORTERS					
India (IN)	In 2021: 25 MPAs along the mainland = ~6850 km^2; 104 MPAs in the two island chains = 3500 km^2; *<1% implemented & fully/highly protected from fishing (MPAtlas 2021)*	Bottom trawling is prohibited within 5-10 km of the coastline depending the State, as far as 19 km in West Bengal; pair trawling prohibited in Tamil Nadu	Annual monsoon trawl closure for 61 days, from 15 April-15 June on the east coast and 31 May-1 July on the west coast	(see Table 6)	Violations of trawl exclusion zones common Monsoon trawl closure strictly enforced MPAs poorly enforced – fishing activities, even trawling, continue unchecked
Indonesia (ID)	*In 2021, Indonesia had 197 MPAs, centred primarily on coral reefs and mangrove forests, covering 3% of its total marine area,;<0.1% are fully / highly protected areas (White* et al*. 2021)*	Bottom otter trawl nets banned in national waters	Not reported	Not reported	
Malaysia (MY)	*In 2019, Malaysia had 90 MPAs, primarily coral islands, covering 2.04% of its total marine area (Masud 2019); <1% implemented & fully/highly protected from fishing (MPAtlas 2021)*	Bottom trawling is prohibited within 9.3 km of the coastline. A process is underway to move this to 22.2 km	Not reported	In Sarawak, a permit is required for all dealings with species listed on CITES Appendix I and II, including possession (Wildlife Protection Ordinance 1998)	

Jurisdiction	MPAs	Trawl exclusion zones	Other fishing gear regulations	Wildlife trade regulations	Notes
Philippines (PH)	In 2014 = 1,800 MPAs of which 1,620 are community based; in 2010, coverage = 0.5% of municipal waters; *<1% implemented & fully/highly protected from fishing (MPAtlas 2021)*	Otters trawls are prohibited in municipal waters, within 15 km of the coastline	Three other gears that catch seahorses are illegal (compressor diving, floating gill nets and seine nets)	(see Table 6)	Illegal fishing occurs in municipal waters – insufficient enforcement
Thailand (TH)	18,136 km^2 or 5.6% total marine area in MPAs – but many allow fishing activity; 1.7% are strictly no-take (national parks); *1.7% implemented & fully/highly protected from fishing (MPAtlas 2021)*	Bottom trawling is prohibited within 5.4 km of the coastline	Seasonal closures in Phang-nga Bay, Andaman Sea from 1 April to 30 June for all fishing activity Seasonal closures in the upper GoT, from 1 July to 30 August for commercial fishing Seasonal closure in Chumphon and Prachuap Khiri Khan from 15 Feb to 15 May for commercial fishing	Not reported	No fishing in national parks but small-scale fishing does occur and is overlooked Artificial reefs are used to protect habitat from trawlers and may enhance habitat for seahorses
Vietnam (VN)	10 MPAs established that cover 1.8 km^2; *<1% implemented & fully/highly protected from fishing (MPAtlas 2021)*	Bottom trawling is prohibited within <11.1 km of the coastline, fishing vessels >15 m only allowed >22.2 km from coastline	Not reported	Not reported	MPAs are reportedly not well implemented – only two MPAs have their own management board Trawling continues and is a common fishery violation
NET IMPORTERS					

Jurisdiction	MPAs	Trawl exclusion zones	Other fishing gear regulations	Wildlife trade regulations	Notes
China (CN)	*In 2020, China (including Hong Kong SAR) had 271 MPAs, covering 4.1% of its total marine area, 85% of which are in the nearshore area (Hu* et al. *2020); <1% implemented & fully/highly protected from fishing (MPAtlas 2021)*	*Bottom trawls are banned from specific areas eg Bohai Sea; pair trawlers are generally prohibited (Zhang and Vincent 2020).*	Summer moratorium (on fisheries using all gears except hook and line; last ~ 4 - 5 months, May to September)	China has seven pieces of legislation that are relevant wildlife trade: 1. Law of The PRC on The Protection of Wildlife (since 1989) 2. Criminal Law of The PRC (since 1997) 3. Regulations of the People's Republic of China on Concession for Utilization of Aquatic Wild Animals (since 1999) 4. Measures for Value Evaluation of Aquatic Wild Animals and Their Products (since 2019) 5. Announcement about the Ban on Wildlife Trade (since Jan. 2020) 6. Notice on Joint Enforcement Actions Against Illegal Wildlife Trade (since Feb. 2020) 7. Decision on Completely Prohibit the Illegal Wildlife Trade, Putting an End to the Abuse of Wild Animals and Effectively Safeguarding the Life, Health and Safety of the People (since Feb. 2020)	
China – Hong Kong SAR (HK)	*In 2021, Hong Kong SAR had 7 MPAs, covering <3% of its total marine area, one of which is fully / highly protected areas (Kay 2021)*	Bottom trawling (including pair, stern, shrimp and hang trawling) is banned from all Hong Kong SAR domestic waters	Not reported	For live specimens of CITES listed animals (all Appendices) traders must apply for an import permit and a license to possess for commercial purposes within Hong Kong SAR (Cap. 586 Protection of Endangered Species of Animals and Plants Ordinance)	

Jurisdiction	MPAs	Trawl exclusion zones	Other fishing gear regulations	Wildlife trade regulations	Notes
China – Taiwan, Province of China (TW)	*In 2021, Taiwan, Province of China, had 45 MPAs, covering <8.16% of its total marine area; most of these MPAs (29) were established for fishery resources conservation in the 1970s (Hung* et al. *2021); <1% implemented & fully/highly protected from fishing (MPAtlas 2021)*	All bottom trawling is prohibited within 5.5 km of the coastline	Regulation of gillnets varies among counties – can include closed seasons, closed areas, and the prohibition of using multi-layer gillnets	Not reported	
Singapore (SG)	*In 2019, Singapore had 2 MPAs, covering <1% of its total marine area (Masud 2019)*	Use of trawl nets prohibited in national waters except for five local trawlers that have been granted an exemption	Not reported	Endangered Species Act – sets terms for implementing CITES but further makes it an offense to possess or have in control, sell, offer, advertise for sale, and display to public specimens that have been obtained in violation of CITES rules Widlife Act – protects Singapore's wildlife – "intentional killing, trapping, taking and keeping of any wildlife prohibited unless with written approval from the DG"	

6.6. Seahorse seizures

Summary

Most jurisdiction reports included only anecdotal/sporadic information on seizures, with almost all noting at least one seizure. Information for some jurisdictions came from government respondents, but for others information was only available from media reports. Respondents reported seizures to be opportunistic, with no specific efforts to find smuggled seahorses. Finally, challenges with moving data from regional to national authorities, and then out to CITES, were highlighted for several jurisdictions, as were challenges with enforcing laws when seizures do happen. Project Seahorse and Oceans Asia are currently working on an analysis of media reports of seahorse seizures which will be made available in 2022.

Details

- Reports from eight jurisdictions included anecdotal/sporadic information on seizures, one jurisdiction provided government records on dried seahorse seizures and one jurisdiction reported no seizures. All seizures were of dried seahorses.
- In three jurisdictions, information on seizures – where available – was gleaned from media, rather than government data or from information shared by government respondents. However, one report noted that media attention was "given only to higher profile species like pangolin, elephant, rhino".
- Seizures were reportedly opportunistic – jurisdictions were not explicitly looking for smuggled seahorses – as the species were not priorities for enforcement at borders.
    - "As seahorses are not a common fishery species and they were not protected by [national] regulations until very recently, very little attention has been paid to the species, especially among the enforcement bodies, therefore their trade almost went unnoted."
- Respondents in five jurisdictions commented on challenges in passing seizures data from the local/regional enforcement bodies up to central Authorities. As three examples:
    - In one jurisdiction there is no regulation/requirement by which law enforcement institutions need to report wildlife seizures to the CITES MA.
    - In another jurisdiction, regional offices collect seizure data but it is not regularly transmitted to a central office as there is no centralized database to collect seizure information.
    - In yet another, there was some information on seizures of seahorses by local enforcement bodies, but they were never properly recorded.
- Three jurisdictions reportedly do not report seahorse seizures in their CITES IWT reports. In two cases this was supposedly because the MA does not receive the information from enforcement teams, and in another because "MAs are not held accountable and there are no penalties imposed by CITES for non-complying Parties."
- Authorities in four jurisdictions shared that the genus level listing of seahorses was helpful because they could easily recognize seahorses but had trouble with individual species ID – but when they see one, they know it is regulated regardless of the species. However, this also meant they did not do species ID on seizures, in spite of species information offering important insights into trade routes.

- Seized specimens of seahorses in at least two jurisdictions were reportedly destroyed when no longer needed for law enforcement.
- Seized specimens of seahorses in one jurisdiction were reportedly donated for scientific research, education, enforcement and training. Disposal was the last resort, if no other options were available.

- Four jurisdiction reports contained information with respect to challenges with enforcing laws even when seizures do happen. One report suggested that successful convictions would act as a deterrent, but there are currently no indications that such convictions will take place.
    - "Finally, even where seahorses are seized and violators arrested, the penalties are negligible compared to profits to be made, and obtaining a conviction remains challenging. Fines associated with the [law] range from about USD 135-340, whereas even lower-level traders

reported making at least USD 300 for a kilogram of the smallest seahorses [~600-700 individuals]."

- "The existing judicial system of the country is a main challenge in combatting wildlife crime in [country]."
- "Even when IWT is seized enforcement actions tend to stop at the point of seizure and not continue through the judicial process."

Recommendations

31. CITES needs to work with its Parties to improve data collection on and from seahorse seizures, particularly with respect to species identification, shipment routes and other wildlife in the shipment, as such data provide important information about trade. Specimens and/or data should be shared with species experts, including the IUCN SSC SPS SG, for analysis.
32. Parties should report seahorse seizures in their CITES IWT reports.
33. CITES should make identification guides for dried seahorses available in multiple languages. These can be based on existing identification tools for seahorses (https://projectseahorse.org/resource-tag/id-guide/).
34. CITES should explore use of DNA forensics and technology for seahorse species identification and monitoring trade flow.
35. CITES needs to work with its Parties to develop toolkits for training enforcement bodies (including frontline officers), prosecutors, judges, etc. in detecting and prosecuting IWT for the oft overlooked marine taxa such as seahorses.
36. Importing Parties should implement the Convention fully by requesting information on NDFs and LAFs when there are concerns about the validity of export permits.

7. Conclusions and key recommendations

To meet their obligations under the Convention, Parties have two options. If Parties wish to keep trade bans/suspensions in place, they should focus on ending the large illegal trade in seahorses. Alternatively, they should work to ensure that the seahorses being traded are sourced sustainably and legally. Currently, the exporting Parties included in this study (all historically important) have banned or suspended exports of dried seahorses of their own volition. However, exports persist. Those exports represent illegal trade, with the majority of these illegal exports being consumed by importing jurisdictions that have always been dominant. Exporters and importers should end such illegal trade, and should ensure the fisheries that supply the international trade are not detrimental to wild populations of seahorses. Parties are not meeting their CITES obligations when they have export bans or suspensions in place, but fail to enforce such closures or adequately manage wild populations. Any level of continued international trade of seahorses is a conservation concern of CITES.

All six of the net exporter Parties we investigate in this report (ID, IN, MY, PH, TH, and VN) have exported notable numbers of seahorses both before and after the CITES listing, despite the fact that such trade is now officially banned or suspended. The ban in India pre-dated the CITES Appendix II listing by one year but arose from the listing process and the ban in the Philippines resulted from a blanket policy in the national Fisheries Code (banning even capture of any CITES-listed species). Indonesia and Malaysia decided on their bans early in the RST process while the bans in Thailand and Vietnam emerged as a result of the RST process. These bans have not been effective. As long as nonselective fisheries persist, seahorses will be caught and available for trade. Without meaningful enforcement and management of these bans, seahorses are being exploited without oversight, monitoring or management, leaving us unable to understand the status of wild populations. The current situation of ongoing illegal export is not effective in conserving seahorses in the wild.

If Parties choose to retain export bans or suspensions, it is imperative that exporting and importing Parties implement these measures properly. To constrain smuggling, Parties will need to be vigilant and effective in enforcement along supply chains and at national borders, with data properly curated and made available to CITES. Such enforcement will not be easy. Many factors will contribute to the difficulty of enforcement: financial benefits to participants commonly far outweigh the low risks of being caught fishing or trading illegally; dried seahorses can be kept and stockpiled for long periods; dried seahorses can be hidden in shipments, often mixed with other wildlife; dried seahorses are exported by the same merchants who export many other marine products; and global demand for dried seahorses remains high. The high levels of illegal trade in dried seahorses have demonstrated that there is not adequate coordination or effort among Parties to enforce bans or suspensions sufficiently.

Given the real difficult in ending seahorse trafficking, Parties might find it better to revert to the spirit of a CITES Appendix II listing and manage exports at levels that do not damage wild populations. That will mean addressing the nature and intensity of extraction of seahorses in fisheries, both those targeting seahorses and (predominantly) those catching seahorses in nonselective gear. In the Philippines, this means primarily constraining illegal capture by compressor diving, an illegal method. In most countries, however, seahorses are obtained primarily in bottom trawls and seine nets, along with a great many other species, including some that are listed on CITES Appendices. Bottom trawling, in particular, is increasingly less discriminate, to the point where some such fisheries have no target species and seek merely to extract life itself for use in feed for farmed fish, chickens and other animals. Such catches are commonly supported by subsidies and will continue until Parties address the extraordinary threat to marine biodiversity posed by these gears.

In the context of the CITES Appendix II listing for seahorses, the challenge is to ensure that seahorses are sustainably caught and that seahorses in trade are legally sourced. The most effective measure for advancing sustainable trade would be to reduce unintentional seahorse capture in bottom trawls. This would best be achieved by eliminating trawling from large areas, through enforcement of existing policies and growth of trawl exclusion zones. As we show in this report, all Parties have already designated no trawl zones for at least some trawl gear in coastal areas, commonly to support small-scale targeted fisheries. All Parties we cover in this report (i) rely on marine protected areas as general conservation and management policy, (ii) have already committed to protecting 10% of the ocean by 2020 under the Convention on Biological Diversity (CBD) Aichi Targets, and will (iii) probably be directing efforts towards protecting 30% by 2030 under new CBD Global Biodiversity Targets. Eliminating bottom trawling from large areas would help the Parties meet these obligations to 10% protection, which none of the Parties in our report has yet fulfilled.

Given the two possible routes towards compliance with CITES – and in light of the challenges with enforcing trade bans/suspensions – Parties may want to consider lifting their export bans/suspensions restrictions and implement the inclusion of seahorses in Appendix II of CITES for an enduring sustainable, legal and regulated trade. For seahorses, the road map is there, the tools are in place and the available protocols should allow good progress. Such a transition would involve making preliminary conditional NDFs and then strengthening them as information improves, with good monitoring/feedback systems in place. Parties would also benefit from the production of legal acquisition guidance for seahorses – the information obtained for this study provides a good starting point. Ensuring a sustainable and legal trade would still require monitoring and enforcement, but such efforts may be more feasible when they can be done in collaboration with stakeholders and trade activity is “above ground”. As one jurisdiction report said: “Legalizing fisheries/catch could create an environment that incentivizes compliance with fisheries laws – where legal fishers put pressure on illegal fishers who would be threatening their, now, legal livelihoods.”

For seahorses – as with most species included in CITES Appendix II – jurisdictions will need management plans in order to grant an export permit, ensuring that proposed export of the seahorses will not harm wild populations. Such plans need to be adaptive, consulting stakeholders and responding to new information as it emerges. Jurisdictions will also need to make sure seahorses are not obtained in contravention of national laws. Finally, jurisdictions will need to establish robust monitoring plans – to ensure seahorses are faring well under current management regimes, or whether more or different management is required.

The unstainable and illegal trade in dried seahorses is a global problem and one that must be addressed in support of seahorse conversation worldwide. Although this study focused on Asia, its findings are relevant to global challenges in implementing CITES for seahorses – as have been documented in West Africa and Latin America, for just two examples (Cisneros-Montemayor *et al.* 2015, Globo.com 2016, HK Customs 2014). Our study has generated many recommendations for helping improve national CITES implementation for dried seahorses, compiled in Annex II, but we here include the top eleven which we consider immediate priorities for attention.

Overall

1. CITES Authorities need to meet their responsibilities to seahorses as they would to other taxa listed on the Appendices.

Actors

2. Parties should take note of IUCN Resolution WCC-2020-Res-107 (Annex III) which calls on governments to “establish/strengthen a national ministry/department/agency with an explicit mandate for marine biodiversity conservation.” These bodies should play a central role in implementing CITES for marine species.

Bans/suspensions

3. Parties should inform the Secretariat of any national management measures that regulate or restrict international trade in seahorses; and how they are implementing and enforcing such measures for seahorses (in support of Decision 18.230a). The Secretariat should make a list of national measures available on the CITES website (in support of Decision 18.229b).

4. CITES should promote meaningful export regulation by scrutinizing and tracking all declarations of export suspensions made during the RST process, imposing sanctions for failures to enforce these suspensions.

Capacity

5. The Secretariat should create and publicize a repository on its website that includes a wide range of materials to support CITES implementation for seahorses, similar to that provided for sharks, for example (in support of Decision 18.228).

6. CITES and its Parties should work with Project Seahorse, host of the IUCN SSC SPS SG, to revise the NDF framework for seahorses to ensure it is applicable in data- and capacity-poor situations.

7. CITES needs to work with its Parties to develop toolkits for training enforcement bodies (including frontline officers), prosecutors, judges, etc. in detecting and prosecuting IWT for the oft overlooked marine taxa such as seahorses.

Illegal trade

8. To address the main drivers of illegal trade, governments need to constrain the operations of both traditional and mechanized non-selective fishing gear to reduce the impacts on seahorses, and to constrain illegal target methods of fishing seahorses.

9. CITES needs to work with its Parties to improve data collection on and from seahorse seizures, particularly with respect to species identification, shipment routes and other wildlife in the shipment, as such data provide important information about trade. Specimens and/or data should be shared with species experts, including the IUCN SSC SPS SG, for analysis.

Management

10. Parties should take note of IUCN Resolution WCC-2020-Res-095 (Annex IV) which calls on governments to:

a. “by 2022, ensure the status of all syngnathids is assessed and included in national/regional Red Lists as warranted;” and “support the work of the Seahorse, Pipefish and Seadragon Specialist Group in keeping the assessments of all syngnathids up to date”;
b. “by 2021, restrict syngnathid culture to operations that have been subject to an appropriate/careful risk analysis prior to proceeding, and where results have concluded that it is reasonable/safe to continue;” and
c. “by 2021, for any release, apply SSC guidelines for reintroductions and translocations.”
d. “enforce regulations on fisheries, area-based management, habitat protection, wildlife trade and other measures that affect syngnathids.”

11. Parties should develop monitoring programmes for seahorses in their national waters to understand effectiveness of their trade rules and any other relevant implementation and enforcement actions for seahorse conservation and management; and share the design and initial results of these programmes to assist other CITES Parties (in support of Decision 18.231b and c).

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Annex I. Seahorse Decisions adopted at CoP18

Decisions 18.228 - 18.233 Seahorses (*Hippocampus* spp.)

https://cites.org/eng/dec/index.php/42088

18.228

Decision directed to: Secretariat

The Secretariat shall include available materials to support CITES implementation for seahorses (non-detriment findings guidance, identification materials, etc.) on the CITES website.

18.229

Decision directed to: Secretariat

The Secretariat shall:

a) issue a Notification to the Parties inviting them to inform the Secretariat of any national management measures that regulate or restrict international trade in seahorses, and on how they are implementing and enforcing such measures for seahorses;

b) compile the responses received to the Notification issued as per paragraph a) of the present Decision and communicate them to CITES Authorities through a Notification to the Parties and through its website; and

c) subject to external funding:

> i) commission a study on trade in *Hippocampus* spp., including applicable regulations, to understand shifts in international trade patterns since the inclusion of seahorses in Appendix II and the Review of Significant Trade of *Hippocampus* spp., as well as the implementation challenges and possible solutions; and
>
> ii) organize an expert workshop to discuss the implementation and enforcement of CITES for trade in *Hippocampus* spp., including the recommendations and outcomes from the Review of Significant Trade process, and propose practical steps to address implementation and enforcement challenges; and

d) report on the implementation of paragraphs a) through c) of the present Decision to the Animals and Standing Committee, as appropriate.

18.230

Decision directed to: Parties

To support the effective implementation of Appendix II of CITES for seahorses, Parties are invited to:

a) inform the Secretariat of any national management measures that regulate or restrict international trade in seahorses; and how they are implementing and enforcing such measures for seahorses;

b) share copies of their non-detriment findings with the Secretariat for posting on the CITES website to assist other CITES Parties; and

c) inform seahorse traders within their jurisdiction of any quotas, including any zero quotas, and any trade suspensions for seahorses to further facilitate General compliance and enforcement by all participants in the trade.

18.231

Decision directed to: Parties

Parties are encouraged to:

a) use existing tools for effective CITES implementation and enforcement that are relevant to seahorses;

b) where quotas, trade suspensions, or both are in place, develop monitoring programmes for seahorses in their national waters to understand effectiveness of these actions and any other relevant implementation and enforcement actions for seahorse conservation and management; and

c) share the design and initial results of these programmes with the Secretariat to report to the 19th meeting of the Conference of the Parties.

18.232

Decision directed to: Animals Committee

The Animals Committee shall analyze and review the results of any activities under Decision 18.229 and other relevant information available to the Animals Committee, and develop recommendations as appropriate to ensure sustainable and legal trade in seahorses.

18.233

Decision directed to: Standing Committee

The Standing Committee shall analyze and review the results of any activities under Decision 18.229 and develop recommendations as appropriate to strengthen CITES implementation and enforcement for trade in seahorses.

Annex II. Continuous list of recommendations

1. Jurisdictions should take note of IUCN Resolution WCC-2020-Res-107 (Annex III) which calls on governments to "establish/strengthen a national ministry/department/agency with an explicit mandate for marine biodiversity conservation." These bodies should play a central role in implementing CITES for marine species, or supporting the implementation of CITES for marine species if they are not the designated national CITES Authorities.
2. Existing national MAs and SAs with marine expertise need to have higher levels of staffing and funding to meet their obligations to the Convention.
3. EFPs that play a role in enforcing CITES should be fully trained in the identification and legal requirements applicable to marine species.
4. All jurisdictions need to improve inter-agency cooperation with respect to CITES implementation and data gathering.
5. CITES Authorities should formalize the role of species experts from civil society (academia, NGOs etc.) in implementing CITES at the national level.
6. CITES Authorities should raise awareness of seahorse trade and its role in conservation of the species with all stakeholders: fishers, traders, consumers, policy makers, enforcement agencies, judiciaries etc.
7. Given the unreliability of formal data, jurisdictions should ensure access to up-to-date trade research in collaboration with species experts. The following jurisdictions need new trade field surveys: CN, HK, ID, MY, SG and TW. Sufficient baseline information exists in the other jurisdictions on which to base adaptive management plans in support of CITES implementation.
8. Parties should inform the Secretariat of any national management measures that regulate or restrict international trade in seahorses; and how they are implementing and enforcing such measures for seahorses (in support of Decision 18.230a). The Secretariat should make a list of national measures available on the CITES website (in support of Decision 18.229b).
9. Jurisdictions should actively enforce any seahorse trade bans/suspensions they declare.
10. CITES should promote meaningful export regulation by scrutinizing and tracking all declarations of export suspensions made during the RST process, imposing sanctions for failures to enforce these suspensions.
11. Parties should share copies of their NDFs for seahorse exports with the Secretariat for posting on the CITES website to assist other CITES Parties (in support of CITES Decision 18.230).
12. Parties should ideally share copies of their LAFs for seahorse exports with the Secretariat for posting on the CITES website to assist other CITES Parties.
13. CITES Authorities should address their responsibilities to seahorses as for other taxa listed on the Appendices.
14. To address the management challenges associated with seahorse bycatch that largely drives illegal trade, jurisdictions should: enforce existing laws around nonselective fishing gears; establish, expand and strengthen national inshore exclusion zones in which bottom trawling is prohibited; constrain non-selective gears in MPAs to ensure vulnerable habitats and ecosystems are effectively protected and recovered; end harmful subsidies for bottom trawling; and limit expansion of bottom trawling.
15. The Secretariat should create and publicize a repository on its website that includes a wide range of materials to support CITES implementation for seahorses, similar to that provided for sharks (cites.org/eng/prog/shark), for example (in support of Decision 18.228).
16. Governments should engage in-country taxon experts to support CITES implementation, as a way of amplifying capacity by deploying complementary skills and expertise. The corollary is that taxon experts need to partner with government to advance conservation agendas.
17. CITES and its Parties should work with Project Seahorse, host of the IUCN SSC SPS SG, to revise the NDF framework for seahorses to ensure it is applicable in data- and capacity-poor situations. This recommendation could be considered in the context of CITES Decisions 18.132 to 18.134 on NDFs.
18. CITES needs to increase Party awareness of the potential for advice from the IUCN SSC SPS SG, which has a global membership, with regional and thematic focal points. Likewise, jurisdictions should

take note of IUCN Resolution WCC-2020-Res-095 (Annex IV) which calls on governments to "take note that the Species Survival Commission (SSC) Seahorse, Pipefish and Seadragon Specialist Group can provide assistance on how to conserve syngnathids."

19. To address the main drivers of illegal trade, governments need to constrain the operations of both traditional and mechanized non-selective fishing gear to reduce the impacts on seahorses, and to constrain illegal target methods of fishing seahorses.
20. CITES needs to conduct research on the convergence of seahorse IWT with that of other CITES listed species, with the aim of understanding potential for synergies with respect to improving CITES implementation at national and global levels.
21. Jurisdictions should take note of IUCN Resolution WCC-2020-Res-095 which calls on governments to "ensure that initiatives to combat Illegal Wildlife Trade (including e-commerce) include syngnathids, as appropriate" and "meet all CITES obligations for seahorses."
22. CITES should collaborate with the TCM industry to provide purchasing guidelines that will advance implementation of the Convention for seahorses.
23. Governments should explore novel techniques for detecting seahorses in trade, such as eDNA or detector dogs.
24. Jurisdictions should take note of IUCN Resolution WCC-2020-Res-095 which calls on governments to:
    a. "by 2022, ensure the status of all syngnathids is assessed and included in national/regional Red Lists as warranted;" and "support the work of the Seahorse, Pipefish and Seadragon Specialist Group in keeping the assessments of all syngnathids up to date";
    b. "by 2021, restrict syngnathid culture to operations that have been subject to an appropriate/careful risk analysis prior to proceeding, and where results have concluded that it is reasonable/safe to continue;" and
    c. "by 2021, for any release, apply SSC guidelines for reintroductions and translocations."[1]
25. CITES should work with the IUCN SSC Conservation Translocation Specialist Group (CTSG, www.iucn-ctsg.org) to establish guidance on the risks of aquaculture and releases to wild populations of CITES listed species. Guidance within CITES Resolution Conf. 17.8 under Option 2 of Annex 1 provides a good starting point for such an effort.
26. Jurisdictions should collaborate with key stakeholders and species experts to develop national plans of action to advance CITES implementation for seahorses; these could relate to both enforcement and sustainability.
27. Jurisdictions should develop monitoring programmes for seahorses in their national waters to understand effectiveness of their trade rules and any other relevant implementation and enforcement actions for seahorse conservation and management; and share the design and initial results of these programmes to assist other CITES Parties (in support of Decision 18.231b and c).
28. Jurisdictions should build on the list of seahorse relevant regulations in Table 7 to inform enforcement efforts and provide the basis for making LAFs should they re-open trade.
29. Jurisdictions should take note of IUCN Resolution WCC-2020-Res-095 which calls on governments to "enforce regulations on fisheries, area-based management, habitat protection, wildlife trade and other measures that affect syngnathids".
30. Jurisdictions should take note of IUCN Resolution WCC-2016-Res-050 which calls on governments to "work towards designating and effectively implementing at least 30% of their national waters as MPAs and other effective area-based conservation measures, …, by 2030". In that context, jurisdictions should also take note of IUCN Resolution WCC-2020-Res-095 which calls on governments to "protect and restore freshwater, transitional and coastal habitats that are important for syngnathid species, using best practices."
31. CITES needs to work with its Parties to improve data collection on and from seahorse seizures, particularly with respect to species identification, shipment routes and other wildlife in the shipment, as such data provide important information about trade. Specimens and/or data should be shared with species experts, including the IUCN SSC SPS SG, for analysis.
32. Parties should report seahorse seizures in their CITES IWT reports.

33. CITES should make identification guides for dried seahorses available in multiple languages. These can be based on existing identification tools for seahorses (https://projectseahorse.org/resource-tag/id-guide/).
34. CITES should explore use of DNA forensics and technology for seahorse species identification and monitoring trade flow.
35. CITES needs to work with its Parties to develop toolkits for training enforcement bodies (including frontline officers), prosecutors, judges, etc. in detecting and prosecuting IWT for the oft overlooked marine taxa such as seahorses.
36. Importing Parties should implement the Convention fully by requesting information on NDFs and LAFs when there are concerns about the validity of export permits.

Annex III. IUCN Resolution WCC-2020-Res-107

Reducing the impact of fisheries on marine biodiversity

(*also available in French and Spanish at https://portals.iucn.org/library/node/49246*)

CONSCIOUS that ocean health depends on thriving biodiversity;

MINDFUL that Sustainable Development Goal (SDG) 14 recognises the importance of ocean conservation and sustainable use;

EMPHASISING that fisheries can exert significant, growing proximate pressure on biodiversity;

DEEPLY CONCERNED about the high incidence of inadequate fisheries management, over-fishing, destructive fishing, catch of non-target marine life and illegal, unreported and unregulated fishing, contravening Article 61 of the United Nations Convention on the Law of the Sea (UNCLOS);

NOTING that negative impacts can extend far beyond those on fish and biodiversity, into social and economic spheres;

MINDFUL that the effects of fisheries on biodiversity are linked to realities such as livelihoods and culture, and exacerbated by corruption, human-rights violations, global markets and perverse incentives;

DEEPLY CONCERNED that Aichi Biodiversity Target 6 has been largely unsuccessful in stemming the adverse impacts of fisheries on biodiversity or in achieving recovery of depleted species;

ACKNOWLEDGING work by the United Nations Food and Agriculture Organization (FAO) and other organisations – such as regional fisheries management bodies (RFBs), the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and the Convention on Migratory Species (CMS) – to promote sustainable, responsible fisheries;

CONCERNED about the increasing number of imperiled marine species on the IUCN Red List of Threatened Species, potentially requiring action from CITES and CMS;

ACKNOWLEDGING that applying Resolution 6.021 Monitoring and management of unselective, unsustainable and unmonitored (UUU) fisheries (Hawai'i, 2016) is an important part of curbing fisheries impacts;

CONCERNED that ecosystem-based management of fisheries, as recognised by Recommendation 5.169 Ecosystem Approach to Fisheries (EAF) (Jeju, 2012), is rarely applied;

AWARE that fishing affects thousands of species that are caught in a targeted or incidental manner, many with poor scientific information and without precise regulation and control;

NOTING that applying Resolution 6.050 Increasing marine protected area coverage for effective marine biodiversity conservation (Hawai'i, 2016) to protect the ocean would significantly limit fisheries impacts;

CONCERNED that reconciling fisheries and conservation requires a comprehensive integrated approach, including consideration of small-scale fisheries, artisanal fisheries, women's fisheries, indiscriminate fisheries, habitat destructive fishing (e.g. bottom trawling, dynamite), non-fish fisheries (e.g. fisheries for invertebrates, reptiles), extraction for non-food purposes (e.g. aquarium, medicinal), fisheries flawed by perverse incentives, and distant-water fisheries; and

RECOGNISING that marine biodiversity is also influenced by many other factors, both anthropogenic and natural, that are not directly linked to fishing;

The IUCN World Conservation Congress 2020, at its session in Marseille, France:

1. REQUESTS the Director General and Commission Chairs to:

a. establish, in 2021, a Task Force to reconcile fisheries and conservation that:

i. involves all IUCN Commissions and all IUCN Regions;

ii. takes account of Antarctica and the Southern Ocean; and

iii. draws on relevant reports from peer organisations (e.g. IPCC Special Report on the Oceans and Cryosphere in a Changing Climate);

b. produce, by 2022, a scientific and technical Situational Analysis on the effects of fisheries on biodiversity, involving a Consultative Workshop, and taking an inclusive approach, to cover:

i. diverse fisheries (e.g. small-scale, artisanal, women's, indigenous, non-selective, invertebrate, distant-water); and

ii. diverse issues (e.g. spatial management, efficacy of legal instruments, perverse incentives, economic dependencies, human well-being and rights, climate change impacts); and

c. convene, in 2023, a second Consultative Workshop to consider the findings of the Situational Analysis and to propose policy to IUCN and implementing parties; and

2. ENTREATS all IUCN State and Government Agency Members and other competent authorities to:

a. establish/strengthen a national ministry/department/agency with an explicit mandate for marine biodiversity conservation;

b. ensure that national Red List assessments and national, regional, or global biodiversity reports include marine fishes and invertebrates;

c. ensure that all fisheries management, including distant-water permitting, is compatible with conservation of threatened marine species (across entire ranges), vulnerable habitats and human well-being;

d. constrain destructive and non-selective fisheries practices, respecting Resolution 6.021;

e. ensure, when implementing Resolution 6.050, that marine protected areas help avoid and mitigate the negative impacts of fisheries on biodiversity; and

f. remove perverse incentives for fisheries, including harmful subsidies.

Annex IV. IUCN Resolution WCC-2020-Res-095

Conservation of seahorses, pipefishes and seadragons (family Syngnathidae)

(*also available in French and Spanish at https://portals.iucn.org/library/node/49234*)

DELIGHTED that seahorses, pipefishes and seadragons (more than 300 species in the family Syngnathidae) exhibit remarkable life histories, including paternal care through to full male pregnancies;

AWARE that syngnathids occur from tropical to subarctic regions in freshwater, transitional/estuarine waters and coastal seas;

MINDFUL that syngnathids are iconic flagship species, help structure communities, are ascribed medicinal and cultural value, and can be economically important for fishers and traders;

WORRIED that human activity and climate change are causing widespread degradation and destruction of syngnathids' freshwater, transitional and coastal habitats (e.g. estuaries, coral reefs, mangroves, seagrass beds);

CONSCIOUS that about 80 countries have exported tens of millions of syngnathids annually for traditional medicines, dried seafood, aquarium display and curiosities;

DISTURBED that syngnathids are extracted by bottom trawls and other non-selective gear at unsustainable levels, particularly during biomass fishing;

DISMAYED about large declines in catch per unit e108ort for syngnathids in industrial and small-scale fisheries;

NOTING that the IUCN Red List of Threatened Species includes 113 syngnathid species as Threatened, Near Threatened or Data Deficient, with special concerns for seahorses (*Hippocampus* spp.), freshwater pipefishes and estuarine species;

APPRECIATIVE that the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) listed seahorses on its Appendix II and approved Decisions at the 18th Meeting of the Conference of Parties (CITES COP18, Geneva, 2019) to strengthen support for this genus;

CONCERNED that many CITES Parties face difficulties in implementation, with vast illegal exports of dried seahorses;

NOTING that bans on capture and export of syngnathids must be accompanied by constraints on non- selective fishing gear;

TROUBLED that aquaculture ventures for syngnathids often add to pressures on their wild populations; and

CONCERNED that syngnathids are released from captive populations or translocated haphazardly, without plans or monitoring;

The IUCN World Conservation Congress 2020, at its session in Marseille, France:

1. ENCOURAGES IUCN to:

a. use iconic syngnathids to promote action on broad ocean issues, including climate change; and

b. contribute to public databases on syngnathids, particularly iNaturalist and iSeahorse;

2. CALLS ON all Members, especially State and Government Agency Members, to:

a. take note that the Species Survival Commission (SSC) Seahorse, Pipefish and Seadragon Specialist Group can provide assistance on how to conserve syngnathids;

b. by 2022, ensure the status of all syngnathids is assessed and included in national/regional Red Lists as warranted;

c. support the work of the Seahorse, Pipefish and Seadragon Specialist Group in keeping the assessments of all syngnathids up to date;

d. ensure that initiatives to combat Illegal Wildlife Trade (including e-commerce) include syngnathids, as appropriate;

e. by 2021, for any release, apply SSC guidelines for reintroductions and translocations; and

f. protect and restore freshwater, transitional and coastal habitats that are important for syngnathid species, using best practices; and

3. URGES all IUCN State and Government Agency Members to:

a. enforce regulations on fisheries, area-based management, habitat protection, wildlife trade and other measures that affect syngnathids;

b. meet all CITES obligations for seahorses;

c. respecting Resolution 6.021 Monitoring and management of unselective, unsustainable and unmonitored (UUU) fisheries (Hawai'i, 2016), measurably reduce impacts of non-selective fisheries on syngnathids;

d. support implementation of Resolution 6.050 Increasing marine protected area coverage for effective marine biodiversity conservation (Hawai'i, 2016), to improve protection for syngnathid populations nationally;

e. ensure that fisheries programmes and subsidies do not threaten syngnathid populations; and

f. by 2021, restrict syngnathid culture to operations that have been subject to an appropriate/careful risk analysis prior to proceeding, and where results have concluded that it is reasonable/safe to continue.

Annex V. Global IUCN Red List Assessments for seahorse species occurring in the national waters of jurisdictions included in this report.

Hippocampus **species**	**Net exporter range States included in this report**	**Net importer range States included in this report**	**Global IUCN Red List status**
H. barbouri	ID, MY, PH		VU (Vulnerable)
H. bargibanti	ID, MY, PH		DD (Data Deficient)
H. comes	ID, IN, MY, PH, TH, VN	SG	VU
H. denise	ID, MY, PH		DD
H. histrix	ID, IN, MY, PH, TH, VN	CN, SG, TW	VU
H. kelloggi	ID, IN, MY, PH, TH, VN	CN, HK, TW	VU
H. kuda	ID, IN, MY, PH, TH, VN	CN, HK, SG, TW	VU
H. mohnikei	ID, MY, TH, VN,	CN, HK, SG, TW	VU
H. pontohi	ID, PH		LC (Least Concern)
H. satomiae	ID, MY		DD
H. spinosissimus	ID, IN, MY, PH, TH, VN	CN, HK, SG, TW	VU
H. trimaculatus	ID, IN, MY, PH, TH, VN	CN, HK, SG, TW	VU
H. waleananus	ID		NE (Not Evaluated)