CONVENTION ON INTERNATIONAL TRADE IN ENDANGERED SPECIES
OF WILD FAUNA AND FLORA

_____

Twenty-seventh meeting of the Animals Committee
Veracruz (Mexico), 28 April – 3 May 2014

BUILDING IN-COUNTRY CAPACITY TO UNDERTAKE NON-DETRIMENT FINDINGS WITH REGARD TO HIPPOCAMPUS SPECIES IN INDONESIA, THAILAND AND VIET NAM

1. The attached information document has been submitted by the Secretariat and has been prepared by Project Seahorse, Fisheries Centre, The University of British Columbia* in relation to agenda item 9.

* *The geographical designations employed in this document do not imply the expression of any opinion whatsoever on the part of the CITES Secretariat or the United Nations Environment Programme concerning the legal status of any country, territory, or area, or concerning the delimitation of its frontiers or boundaries. The responsibility for the contents of the document rests exclusively with its author.*

Building in-country capacity to undertake Non-Detriment Findings with regard to Hippocampus species in Indonesia, Thailand and Viet Nam

EU-CITES Capacity-building project
No. S-411

2013

CITES Secretariat

About the EU-CITES Capacity-building project

The project *Strengthening CITES implementation capacity of developing countries to ensure sustainable wildlife management and non-detrimental trade* was approved for funding by the European Union in 2009.

A major challenge for many countries is the difficulty in meeting the requirements for trade in CITES-listed species, ranging from legal sourcing and sustainability requirements, to the effective control of legal trade and deterrence of illegal trade. Mechanisms exist in CITES and in both exporting and importing countries that promote and facilitate compliance – although Parties are often hampered by a lack of capacity or a lack of current biological or trade information with respect to certain species. This can result in levels of trade which are unsustainable, which in turn can impact on economic growth and local livelihoods, and reduce options and incentives for conserving and managing wild resources effectively.

The overall aim of EU's support is to strengthen capacities to implement the Convention and satisfy the CITES-related requirements of trading partners (such as the European Union), to prevent overexploitation and to ensure legal international trade in wild fauna and flora does not exceed sustainable levels.

This publication is one of the reports and tools developed under this project, which provide information and guidance to Parties in a particular area of concern based on needs identified by developing countries.

This document was prepared by Project Seahorse, Fisheries Centre, The University of British Columbia, under a contract with the CITES Secretariat and made possible through funding received from the European Union.

Suggested citation:

Secretariat of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), 2013. *Building in-country capacity to undertake Non-Detriment Findings with regard to Hippocampus species in Indonesia, Thailand and Viet Nam*. Report prepared by Project Seahorse, Fisheries Centre, The University of British Columbia. Geneva, Switzerland, 110 pp.

Building in-country capacity to undertake non-detriment findings with regard to Hippocampus species in Indonesia, Thailand and Viet Nam

Report Submitted: October 31, 2013

PROJECT SEAHORSE
advancing marine conservation

UBC

UBC FISHERIES CENTRE

Project Title: *Building in-country capacity to undertake Non-Detriment Findings with regard to Hippocampus species in Indonesia, Thailand and Viet Nam*

Project Lead: Dr. Amanda Vincent

Project Staff: Dr. Sarah Foster, Mr. Stefan Wiswedel

Institute: Project Seahorse, Fisheries Centre, The University of British Columbia

Project Locations: Indonesia, Thailand and Viet Nam

Project Dates: December 11, 2012 – October 7, 2013

Date of Report: October 31, 2013

Summary:

Project Seahorse is proud to have executed high quality work on this contract, meeting all obligations within the agreed timeframe and budget. In collaboration with national CITES Authorities and experts, our deliverables under this contract advance and support the implementation of the Appendix II listing for seahorse species (*Hippocampus* spp.) in Indonesia and for those species under the Review of Significant Trade in Thailand and Viet Nam. We reviewed all available data on seahorse biology, ecology, habitats, threats, fisheries, trades and conservation action. We developed trade-appropriate identification materials. We created and revised a framework for making Non-Detriment Findings that underwent practical testing and will serve as a living document for implementation of the Convention for seahorses. We posted all documents on a dedicated web page (www.projectseahorse.org/NDF) to allow for ongoing improvements. Finally, and critically, we developed good relations with the national CITES Authorities and experts in Indonesia, Thailand and Viet Nam --- as the basis for continuing collaboration on implementation of the Appendix II listing for seahorses. Project Seahorse is most happy to have helped set precedent for supporting the first CITES Review of Significant Trade for marine fishes and is eager to contribute to all other implementations of marine fish listings on CITES Appendix II.

Preamble:

The overall aim of this project was to strengthen capacities of Indonesia, Thailand and Viet Nam to implement the Convention and satisfy the CITES-related requirements of trading partners (such as the EU), to prevent overexploitation and to ensure legal international trade in wild fauna and flora does not exceed sustainable levels.

The Secretariat is implementing a project to strengthen the CITES implementation capacity of developing countries to ensure sustainable wildlife management and non-detrimental trade. A major challenge for many countries is the difficulty in meeting the requirements for trade in

species listed on Appendix II, ranging from legal sourcing and sustainability requirements to the effective control of legal trade and deterrence of illegal trade. Mechanisms exist in CITES and in both exporting and importing countries that promote and facilitate compliance. Countries that are considered not to meet CITES requirements may be subject to a range of international compliance measures, including trade suspensions.

While mechanisms for identifying non-compliance and recommending actions to restore compliance are well developed, programmes to encourage and assist countries in meeting trade requirements are limited. Solutions are hampered by a lack of capacity in many exporting countries, and/or a lack of current biological or trade information with respect to certain species. This can result in levels of trade that are unsustainable, which in turn can affect economic growth and local livelihoods, and reduce options and incentives for conserving and managing wild resources effectively.

At AC25, three species of seahorses (*Hippocampus* spp.) were formally brought under the Review of Significant Trade (RST), after preliminary consideration. At AC26, the Significant Trade Working Group judged that there were Urgent Concerns about Thailand's implementation of the Convention for *H. kelloggi, H. kuda, H. spinosissimus* from Thailand, and Possible Concern about Viet Nam's exports of *H. kuda*.

At AC26, four more species of seahorse were formally brought under RST: *H. algiricus* (found only off West Africa), *H. barbouri, H. histrix* and *H. trimaculatus.* Compliance of certain range states with the Convention will be considered at AC27.

The European Union temporarily suspended imports of wild *Hippocampus* species *(H. barbouri, H. comes, H. histrix, H. kelloggi, H. kuda,* and *H. spinosissimus*) from Indonesia in 2007 on the advice of the European Union (EU) Scientific Review Group (SRG), until concerns outlined by the SRG are addressed. There is some confusion about EU acceptance of captive-bred seahorses from Indonesia, which seems somewhat variable.

Agreed Activities Completed Within the Contract:

The overall goal of the project was to assist CITES Authorities in Indonesia, Thailand and Viet Nam to develop approaches for making Non-Detriment Findings (NDFs) for proposed international trade in seahorses. This was achieved through three activities, which we now report.

Activity 1: Generate a step-by-step framework for development of adaptive management programmes and production of sound Non-Detriment Findings, in consultation with CITES Authorities, government agencies and national experts in Indonesia, Thailand and Viet Nam, to be disseminated at national consultative workshops (see Activity 3, below).

Expected output: (3b) Compilation of a step-by-step framework for development of adaptive management programmes and methods for making sound Non-Detriment Findings for seahorses.

Project Seahorse has developed a practical NDF framework that guides Parties through steps needed to make NDFs for proposed seahorse exports. Making NDFs for seahorses can seem challenging, especially where Parties feel they know little about their seahorse populations. Our framework built on the fact that most Parties already know enough to get going – and, in the spirit of adaptive management, will be able to improve their NDFs as they learn more.

Our step-by-step framework for the development of adaptive management programmes and production of sound NDFs for seahorses is now available on www.projectseahorse.org/NDF, and included with this report as Annex 1. This living document was developed in consultation with CITES Authorities from multiple countries, government agencies and national experts --- and remains open to revision. The first version of the NDF framework was provided (in Vietnamese) to a national consultative training workshop for CITES Authorities and national experts in Viet Nam in May 2013 (see Activity 3, below). The workshop provided a platform to facilitate input into the design and to generate ownership of the framework. The framework was revised based on the excellent feedback Project Seahorse received from workshop participants, and subsequently provided (in Thai) to a similar training workshop in Thailand in June 2013 (see Activity 3, below). This second version incorporates yet more helpful amendments from participants at the Thai workshop, as well as feedback obtained from colleagues at the Fisheries Centre at The University of British Columbia.

The framework presently consists of eight sections that guide Authorities through the steps needed to make an NDF assessment for proposed seahorse exports. Section 1 sets the stage, and Section 2 explains how to use the framework. In Section 3, Authorities first determine if they even need to make an NDF for the proposed export. If they do, Sections 4 and 5 guide them in making that NDF. Section 4 evaluates the pressures facing the seahorse species under consideration and Section 5 evaluates the ability of existing management to mitigate the risks identified in Section 4. These two sections each consist of a series of steps, each of which in turn is supported by guiding text, a flowchart and a worksheet; these three elements are all cross-referenced for ease of use.

Where risks are not being managed with good results, or are unknown, then Section 6 offers guidance and advice about how to improve management action and/or fill knowledge gaps, in support of adaptive management. If all risks are being managed appropriately and effectively, then Authorities turn to Section 7 which considers the final steps to take before issuing a permit in situations where an export has been considered non-detrimental to wild populations of seahorses. Finally, Section 8 lists useful resources for more information on seahorses and CITES/NDFs (in compliance our contract).

Project Seahorse must next take its NDF framework to IUCN Species Specialist Groups that cover CITES-listed marine species, e.g. sharks and rays, groupers and wrasses. A particular area that needs enhancement is the section that evaluates Party's existing management and whether it adequately mitigates identified risks to wild seahorse populations. Improvements to this section will undoubtedly arise from real-world applications of the framework. Project Seahorse is very mindful that ours is one of the first NDF frameworks for marine fish species and will provide a template for other taxa. We will need to translate the NDF framework into Thai and Vietnamese again once we have finished the Specialist Group consultations, and then assist these Parties to with their NDF process.

Our NDF framework for seahorses will be deployed soon as a resource tool at a meeting to plan an NDF framework for porbeagles (*Lamna nausu*). This meeting (to be held at IUCN in Gland, Switzerland, on 4 December 2013) will draw together experience from seahorses, humphead wrasse and other marine fish taxa listed on CITES Appendix II. Our experience in developing the NDF framework – in consultation with Parties and national experts – is precedent-setting for marine fishes and is eagerly sought by Dr. Sarah Fowler, ex-Chair of the IUCN SSC Shark Specialist Group, as she implements a grant from the German government. In return, we will garner expert input for further revision of our own NDF framework for seahorses.

Activity 2: Consolidate existing information on seahorse identification, biology, habitats, threats and conservation action for national consultative workshops (see Activity 3, below).

Expected outputs: (3c) Compilation of existing information on seahorse identification, biology, habitats, threats and conservation action (for the seven focal *Hippocampus* spp.), in a format which is easy to access and download for relevant stakeholders.

(3d) Production and dissemination of seahorse identification posters in national languages showing species at a national level, with taxonomic advice.

(3c) Before the NDF workshops in Thailand and Viet Nam, Project Seahorse compiled current understanding of species-specific seahorse life history and ecology (including habitats) into a downloadable spreadsheet. We then invited input from participants in the workshops in a bid to include all available data. The current version of this document has now been uploaded (in English only) to www.projectseahorse.org/NDF. This is a living document and will be constantly updated as new information becomes available.

During the NDF workshops in Thailand and Viet Nam, Project Seahorse and participants compiled and presented spreadsheets summarizing the current understanding of threats to seahorses (including fisheries) and conservation action in support of seahorses for sharing and discussion. We drew our information direct from the seahorse entries on the IUCN Red List of Threatened Species and National Red Lists, which Project Seahorse generates and / or manages in its role as the IUCN SSC Specialist Group for Seahorses, Pipefishes and Sticklebacks. As this information will always be the most current, we now direct Parties to these sources through www.projectseahorse.org/NDF; only English language versions are available.

Finally, Project Seahorse also distributed country-specific summaries of the seahorse fisheries and trade to participants at the NDF workshops, as hard copies and electronic pdf files. These were also provided to Indonesian Authorities and experts at a meeting in Jakarta in June 2013. All were provided in Bahasa Indonesian, Thai, and Vietnamese as appropriate.

(3d) Project Seahorse provided a bifurcating key to guide Parties in identifying the Southeast Asian seahorses commonly found in trade. We presented translated first drafts of this poster at the NDF workshops in Thailand and Viet Nam. The attached versions (also found at www.projectseahorse.org/NDF) – in Bahasa Indonesian, English, Thai and Vietnamese (see

Annex 2) – incorporate revisions from those consultations. The revised poster will be returned to the CITES Authorities in Indonesia, Thailand and Viet Nam, for distribution through available networks to Customs points, traders, researchers, etc.

Activity 3: Hold national consultative training workshops for CITES Authorities and national experts, specific to Indonesia, Thailand and Viet Nam. This will provide a platform to facilitate input into the design – and to generate ownership of the step-by-step framework for developing an adaptive management programme and undertaking NDFs.

Expected outputs: (3b) Compilation of a step-by-step framework for development of adaptive management programmes and methods for making sound Non-Detriment Findings for seahorses.

(3e) An English-language briefing to explain the potential utility of each data set for making NDFs, to highlight the critical gaps in knowledge and to indicate possible implications of any gaps and uncertainties for NDFs.

DEVIATIONS FROM THE AGREED PLAN: With approval from the CITES Secretariat, Project Seahorse deviated somewhat from the plan outlined in the signed Small Scale Funding Agreement. First, it turned out that neither Thailand nor Viet Nam could allocate money for the NDF framework workshops, as we had planned in the original contract budget. Their long budgetary processes meant that such funds simply could not be made available in the necessary time frame. The lack of matching funds from the Parties meant that we had a considerable shortfall in funds for those meetings.

The corollary, however, was that Indonesia was still some way from wishing to embark on an NDF workshop process (see Indonesia report, below). Essentially, as Indonesia was neither allowing wild export, nor a part of the current RST process, it felt that engaging with this workshop activity would give the impression that they were trying to solve an RST matter.

Therefore, with Secretariat approval, Project Seahorse did not hold a workshop in Indonesia – but instead travelled to Jakarta to consult with CITES-Indonesia and other stakeholders. The main goals of the visit to Indonesia were to understand the background to the EU ban on wild seahorse imports from Indonesia, and the current status of Indonesia's trade in seahorses. We report on the visit below. The funding that had been allocated for a workshop in Indonesia was instead re-directed toward covering the shortfall of the Vietnamese workshop. The Thai workshop funding shortfall was covered by a separate grant from the People's Trust for Endangered Species (PTES), but with material support from this contract (e.g. Project Seahorse airfares to Asia and salary support for Project Seahorse Project Leader and Project Assistant). We discuss these deviations again under the Budget Discussion section, below.

Indonesia:

Representing Project Seahorse, Dr. Sarah Foster travelled to Jakarta from 5-7 June 2013, to consult with CITES-Indonesia and other stakeholders. The original idea to hold an NDF

workshop for seahorses had already been set aside (with Secretariat approval) after remote consultation with CITES Indonesia (see: Deviations From The Agreed Plan, above). Instead, the main goals of the visit to Indonesia were to understand the background to the EU ban on wild seahorse imports from Indonesia, and the current status of Indonesia's trade in seahorses. Such knowledge will help inform action to ensure that international trade is not detrimental to wild populations.

On 5 June, Project Seahorse participated in a meeting at the Ministry of Forestry (MoF) with representatives from the CITES MA (MoF), CITES SA (LIPI), five CITES officers, ZSL Indonesia, the aquaculture industry and the Director of the Coral and Ornamental Fishes Association. CITES-Indonesia explained that it would be very difficult to make NDFs for international trade in (a) any dried seahorses and (b) live seahorses from the wild --- simply because the animals can be sourced from 17,000 islands across 33 provinces. As a consequence, CITES-Indonesia had decided to allow trade only in captive bred (F2+, coded as C) live seahorses, making the EU ban on wild imports rather irrelevant; Indonesia told Project Seahorse that the EU continues to accept Indonesian exports coded as C although we had previously understood this not to be the case. Seahorse aquaculture operations in Indonesia are apparently community based, and intended to provide alternative livelihoods for communities heavily dependent on marine resources; Indonesia intends to expand the number of such operations from a few to hundreds.

CITES-Indonesia confirmed that Indonesia ranks seahorses as priority species for conservation and management. Further, it expressed openness to research that could increase current understanding of (i) seahorse distribution and (ii) seahorse hot spots. Such knowledge could support fisheries for broodstock to supply proposed village-based seahorse culture operations, as well as informing the government mandated "re-stocking" programme for seahorses and other threatened species. Project Seahorse noted that the IUCN Reintroduction Specialist Group has guidelines for "re-stocking", especially when wild populations are still present. Indeed, Project Seahorse, as the IUCN Specialist Group, has considerable concerns about the proposed seahorse aquaculture ventures and will endeavour to communicate these appropriately to CITES Indonesia.

On 7 June, Project Seahorse met with two representatives at the Ministry of Marine Fisheries (MMAF), Directorate of Area and Fish Species Conservation (KKGI). They confirmed that seahorses are one of 15 priority taxa in Indonesia, and that KKGI would like to develop a national plan of action for seahorses. They noted, however, that KKGI lacks resources and would value support that might result in increase understanding of wild seahorse populations in Indonesia, again with particular reference to information about hot spots that could inform community-based spatial management. The following research priorities for seahorses emerged from discussion with KKGI:

- Trade surveys, to help develop an understanding of seahorse distributions, fisheries, domestic trade, and illegal trade.
- Development and promotion of iSeahorse, Project Seahorse's new global citizen science tool (www.iseahorse.org) that will help map seahorse distribution and track seahorse populations.
- A workshop on seahorses to set a national plan of action.

One June 7, Project Seahorse also met with TERANGI, an Indonesian NGO that partners with MoF and MMAF on developing "best practice" guidelines for ornamental fisheries, databases on landings of CITES-listed species (with sharks as the first priority), and Indonesian national and community based-MPAs. TERANGI was very interested in the potential offered by iSeahorse.

In the wake of these meetings, Project Seahorse and ZSL-Indonesia have begun drafting funding applications to undertake action for seahorses in collaboration with MoF, LIPI, and MMAF; Project Seahorse will be sending further information to these agencies and fostering ongoing communications.

Thailand:

Project Seahorse catalysed a productive NDF workshop at Burapha University, Bangsaen, from 10-12 June, 2013. The meeting was co-organised by Project Seahorse and the Thai Department of Fisheries (DoF), which serves as the CITES Authorities (Scientific and Management) for fisheries issues in Thailand. Our DoF colleagues had great enthusiasm for the process and experience. The discussions benefited wonderfully from simultaneous interpretation (both ways) by two very good professionals.

Participants included many DoF representatives (including senior officials, CITES Management and Scientific Authority staff, researchers, enforcement officers, and CITES staff at airports), along with representatives from the Thai Department of National Parks, the Department of Marine and Coastal Resources, university researchers, and citizen representatives (see Figure 1). Simultaneous interpretation made a big difference in communication.

Figure 1: Thailand NDF Workshop

The objectives of the workshop were to:

- Connect CITES Authorities, other government agencies, and national technical experts;
- Examine and revise the draft NDF framework;
- Share available knowledge on seahorse taxonomy, biology, habitats, threats, and conservation/management, including information from national scientists;
- Design programmes to monitor catch landings and effort data;
- Collectively revise the framework for making NDFs in light of the three workshop days of exchanges and explorations; and
- Provide assistance to the Management Authorities of Thailand in responding to relevant recommendations from CITES.

Further details of the workshop can be found in the appended report (see Annex 3). This report includes the agenda, participants list, and resulting action plan in support of moving Thailand's seahorse trade toward sustainability. The action plan serves as output 3e, highlighting the critical gaps in knowledge and indicating possible implications of any gaps and uncertainties for NDFs.

Workshop participants spent the first day reviewing all available knowledge of Thai seahorses, their habitats, and their catches and trade --- along with Thai fisheries and spatial management practices in general. Project Seahorse presented its knowledge. However, and as expected, the expert presentations at the workshop also allowed us to gather other existing information (particularly on spatial distribution of seahorses, potential threats and conservation measures in Thailand), much of which had never previously been formalised.

The second day was dedicated to working through the NDF framework, freshly revised from our Viet Nam workshop two weeks earlier. Participants broke into three groups, each focusing on one of the three species under RST, and enjoyed animated and interesting discussion. The result was a draft NDF for each species and yet more helpful amendments to the NDF framework.

Using the draft NDF framework, Thailand was not able to make a defensible NDF for its wild exports of *Hippocampus kelloggi*, *H. kuda* and *H. spinosissimus*. Workshop participants determined that all three species in Thailand are at some risk (medium, high or unknown) from fishing mortality or habitat damage / loss. Thailand has established numerous initiatives to help manage its near-shore fisheries, including spatial and temporal restrictions. However, the effectiveness of such measures for mitigating pressures on Thai seahorses remains unknown. Moreover, some pressures, such as posed by unregulated small-scale crab trap fisheries have still not been addressed.

Recognising that Thailand could not yet make an NDF for the three species of *Hippocampus* under review, the workshop developed action points that might address the gaps in knowledge and management. These have timelines and actors set against them, and are included in the appended workshop report (see Annex 3).

The third day revolved around a brainstorm session on how best to address remaining AC recommendations. Participants considered what existing information could be compiled to round out the seahorse story, what more needed to be done, what might be the trigger points for a

change in adaptive management, and what such changes might be. The last of these points was largely left for further consideration. The Director of the Marine Fisheries Research and Tech Development Institute proposed an annual Thai review process for seahorses, with an array of agencies and institutions represented.

Project Seahorse left the meeting encouraged by the discussions, having developed warm relationships with our Thai colleagues --- and advanced / opened further our collaboration with DoF. Thailand appears to be putting effort into measures that should benefit seahorses, to a level that should help in the RST process. All agreed that the work for *H. kuda*, *H. kelloggi* and *H. spinosissimus* would also be useful for analysing exports of their other seahorse species for non-detriment, especially with the Review of Significant Trade underway for *H. trimaculatus* (and *H. histrix*, for which the Party is mistakenly currently not recognized as a range state).

Project Seahorse has remained in active dialogue with Thai CITES Authorities since the workshop. We translated the action plan for distribution among DoF colleagues, and are planning to visit Thailand in early 2014 to review progress on action items, present the revised NDF framework, and foster ongoing communications.

Viet Nam:

Project Seahorse catalysed a positive and successful NDF workshop in Viet Nam from 29-31 May, 2013. The meeting was co-organised by Project Seahorse and the CITES Authorities (Scientific and Management) for Viet Nam. It included senior representatives from CITES Authorities, Fisheries, academia, government research and the aquaculture industry (see Figure 2); unfortunately NGO reps (e.g. IUCN, TRAFFIC) did not manage to overcome a late date change, however these groups are actually little involved in marine issues.

Figure 2: Viet Nam NDF Workshop

Project Seahorse trialled the new framework for making NDFs for seahorses, distributed in Vietnamese and English prior to the workshop. Two break out groups independently arrived at the same assessment of risk for *H. kuda* in all categories we had generated – and agreed that no NDF could be made. The framework itself proved good but with enough imperfections to reward collective engagement in fixing it. Indeed, it was encouraging to see the animated discussion that accompanied the trial.

Recognising that Viet Nam could not yet make an NDF for *H. kuda*, the workshop developed action points that might address the gaps in knowledge and management. These have timelines and actors set against them, and are included in the appended workshop report (see Annex 4). As with Thailand, the action plan serves as output 3e, highlighting the critical gaps in knowledge and indicating possible implications of any gaps and uncertainties for NDFs. Project Seahorse has agreed to try to help in a few instances, entirely in collaboration with counterparts at the CITES Scientific Authority, universities and Institute of Oceanography. We agreed that the work for *H. kuda* would also be useful for analysing exports of their other seahorse species for non-detriment, especially with the Review of Significant Trade underway for *H. trimaculatus / H. histrix*.

The NDF workshop was characterized by good humour and engagement, allowing us to reach a key goal of relationship building. The discussions benefited wonderfully from simultaneous interpretation (both ways) by a very good professional. The aquaculture industry sponsored a field trip for workshop participants, with seahorse releases and a dinner / beach party. Project Seahorse mentioned that any seahorse releases really should be undertaken within the framework of the IUCN Reintroduction Specialist Group guidelines.

Project Seahorse has remained in active dialogue with the Vietnamese CITES Authorities since the workshop. We are in the process of seeking research permission for a post-doctoral fellow to visit Viet Nam in early 2014 to help conduct a rapid assessment of Viet Nam's seahorse populations and generate engagement with our new citizen science platform for seahorses – iSeahorse. We are also planning to visit Viet Nam in early 2014 to review progress on action items, present the revised NDF framework, and foster ongoing communications, and for life history research to be carried out in Viet Nam in mid-2014.

Future Plans:

Project Seahorse is very keen to obtain further financial support for work on implementing Appendix II listings for seahorses, and hopes the Secretariat will assist in identifying sources. We need to act on our strong relationships with both Viet Nam and Thailand; both still have some way to go before they can make reliable NDFs for seahorses and both seek support to embark on action items arising from the NDF workshops. In addition, Indonesia considers seahorses to be priority species and is keen to develop a national action plan for their conservation. As well, AC27 will consider more seahorse issues involving more Parties under the ongoing Review of Significant Trade --- and likely generate recommendations that require additional support to Parties. We are highly qualified and eager to engage in this work.

We note that our work under this contract is already proving useful in the development of frameworks for Non-Detriment Findings for porbeagle (*Lamna nasus*) and other sharks. We are confident that continued progress on seahorse implementation, especially through the RST, will provide precedent and template for other marine fishes listed on CITES Appendix II. Moreover, such progress will be forged with seahorses, the marine fishes that are arguably the least controversial marine fish species on the CITES Appendices, and thus the most likely to generate constructive engagement by Parties apprehensive about CITES marine fish listings.

Acknowledgements:

This project was funded by the European Commission through the CITES Secretariat. Additional support came from The People's Trust for Endangered Species, Guylian Chocolates Belgium, an anonymous donor through their partnerships for marine conservation with Project Seahorse, and the John G. Shedd Aquarium.

Project Seahorse wishes to thank our Indonesian, Thai and Vietnamese colleagues for their welcome, expertise and positive engagement. We particularly thank the CITES Authorities in all countries, both Scientific and Management, who were marvellous counterparts in all respects.

Annexes:

Annex 1 – NDF Framework
Annex 2 – Seahorse ID Posters (1 each in English, Vietnamese, Thai, and Bahasan Indonesian)
Annex 3 – Thai Workshop Report
Annex 4 – Viet Nam Workshop Report

Annex 1

NDF Framework

Table of contents

LIST OF TABLES

PREFACE

This framework for making Non-Detriment Findings (NDFs) for seahorses (*Hippocampus* spp.) was developed to meet an obligation to The CITES Secretariat under a project entitled ***Building in-country capacity to undertake non-detriment findings with regard to Hippocampus species in Indonesia, Thailand and Viet Nam***. The overall goal of the project was to assist CITES Authorities to develop approaches for making NDFs for proposed CITES trade in seahorses.

Project Seahorse is uniquely poised to provide such assistance because of its unusual blend of expertise in seahorse research, management and policy. Project Seahorse is the recognised global authority on seahorse biology, trade, and fisheries management, as measured by its diverse seahorse-expertise roles, including: (i) IUCN SSC Specialist Group for Seahorses, Pipefishes and Sticklebacks; (ii) Chair, CITES Working Group on syngnathids; (iii) FishBase Authority for syngnathids; (iv) authors of papers and definitive taxonomy, and more.

One activity under the project was to generate a step-by-step framework for the development of adaptive management programmes and production of sound NDFs for seahorses, in consultation with CITES Authorities, government agencies and national experts. Key inputs for the framework came from guidelines to support CITES Authorities in making NDFs for perennial plants[1], and the outcomes of the Fishes Working Group at the International Workshop on CITES Non-Detriment Findings, held in Cancun, Mexico in 2008[2].

A first draft of the NDF framework for seahorses was presented at a national consultative training workshop for CITES Authorities and national experts in Nha Trang, Viet Nam in May 2013. The workshop provided a platform to facilitate input into the design – and to generate ownership of – the framework. The framework was revised based on the excellent feedback we received from workshop participants, and subsequently presented at a similar training workshop in Thailand in June 2013. Version 2 incorporated yet more helpful amendments from participants at the Thai workshop, as well as feedback obtained from colleagues at the Fisheries Centre at The University of British Columbia. This version (3) has been further amended to reflect ideas arising from a discussion with colleagues with respect to a similar framework for sharks.

We have made English, French and Spanish versions available to all Parties at www.projectseahorse.org/NDF and aim to return translated versions of the framework to Viet Nam and Thailand. However, this framework and supporting material are living documents (continually updated) so please check for new versions regularly, and contact us with any suggestions for improvement. We want to hear from you. Our next step is to take the framework to several IUCN Species Specialist Groups that include CITES listed marine species, e.g. sharks and rays, groupers and wrasses. A particular area that needs enhancement is the section that evaluates Party's existing management and whether it adequately mitigates identified risks to wild seahorse populations. Improvements to this section will undoubtedly arise from real-world applications of the framework.

[1] http://www.traffic.org/home/2012/11/19/living-fossils-used-as-trade-case-studies.html
[2] http://www.cites.org/eng/prog/ndf/index.shtml

ACKNOWLEDGEMENTS

This project was funded by the European Commission through the CITES Secretariat. Additional support came from: The People's Trust for Endangered Species (PTES); Guylian Chocolates Belgium and an anonymous donor through their partnerships for marine conservation with Project Seahorse; and the John G. Shedd Aquarium.

Project Seahorse heartily thanks our Thai and Vietnamese colleagues, particularly those from the CITES Management and Scientific Authorities, for their welcome and positive engagement in the development of this framework. We also thank the Conservation and Research Foundation whose seed money allowed for important first visits to Thailand and Viet Nam.

1. INTRODUCTION

1.1 Rationale

This framework is intended to help CITES Authorities in making "Non-Detriment Findings" (NDFs) for seahorses (see Section 1.3, below). We realise making NDFs for seahorses can seem challenging, especially where Parties feel they know little about their seahorse populations. But the truth is you already know enough to get going. Truly. **A lot can be done right away with the information you have.** Then – in the spirit of adaptive management – you can improve your NDFs as you learn more. The more your seahorse populations are exploited or under pressure from people, the more you will need to pay attention to fixing the NDFs.

This framework and the guidance we provide are intentionally generic. They need to apply to many Parties, each with different situations, limitations and opportunities. **It is for you to decide which parts are appropriate and practical for your Party's situation.**

1.2. What CITES means for seahorses

In November 2002, CITES Parties voted to list all seahorse species (*Hippocampus* spp.) on Appendix II, with implementation in May 2004.

This means the export of seahorses requires a permit from CITES Management Authorities (MAs).

Such an export permit should only be granted when all three of the following conditions have been met[3]:

1.2.1. Formal CITES text: a Scientific Authority of the State of export has advised that **such export will not be detrimental to the survival of that species (in the wild)**;

Informal explanation: The export of seahorses must not harm wild populations of seahorses. *We address this condition in Section 3.1 and Section 4.*

1.2.2. Formal CITES text: a Management Authority of the State of export is satisfied that **the specimen was not obtained in contravention of the laws of that State** for the protection of fauna and flora;

Informal explanation: Seahorses caught in a way that violated any laws must not be exported. *We address this condition in Sections 3.2.*

[3] http://www.cites.org/eng/disc/text.php#IV

1.2.3. Formal CITES text: a Management Authority of the State of export is satisfied that **any living specimen will be so prepared and shipped as to minimize the risk** of injury, damage to health or cruel treatment.

Informal explanation: Live seahorses have to be treated humanely when shipped from one country to another. *We address this condition in Section 8.1.*

1.3. What is an NDF?

An NDF – "Non-Detriment Finding" – is how Parties show that condition 1.2.1 (*above*) **has been met** – that exporting seahorses will not harm wild populations.

1.4. How can exports *harm* wild seahorse populations?

Most seahorses in trade are fished from the wild. Many of the same characteristics that make seahorses such interesting animals also make them vulnerable to heavy fishing and habitat damage. Indeed, we know that **wild seahorse populations usually do badly under heavy fishing pressure.**

- Seahorses are generally found in low numbers, and are patchy in distribution – this means even low rates of removal can significantly reduce population numbers.
- The male seahorse becomes pregnant and this means the babies depend on their father until they are born. If males are fished when they are pregnant, then none of their babies survive.
- Seahorses form long-term pair bonds. Many only mate with a single partner throughout the breeding season. If one of the seahorses is removed, the other stops reproducing unless it can find a new mate.
- Seahorses of most species have very small home ranges, and as mentioned are generally found in low numbers (low densities). This makes it hard for seahorses to find each other
- Seahorses are very slow swimmers, which prevents them from escaping fishing pressure, and means they can be slow finding other seahorses.
- Adult seahorses do not get eaten much by other marine life because of their good camouflage. This makes fishing a relatively new pressure on seahorses, and one they have not evolved to deal with.
- Seahorses are mostly found in coral reef, seagrass and mangrove habitats. All of these habitats are under pressure from human activities worldwide, putting seahorses under pressure too.

All that said, there are many ways Parties can reduce potential harm to wild populations, and as a result have both seahorse trade and healthy seahorse populations (*more on this in Section 5*).

Project Seahorse has summarised the life history and ecology of seahorses globally, as we know it – you can find this information online at www.projectseahorse.org/NDF[4]. You will see there are many gaps for many species. Indeed, compared to many commercially important fish species,

[4] Be sure to check www.projectseahorse.org/NDF regularly for updates of this information.

we know very little about the life-history and biology of seahorses. Section 7.2 suggests ways to fill those gaps – but we will get back to that later.

1.5. Why all this talk about fishing and habitats? Isn't CITES about trade?

Yes, CITES is about international trade. But **NDF assessments must consider ALL pressures facing your seahorses**. So even very small export volumes could pose a problem – and potentially need reduction – if your seahorses are threatened in other ways. For example, if your seahorse habitats are in bad shape, or there is a large domestic or illegal trade, then any export might be unsustainable. That is why we will consider fishing pressures in Section 4.3 and threats to seahorse habitats in Section 4.5. This is also why, when considering trade pressures in Section 4.4, we consider domestic consumption, and illegal, unregulated and unreported (IUU) fisheries and trades; if either of these is big, then even a small international trade can be too much for a population to handle.

1.6. Section summary

- CITES Appendix II listing for all seahorse species means seahorse exports require a permit issued by the exporting Party's CITES Management Authority.
- **Three conditions** must be met before that permit can be issued:
  The proposed export **will not harm wild** populations (Section 1.2.1).
  The proposed export is of **legally acquired** specimens (Section 1.2.2).
  When applicable, live seahorses are being **shipped humanely** (Section 1.2.3).
- **A Non-Detriment Finding (NDF) determines if the first of these conditions (1.2.1) is being met** – that the proposed export will not harm wild populations of seahorses.
- A preliminary NDF assessment can be made with very little information, and improved as knowledge improves.
- **NDFs need to consider ALL pressures** on a population – not just those imposed by international trade.

It's common to feel a bit lost at this stage, with so much to absorb. That's why the next section explains how this framework will guide you in making NDFs for your seahorse exports. Please go to Section 2.

2. HOW TO USE THE FRAMEWORK

This framework will guide you through the steps needed to make an NDF assessment for proposed seahorse exports.

2.1. How the framework is structured

Section 3 will help you first determine **if you even need to make an NDF** for the proposed export.

If you do, **Sections 4, 5 and 6 will guide you in making that NDF**. Sections 4 and 5 each consist of a series of steps. Each step is supported by **guiding text, a flowchart and a worksheet**. These three elements are all cross-referenced for ease of use.

In **Section 4 you evaluate the pressures** facing the seahorse species under consideration.

- Section 4.1 will help you determine the species in trade.
- In Section 4.2 you describe the pressures facing wild populations of that species in your Party's oceans.
- In Sections 4.3 through 4.5 you assess the risk to the species (low, medium, high or unknown) from fishing, trade and habitats pressures, respectively.

In **Section 5 you evaluate the ability of existing management to mitigate the risks** identified in Section 4. You will consider whether existing management is appropriate for the risks (Section 5.2.1), whether it is being implemented (Section 5.2.2), and whether it is indeed effective at reducing the identified pressures in support of sustainable seahorse populations and so sustainable trade (Section 5.2.3).

Completing Sections 4 and 5 should provide Scientific Authorities sufficient information to make a decision about the NDF, and **we consider the NDF options in Section 6.**

Where risks are not being managed with good results, or are unknown, then **Section 7 offers guidance and advice about how to improve management** action (Section 7.1) and/or **fill knowledge gaps** (Section 7.2), in support of adaptive management.

If all risks are being managed appropriately and effectively, then you can turn to **Section 8 which considers the final steps to take before issuing a permit** in situations where an export has been considered non-detrimental to wild populations of seahorses.

Finally, **Section 9 lists some useful resources** you can consult for more information on seahorses and CITES/NDFs.

2.2. Sources of information for making NDFs

As mentioned in the previous section, a lot can be done right away with existing information – you just have to know where to find it. **So where can you find existing information on seahorse species** biology, ecology, threats, management and conservation? There are the usual places – such as the primary (published, peer-reviewed) literature. Project Seahorse maintains a database of seahorse publications that we would be happy to share with you. Project Seahorse has also summarised the life history and ecology of seahorses globally, as we know it – and you can find this information online at www.projectseahorse.org/NDF, along with links to other key seahorse resources (see also Section 9). **But there are other important places to look for information as well, and we touch on them here.**

NDFs should be scientifically sound and defensible. That means that regardless of where you get your information, it is important to consider its quality and reliability. The less confident you are about the quality of information, the more precautionary you must be when assessing risk to your species from pressures (Section 4), and when evaluating the ability of existing management measures to mitigate those risks (Section 5).

2.2.1. Conservation assessments

A species conservation assessment evaluates whether members of it are still alive, and how likely the species is to become extinct in the near future. Many factors are taken into account when assessing conservation status: not simply the number of individuals remaining, but the overall increase or decrease in the population size over time, breeding success rates, known threat, etc.

2.2.1.1. Global status, or, the IUCN Red List

The IUCN Red List of Threatened Species (www.iucnredlist.org) is the best-known worldwide conservation status listing and ranking system. Species are classified by experts into nine categories of risk reflecting criteria such as rate of decline, population size, area of geographic distribution, and degree of population fragmentation.

- Critically Endangered (CR), Endangered (EN), and Vulnerable (VU): These indicate that the species is threatened with extinction.
- Near Threatened (NT): This species does not currently qualify for threatened but may do so in the near future.
- Least Concern (LC): This species has little risk of becoming extinct.
- Data Deficient (DD): This species has been assessed, but we do not know enough to assess its status. Such a designation gives no information about the conservation status of the species, good or bad.
- Not Evaluated (NE): This species has never been assessed.

The species assessments found at www.iucnredlist.org include summaries of the information used to make the assessment – such as taxonomic notes, geographic range, population information and trends, habitat and ecology, threats, and conservation action. **The information is all cited and peer reviewed.**

2.2.1.2. National conservation status

The conservation status of a species globally may be different from the status regionally or nationally. Because of this some countries also have national assessment lists (http://www.nationalredlist.org/). Most of these lists use the same approach as the IUCN Red List, but consider the populations within a country. These are also often called Red Lists or Red Data Books. Some, but not all, of these also include summaries of the information used to make the assessment.

Many seahorses on the Red List are listed as DD, and there are some NEs. If you discover that your species is without a global or national conservation status and would like to change that please contact Project Seahorse. Project Seahorse is the IUCN Species Specialist Group (SSG) for seahorses and their relatives, and so coordinates the conservation assessments for these species. We will be pleased to guide you in assessing your species!

2.2.1.3. Which list should I use?

Since CITES is implemented at the national level, use the national assessment if there is one. If the national assessment is non-existent, out of date, or unreliable, then the global assessment can be used. However, **you should consider that the conservation status of the species globally could be very different from its status in your country.** A species that is threatened globally could be flourishing in any range state, or a species of Least Concern globally could be highly threatened locally.

2.2.1.4. IUCN Red List ≠ CITES

It is important to note that the IUCN Red List is not the same as CITES, although they are often confused. The confusion comes from the fact the IUCN Red List and CITES use similar sets of criteria to evaluate species for inclusion. But the criteria are not identical. And the lists differ in their regulator capacities.

The IUCN Red List is a flagging device. It is intended to draw attention to species that may be in need of conservation intervention, or to those we need to learn more about. The listing of a species on the Red List as threatened or otherwise has no legal consequences.

The listing of a species on CITES has legal consequences. When a species is listed on a CITES Appendix, its international trade MUST be regulated by signatory Parties or the Party could face review and eventual sanctions.

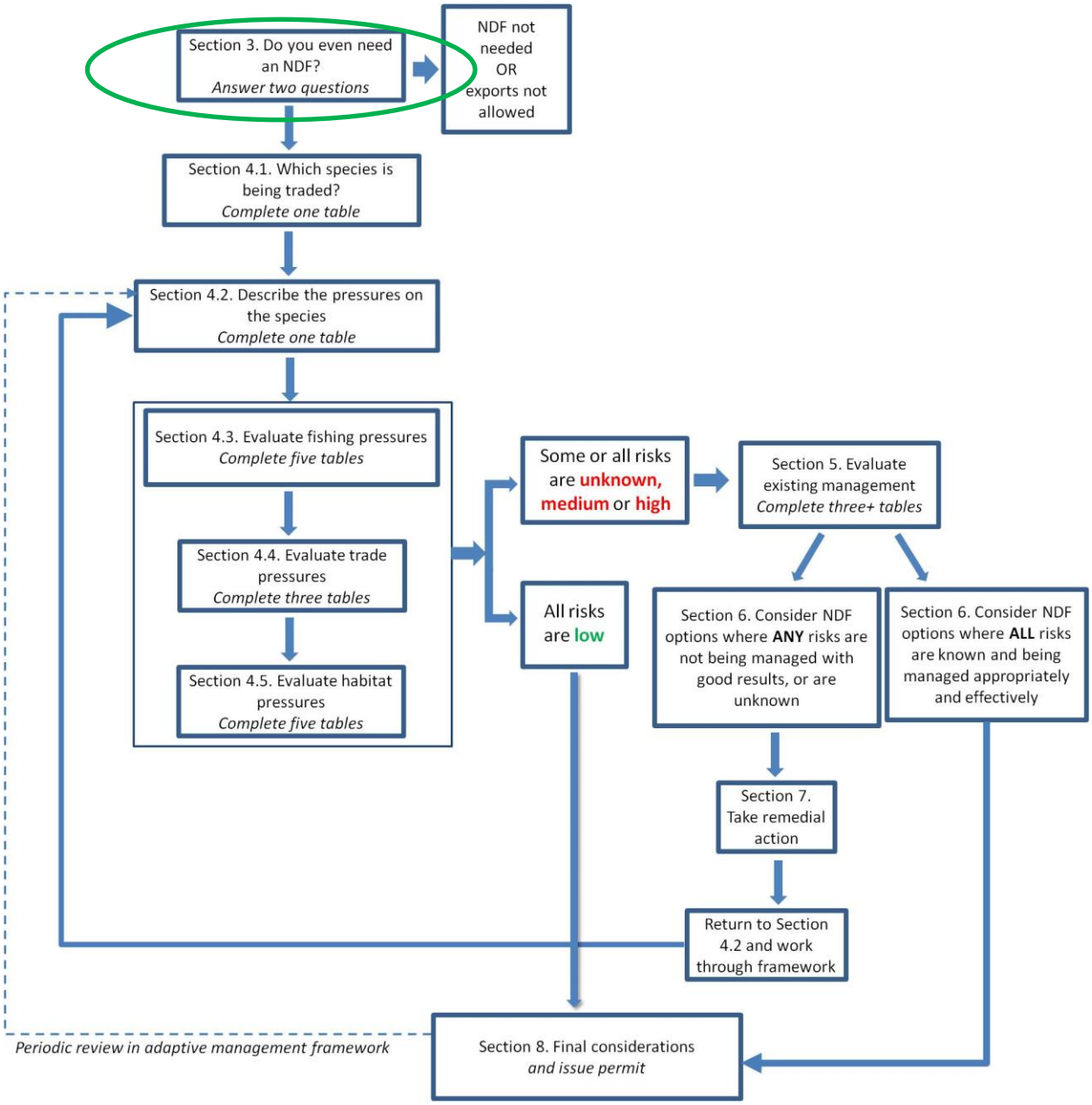
2.2.2. National experts

The other important sources of information for making NDF assessments for seahorse species are your regional experts. You can consult Project Seahorse to find out about your Party's seahorse experts. However important information can also come from people that know nothing about seahorses at all, but know a lot about the habitats they live in, the fisheries that catch them, the management that might affect them. **We suggest bringing these experts together to work through this framework** – doing so will reveal how much is already known, and what gaps need to be filled in understanding of seahorse populations and pressures.

Ok – let's get started. Please move to Section 3 to determine if you even need to make an NDF. You might not...

Flow chart to support Section 2. How to use the framework

This chart represents all sections of the framework, starting with the next section (Section 3) in which you determine if you even need to make an NDF. **We will use this summary flowchart to guide us through the framework from this point forward.**



3. DO YOU EVEN NEED AN NDF?

Answering just two questions will determine if you even need to make an NDF for the proposed exports.

3.1. Could the proposed trade harm *wild* seahorse populations?

Remember condition 1.2.1 for granting an export permit: the proposed export of seahorses should not harm **wild** populations. So you need to **start by asking about the source of the seahorses** for which the permit is being sought.

Sources of seahorses generally fall into one of three groups, of which two need NDFs[5].

You DO need to make an NDF for these two groups:

3.1.1. Wild caught seahorses (seahorses taken from the wild). If the seahorses were taken from the wild you have to make an NDF. This includes those that were taken from the wild and then kept in captivity for some time before export (i.e. "ranched").

3.1.2. Offspring of wild caught seahorses. The offspring of wild caught seahorses are known as "F1" generation and the parents as "broodstock". If the parents were taken from the wild, then you have to make NDFs for the parents. Export of their offspring (F1) can be a particular problem for wild populations where a lot of wild parents must be brought into captivity to maintain culture production.

If the permit application is for seahorses from groups 3.1.1 (wild caught) or 3.1.2 (offspring of wild caught) then go to Section 3.2. If not, keep reading.

You DO NOT need to make an NDF for this group:

3.1.3. Offspring of captive born parents. The offspring of captive born parents (F1) are known as "F2" generation. The offspring of F2 parents are known as "F3", and so on. In cases where offspring are born to captive born parents there is little or no reliance on wild seahorses – and little or no chance of harming wild populations. So you do not need to make an NDF.

If the permit application is for group 3.1.3 (offspring of captive born parents) – and you have the documentation to prove it – then you can stop here. Your job is done, as no NDF is needed.

[5] http://www.cites.org/common/com/ac/19/X-AC-19i-06.pdf

3.2. Are the seahorses legally obtained?

Remember condition 1.2.2 for granting a CITES permit: that seahorses sourced from activities that **violate national laws cannot be traded**.

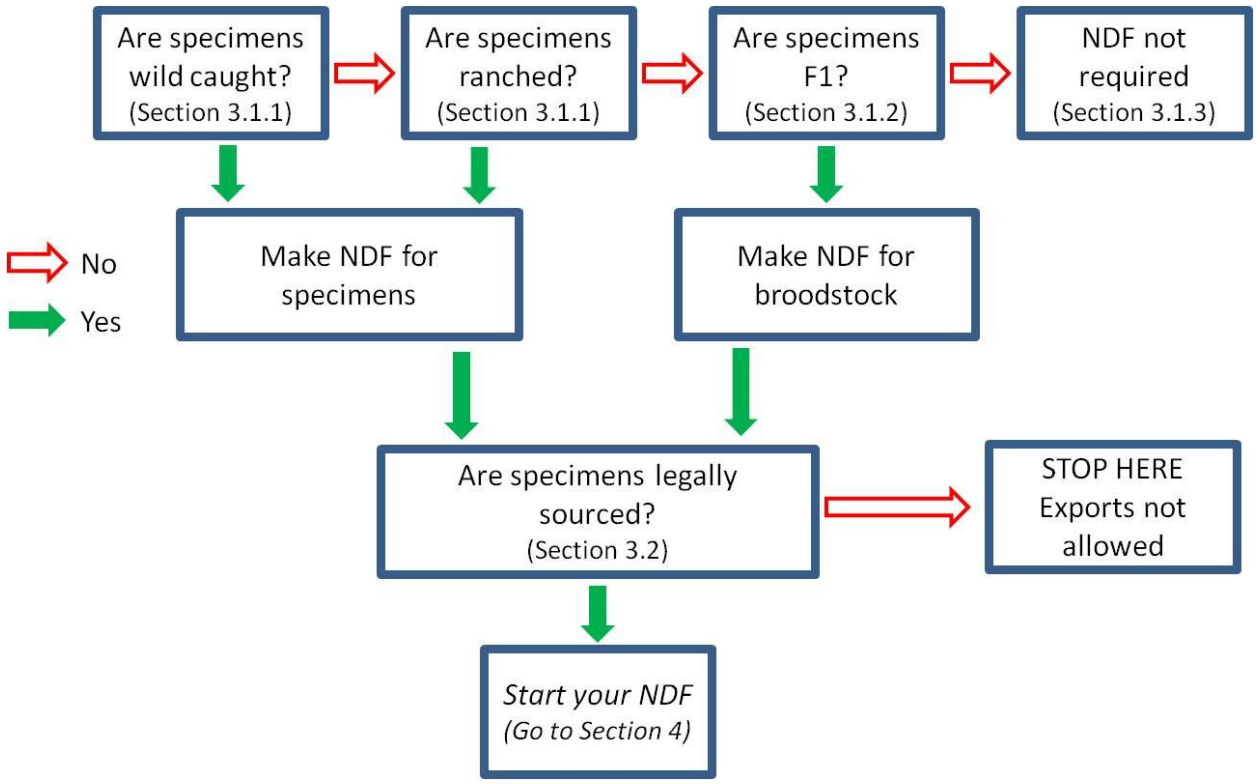
Examples of seahorses sourced in ways that violate national laws:

- Sourced from illegal fishing activities, such as from trawlers operating in areas closed to trawling;
- Taken from inside the boundaries of no-take marine protected areas (MPAs) or reserves;
- Caught during closed fishing seasons;
- Caught even though regional or national laws prohibit fishing seahorses.
- And, of course, if export is banned by national legislation.

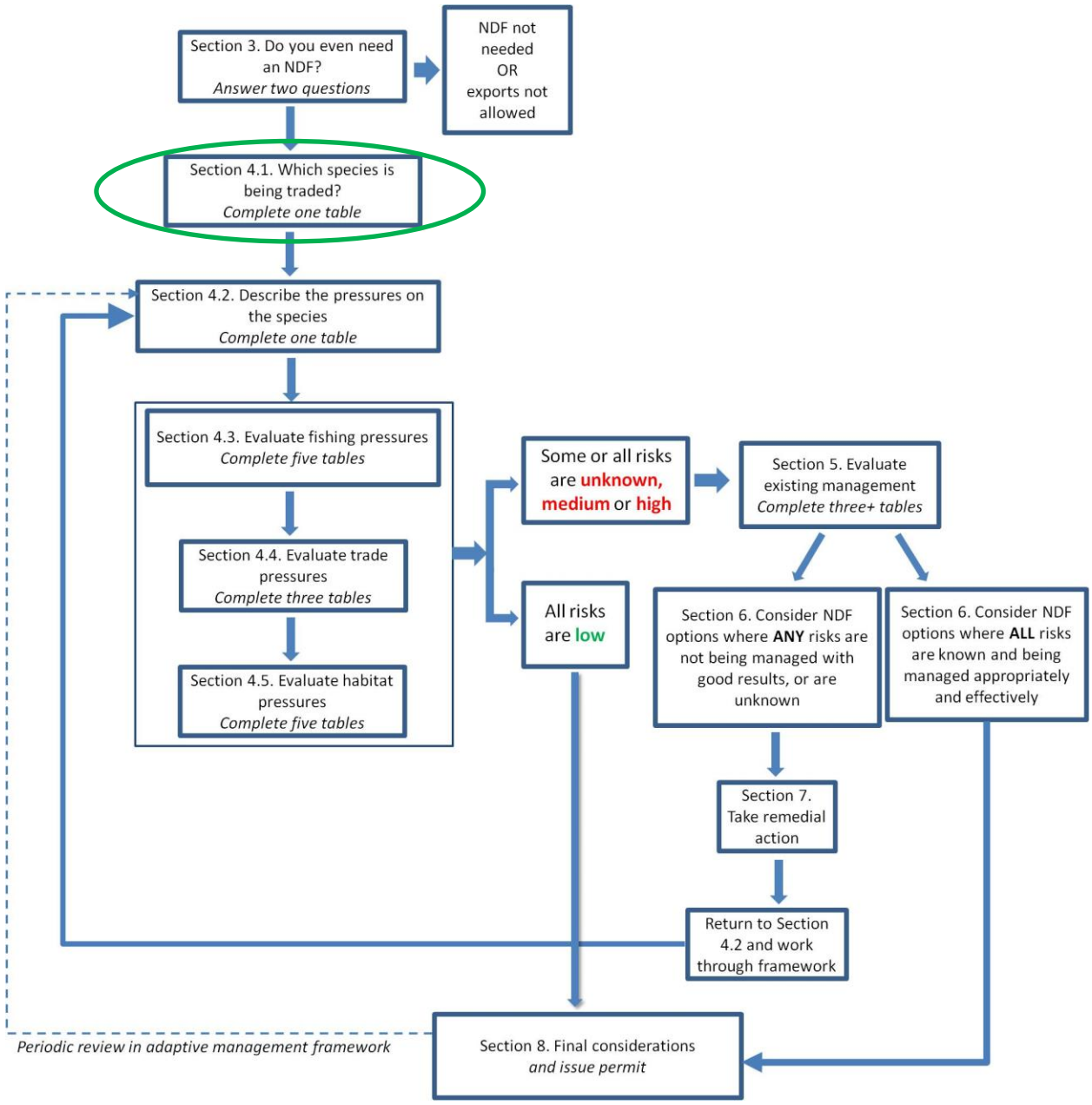
If the seahorses were caught in a way that violates any national laws then stop here. You cannot grant an export permit for those seahorses.

If the seahorses were legally obtained, move to Section 4 and start your NDF.

Flow chart to support Section 3. Do you even need an NDF?



Where we are headed next



4. EVALUATE PRESSURES ON THE SPECIES

This section considers situations where export has the potential to harm wild populations (from Section 3.1), and exported specimens are legally obtained (from Section 3.2). We will work through Sections 4.1-4.5:

- Section 4.1 will help you determine the species in trade.
- In Section 4.2 you will consider and summarise the pressures on your wild seahorse populations.
- Sections 4.3-4.5 will help you evaluate the risk to wild populations of your species associated with the pressures identified in Section 4.2.

4.1. Which seahorse species is being traded?

All NDFs should be made at the species level. CITES Management Authorities (MAs) are supposed to ensure the seahorse is correctly identified on the permit application. Correctly is when the name agrees with the nomenclature adopted by CITES[6]. Doing this will greatly improve the use and value of the CITES data (which come from Parties' permits) in tracking the international trade in seahorses (*more on this in Section 8*).

The challenges, of course, are that (a) seahorse species can all look much the same and (b) dried seahorses are commonly exported as mixed species shipments. But you can still move forward effectively.

4.1.1. What if I need help determining the species?

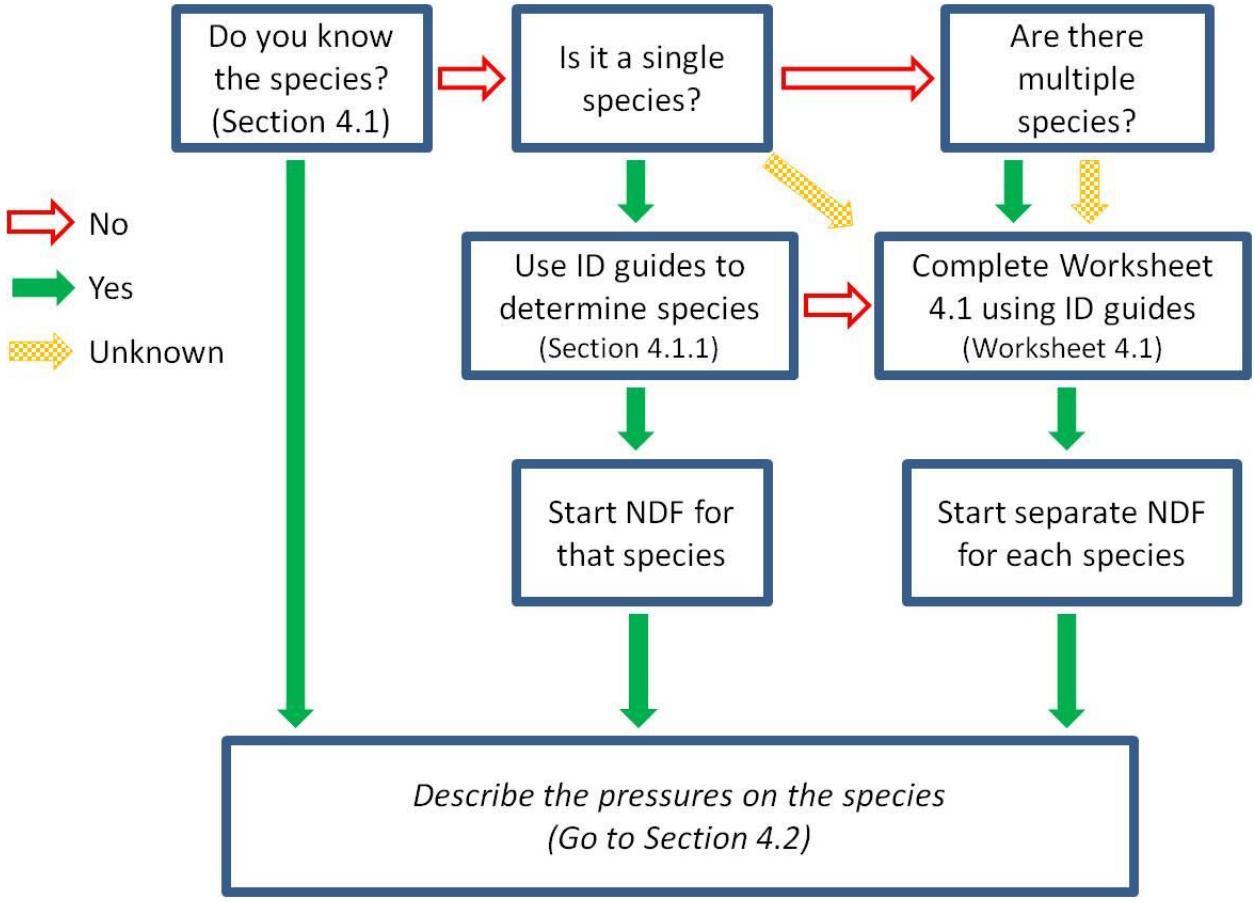
CITES Authorities should use the identification guides produced by Project Seahorse. The guides can be found online at www.projectseahorse.org/NDF.

You can take a sub-sampling approach where you suspect a shipment consists of more than one seahorse species. **Remember, you will need to make separate NDFs for each of those species.** Worksheet 4.1 will guide you in the process, but to summarise you take a random sample of any shipment with multiple species and identify all seahorse species in that sample. Then, you assume that each species comprises the same proportion in the full shipment as it did in the sample. You might miss some of the less commonly traded species, **but it is unrealistic to expect Authorities or enforcement agencies to identify every individual in a shipment of 1,000, 10,000 (or more!) seahorses.** Indeed to try might be very discouraging ---

If you know the species, move to Section 4.2. If you don't, then turn to Worksheet 4.1.

[6] see CITES Resolution 12.11 (Rev. COP15)

Flow chart to support Section 4.1. Which seahorse species is being traded?



Worksheet 4.1. Which seahorse species is being traded?

Instructions:

Using Table 4a:

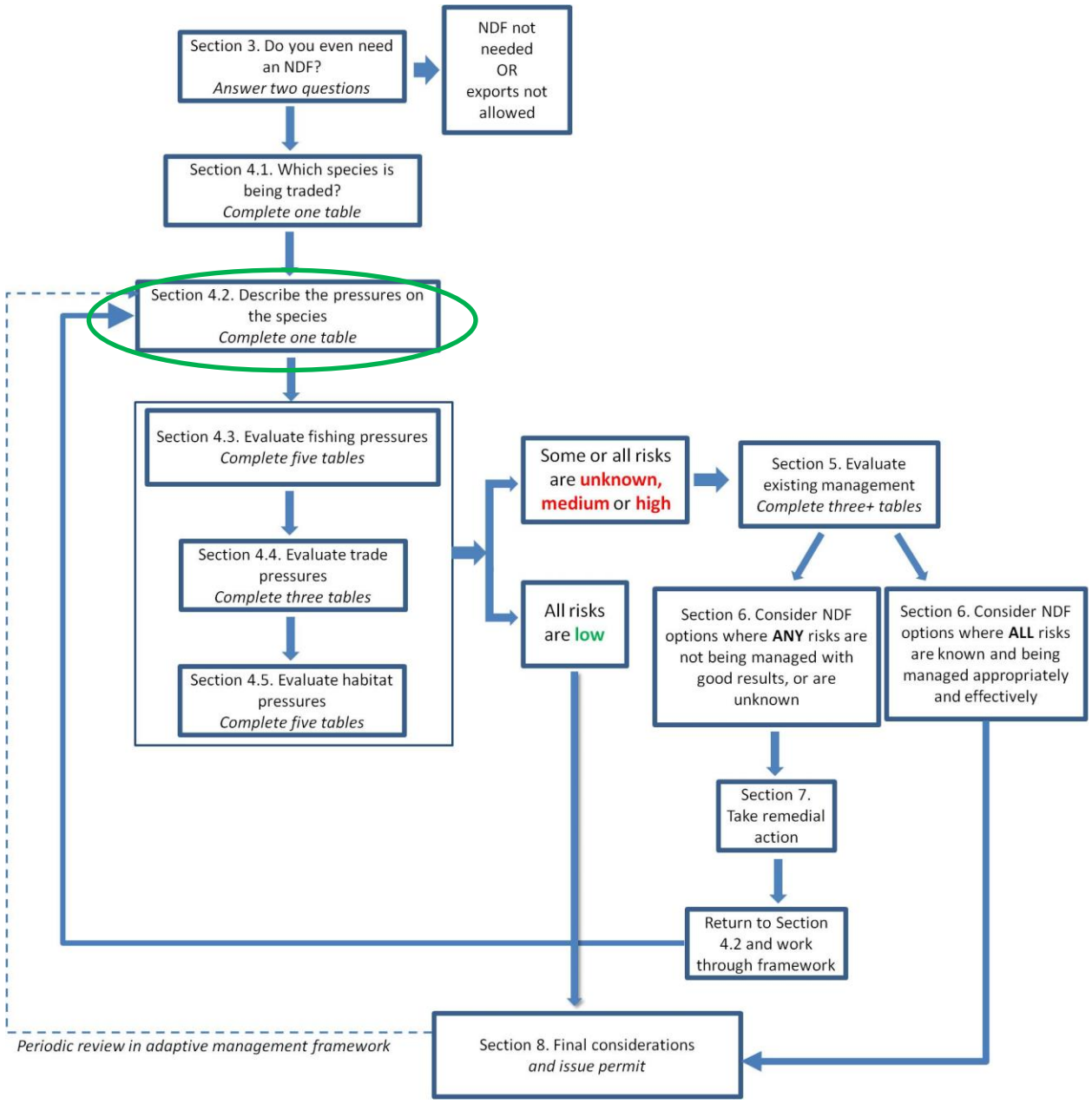
- Record the weight or total number of **all individuals in the proposed shipment** in **cell X.** For dried shipments, weight will almost always be easier.
- **Take a sample** of the shipment – make it as big as possible but also remember you will need to identify every individual in the sample. So be realistic.
- Record the weight or total number of **all sampled individuals** in **cell Y**.
- **Identify each seahorse in the sample**, using the identification materials at www.projectseahorse.org/NDF where needed, and sort the sample according to species.
- **Record each species** you found under column heading: ***Hippocampus sp.***
- Record the weight or total number of **individuals of each species** in the sample under column heading: **Weight or number of species in sample.**
- Finally, **extrapolate** from the sample up to the entire shipment, by doing the math under column heading: **Total weight or number of species in shipment.**
- *Hint: The sum of all entries under* **Total weight or number of species in shipment** *of Table 4a should be equal to the value recorded in cell X.*

Table 4a. Determining the species composition of proposed seahorse shipments.

Total weight or number of all individuals in the shipment		X
Weight or number of all individuals in the sample		Y
***Hippocampus* sp.**	**Weight or number of species in sample**	**Total weight or number of species in shipment**
species 1	a	=a*(X/Y)
species 2	b	=b*(X/Y)
species 3	c	=c*(X/Y)
species 4	d	=d*(X/Y)
species 5	e	=e*(X/Y)
species 6	f	=f*(X/Y)
species 7	g	=g*(X/Y)
species 8	h	=h*(X/Y)

Congratulations! Now that you have identified your species, move to Section 4.2.

Where we are headed next



4.2. Describe the pressures on the species

Seahorses are under pressure from many human activities. These activities in turn lead to population declines, destruction or damage of their habitats, or changes in their distribution. We now provide some examples of threats to seahorses, recognising that fisheries and trade are intimately linked.

4.2.1. Overfishing – bycatch

The vast majority of seahorses in trade (as much as 95%) are caught incidentally by shrimp trawlers – such secondary, or non-targeted, catch is called bycatch. Many seahorses are likely to be particularly vulnerable to capture in shrimp trawls because they are found in the same benthic habitats as shrimp, swim slowly and are the same size as targeted shrimp. Seahorses are also obtained in many other gear types including beach, shore and purse seines to crab pots. Seahorses caught as bycatch mostly go into the dried trade, but can sometimes enter the live trade (although they usually die from injuries). *We re-visit bycatch in Section 4.3.*

4.2.2. Overfishing – target catch

Some Parties have a targeted seahorse fishery. Although these fisheries are usually small, **they can make big impacts where seahorse populations are small or depleted**. Most target seahorse fisheries occur in developing countries where fishers catch seahorses by hand or by using small hand-held nets. Seahorses caught this way can be sold into either the dry or live seahorse trade. *We re-visit target catch in Section 4.3.*

4.2.3. Overfishing – IUU

Illegal, unreported and unregulated (IUU) fishing practices occur worldwide; it is estimated that that IUU fishing occurs in most fisheries, and accounts for up to 30% of total catches in some important fisheries[7]. Much of our understanding of population trends and trade in seahorses comes from surveys of fishery landings; it is therefore important to understand the extent of IUU fishing as it could have considerable influence on population estimates. Also, proposed management solutions to control pressures on seahorses may not be effective if much of the fishing pressure is IUU. *We re-visit IUU for fisheries and trades in Section 4.4, and management practices in Section 5.*

4.2.4. Inadequately managed trade

The global trade in seahorses is vast, complex and diverse. Seahorses are traded dry for traditional medicines and for curios, and live for the aquarium trade. Many millions of animals are exchanged among at least 80 countries every year. Most of this trade is dried, and most of the seahorses are sourced from countries in Southeast Asia and West Africa and sold to East Asia. The majority of seahorses are sold whole, but they can also be ground up and included in prepared medicines. Any processing before first export makes tracking seahorse trade difficult.

Many countries also have a significant domestic demand for seahorses – for traditional medicines and souvenirs. *We re-visit trade in Section 4.4.*

[7] FAO 2010. The State of World Fisheries and Aquaculture (SOFIA).

4.2.5. Habitat loss and degradation

Knowing your species habitat preferences – its range within your Party's waters, preferred depths and habitat types – will be important when evaluating habitat pressures in Section 4.2, and when assessing the potential of existing management measures to mitigate risks to your species in Section 5.

Most species of seahorses are found in seagrasses, coral reefs or mangroves. Seahorses can also be found on sandy, muddy or rocky bottoms, or living on artificial habitats (like nets or cages). Many species live in two, three, or all of these habitats. Abiotic factors – such as temperature, pH, salinity, and water quality, are also important components of seahorse habitat.

Seahorse habitats are globally declining due to threats such as: coastal development, fishing (e.g. trawling), pollution, sedimentation, and climate change. There can be both habitat loss (i.e. reduced area covered by a critical habitat) and fragmentation (i.e. breaking apart of continuous habitat into small patches), or habitat degradation (when habitat quality declines).

***Seagrasses*:** A quarter of all seagrass species are threatened with extinction – this threat is centred on species found in the tropics[8], where many seahorse species are also found.

***Coral reefs*:** Over 60% of coral reefs in the ocean are threatened by direct human impacts such as too much fishing, destructive fishing, coastal development and pollution. This number increases to over 75% if thermal stress from global climate change is considered[9].

***Mangroves*:** The main threat to mangroves is coastal development, including aquaculture. Globally there has been a 20% decline in mangrove cover in the past 25 years and most of this has occurred in Asia[10], which is also the centre of seahorse diversity.

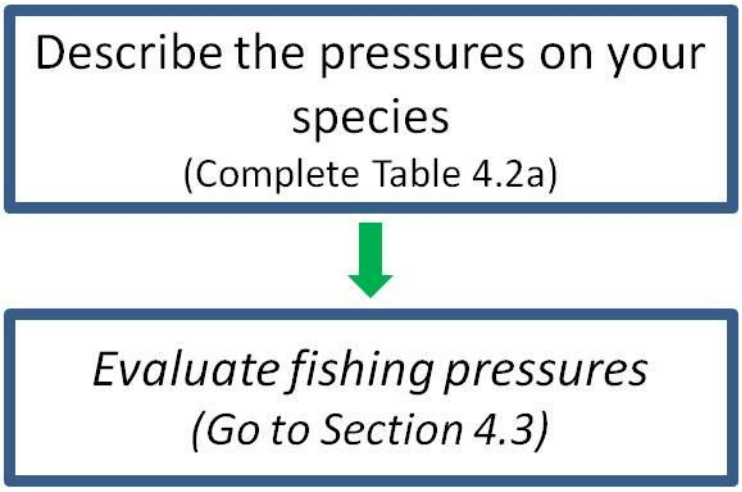
***Abiotic factors*:** Human activities can result in deleterious changes to abiotic components of marine habitats. For example: cause increased pollution – including that from noise, increased temperature, changes in salinity, decreased water clarity, excessive nutrients in runoff, increased sedimentation.

We re-visit habitats in Section 4.5.

It is now time to summarise the pressures on your seahorse species. Please complete Worksheet 4.2. It would be helpful to consult the species' global or national conservation assessment, if one exists (see Section 2.2.1). You may also want to bring your experts together in a workshop to complete the worksheet (see Section 2.2.2).

[8] Short *et al*. 2011. Biological Conservation. 144(7): 1961–1971
[9] Burke *et al.* 2011. Reefs at Risk Revisited.
[10] FAO 2007. The world's mangroves 1980-2005.

Flow chart to support Section 4.2. Describe the pressures on the species



Worksheet 4.2. Describe the pressures on the species

In this section you will consider and summarise what is known or unknown about the pressures facing wild populations of the seahorse species requiring the NDF in your Party's waters. You will need this information to complete the rest of the framework. Include as much detail and you can – do not be constrained by the size of Table 4.2a, it is here for guidance only.

Table 4.2a. Describe pressures on populations of the seahorse species being considered. Identify if each of the following is an extant pressure on populations of the seahorse species being considered, and describe its nature.

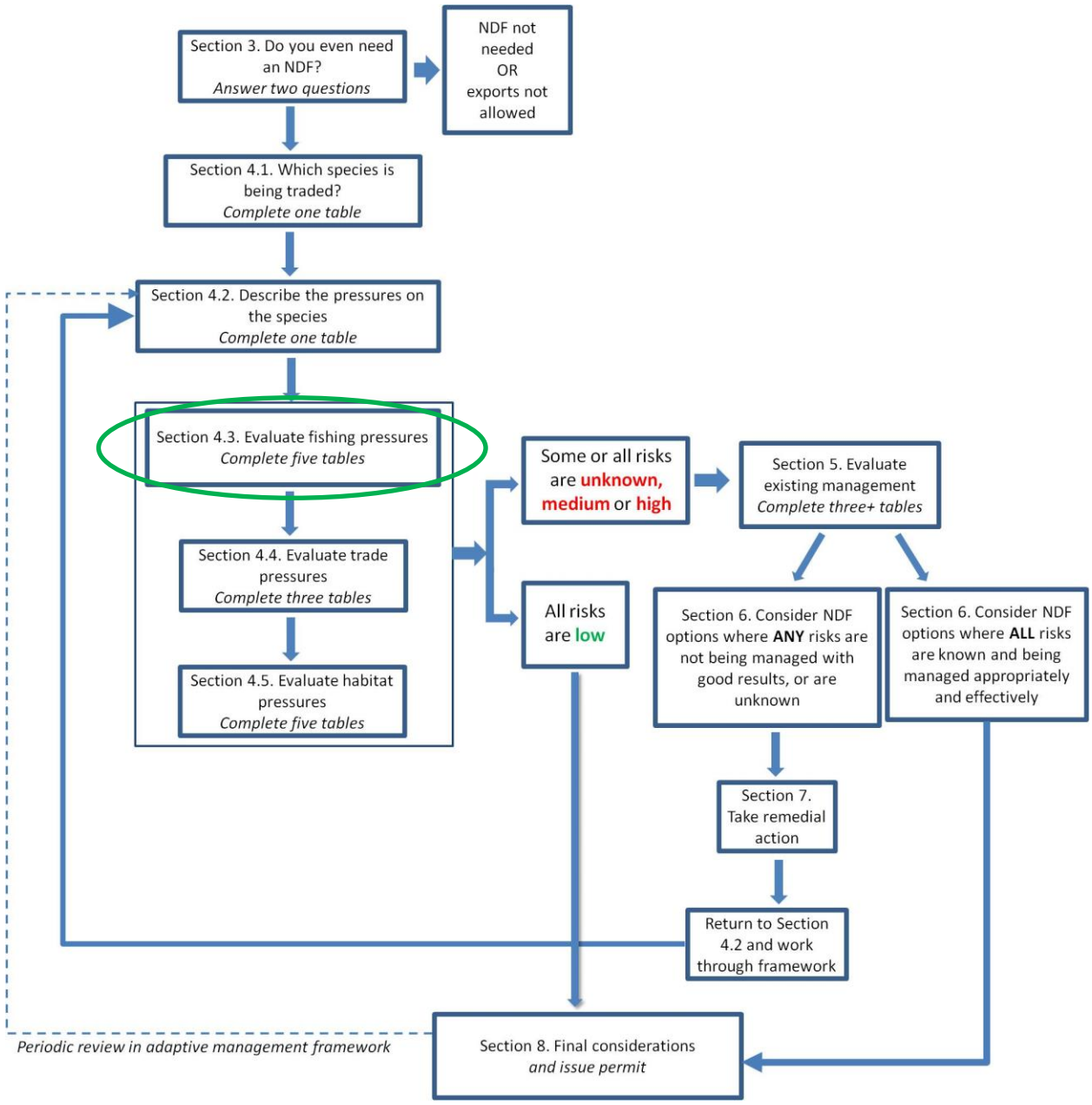
Seahorse species under consideration:		
Pressure	**Circle one**	**Describe**
FISHING – Consider all fishing methods and gears that interact with the seahorse species		
Bycatch	Yes No Unknown	
Target catch	Yes No Unknown	
IUU fishing	Yes No Unknown	
TRADE – Consider all trades (dried: whole, processed; live) that involve the seahorse species		
International trade	Yes No Unknown	
Domestic trade/consumption	Yes No Unknown	
IUU trade	Yes No Unknown	

Table 4.2a. Continued...

Seahorse species under consideration:		
HABITAT – Consider each of the seahorse species habitats		
Describe the species habitats in your nations waters	Geographic range:	
	Depth range:	
	Habitats:	
Pressure	**Circle one**	**Describe**
Habitat loss / fragmentation	Yes No Unknown	
Habitat degradation	Yes No Unknown	
Changes in abiotic habitat (e.g. temperature, salinity, pH, noise pollution, water quality)	Yes No Unknown	

Congratulations! Now that you have described the pressures on your species (if any), move to Section 4.3.

Where we are headed next



4.3. Evaluate fishing pressures

As mentioned in Section 4.2, **seahorses entering international trade are obtained as bycatch or from target fisheries**. Fishing pressure can pose many serious problems for seahorses. The more fisheries you have interacting with your seahorse populations, the more complicated your NDF assessment will be.

4.3.1. Seahorse fisheries

4.3.1.1. Bycatch

The vast majority of seahorses in trade (as much as 95%) are caught incidentally by shrimp trawlers – called bycatch. Many seahorses are likely to be particularly vulnerable to capture in shrimp trawls because they live in the same habitats as shrimp, live on the sea floor, swim slowly and are the same size as targeted shrimp. Seahorses are also obtained in many other gear types, ranging from beach, shore and purse seines to crab pots.

Sometimes fishers sort the seahorses from the bycatch. Many of these seahorses are destined for international trade. But sometimes the seahorses are thrown back (discarded), or are sent with the rest of the low-value catch to be processed into fishmeal or fertilizer.

***There are two important take home messages with respect to bycatch*:**

- **Many catches of just a few seahorses add up to a total take of many many seahorses**. There are a great many trawlers, a great many fishing gears, and a great many fishing trips. If each trawler catches only one or two seahorses a night, those tiny catches can total hundreds of thousand, even millions, of animals caught each year. This is well documented[11].

- **Although some gear types do land seahorses alive, you should assume any seahorse caught by any gear will be a dead seahorse.** Even when seahorses are thrown back alive, they are not likely to survive. There is effectively no chance that a discarded seahorse will survive injuries from gear and depth changes, escape predation, find its mate, and end up in suitable habitat.

4.3.1.2. Target catch

Most direct exploitation for syngnathids is by small-scale or subsistence fishers in developing countries, although some are taken by aquarium collectors in developed countries.

[11] e.g. Baum *et al*. 2003. Fishery Bulletin 101: 721–731; Giles *et al*. 2006. Biodiversity and Conservation 15: 2497-2513; Perry *et al*. 2010. Aquatic Conservation: Marine and Freshwater Ecosystems 20: 464–475.

4.3.2. Potential fishing impacts

Indirect or direct fishing can affect seahorse individuals, populations and species in a variety of ways. For example (also see Section 1.4):

- injure or kill individuals;
- reduce reproduction by catching more of one sex than the other;
- reduce reproduction by splitting mated pairs;
- limit future population growth by selecting for particular sizes/ages; and/or
- damage habitats (especially true of bottom trawls).

4.3.3. What determines fishing impacts?

Parties should **consider at least three factors when evaluating potential for fisheries impacts** on seahorses.

4.3.3.1. The number of fishing methods and/or gears that interact with the species. The greater the diversity of fishing methods and/or fishing gears that interact with your wild populations of seahorses, the more complex your assessment and management of fishing impacts will be. This in turn results in a seahorse trade that is very challenging to understand, monitor and regulate.
To estimate impact, you need to understand which fishing methods/gears interact with seahorses.

4.3.3.2. Fishing mortality – the proportion of the total population that is removed by fishing. This in turn depends on:

- type of impact (what gears are used, if any);
- frequency of impact (continuous / regular, as distinct from occasional); and
- extent of impact (whether there are non-fished parts of population).

For seahorses, an appropriately precautionary rate of fishing mortality would be: $F \leq 0.5*M$ (M = natural mortality).
To estimate impact, you need to compare the number of seahorses in the wild to the number being caught. You should be conservative when estimating abundance, especially given the patchiness of seahorse populations.

4.3.3.3. Size selectivity – which seahorse sizes/ages are caught and which are left. Different fisheries may catch different size/age classes. This factor considers if fishing has the potential to harm the breeding population and influence recruitment. **If a fishery takes all the small/immature individuals**, there are no fish left to mature and contribute to the next generation. **If a fishery takes all the large/mature individuals**, then over time the mature adult population is depleted to a level where it no longer has the reproductive capacity to replenish itself – there are not enough adults to produce offspring. Therefore, in the case of fisheries, being highly selective for only smaller or larger size classes can lead to greater negative impacts on wild populations.
To estimate impact, you need to compare length frequency plots of seahorses in the wild and in the catch.

4.3.3.4. Discard rates – the proportion of the catch that is actually landed compared to that which is thrown back, or sent for processing with the rest of the low valued catch. What we know about seahorse fisheries comes largely from trade surveys and a few sets of landing data. These data do not account for the seahorses that are thrown back. **Fishing may be a big and unknown pressure where discard rates are high.** Remember – you should assume any seahorse caught by any gear will be a dead seahorse – even if thrown back alive (see take home messages in Section 4.3.1.1).
To estimate impact, you need to know something of discard rates so you can related landed seahorses and caught seahorses.

Illegal, unregulated and unreported fisheries (IUU) also pose a particular challenge – but we address this issue in Section 4.4 (4.4.1.2 in particular).

4.3.4. What are the indicators of adverse fishing impacts?

Authorities can find clues to the adverse impacts of fishing practices by monitoring their seahorse populations or catches over time for any of the following parameters:

Declines in:
- Geographic distribution (presence/absence across space).
- Relative abundance [population size and/or catch per unit effort (CPUE)].
- Mean size of animals.
- Frequency of male pregnancy (indicates disruption of breeding activities).
- *Sex ratio* (*not a decline per se, but a change*).

4.3.5. Monitoring for indicators of adverse fishing impacts

Monitoring for indicators of adverse impacts from fishing activities can occur on two levels:

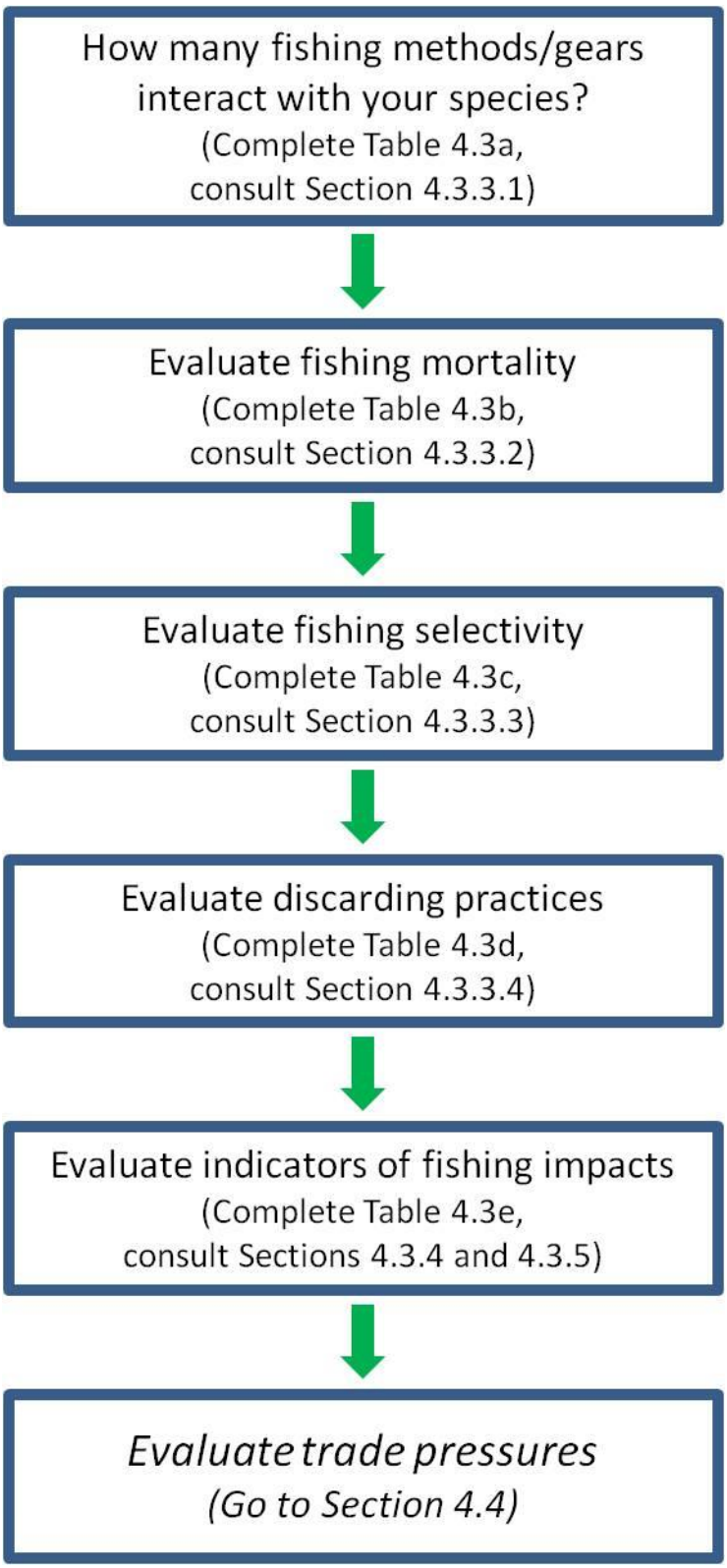
4.3.5.1. Population monitoring – usually consists of underwater surveys of seahorse populations (using SCUBA or snorkel), but may also involve using pushnets or other gears to systematically survey seahorses in shallow waters. Project Seahorse has a toolkit for underwater seahorse monitoring, available at www.projectseahorse.org/NDF, and can provide guidance for Parties wishing to try other means.

4.3.5.2. Fisheries monitoring – monitor catches, including discards where possible – or at least landings. The key to fisheries dependent monitoring is to **collect information on fishing effort** – the data are only truly useful and dependable if they are accompanied by a measure of effort. Project Seahorse has a toolkit for monitoring seahorse landings at ports, available at www.projectseahorse.org/NDF. There are of course many other approaches to fisheries dependent monitoring, such as ob-board observers, deployment of Vessel Monitoring Systems (VMS) and/or onboard cameras. As with the rest of this framework you need to consider which approaches are appropriate and practical for your situation.

We suggest that Parties set up specific "sentinel" or indicator populations and/or fisheries that can be monitored at regular intervals over time to evaluate fishing impacts on their wild seahorse populations. Parties need to evaluate the feasible frequency for sampling, seeking consistency in timing. We recommend repeating surveys annually at a minimum – recognising that more frequent monitoring will provide useful information more quickly.

Please complete Worksheet 4.3 to evaluate the fishing pressures faced by your species.

Flow chart to support Section 4.3. Evaluate fishing pressure



Worksheet 4.3. Evaluate fishing pressures

For each table, circle the level of risk that is associated with the row option that corresponds to the seahorse species needing the NDF. Consider all fishing pressures you described in Worksheet 4.2 (Table 4.2a) together.

Table 4.3a. Evaluate risk from the diversity of fishing methods/gears that interact with your species. Corresponds to Section 4.3.3.1 in text.

Seahorse species:	
Diversity of fishing methods/gears	**Risk**
Caught by one method/gear	Low
Caught by a few methods/gears	Medium
Caught by many methods/gears	High
Methods/gears unknown	Unknown
Reasoning	

Table 4.3b. Evaluate risk from fishing mortality. Corresponds to Section 4.3.3.2 in text.

Seahorse species:	
Fishing mortality	**Risk**
Small proportion of population removed by all fishing activities (low rate of fishing mortality)	Low
Moderate proportion of population removed by all fishing activities (medium rate of fishing mortality)	Medium
High proportion of population removed by all fishing activities (high rate of fishing mortality)	High
Unknown proportion of population removed by all fishing activities (unknown rate of fishing mortality)	Unknown
Reasoning	

Table 4.3c. Evaluate risk from fishing selectivity. Corresponds to Section 4.3.3.3 in text.

Seahorse species:	
Fishing selectivity	Risk
Fisheries are not selective for any age-size classes	Low
Fisheries are moderately selective for certain age-size classes	Medium
Fisheries are highly selectivity for certain age-size classes	High
Unknown selectivity for age-size classes	Unknown
Reasoning	

Table 4.3d. Evaluate risk from discarding practices. Corresponds to Sections 4.3.1.1 and 4.3.3.4 in text.

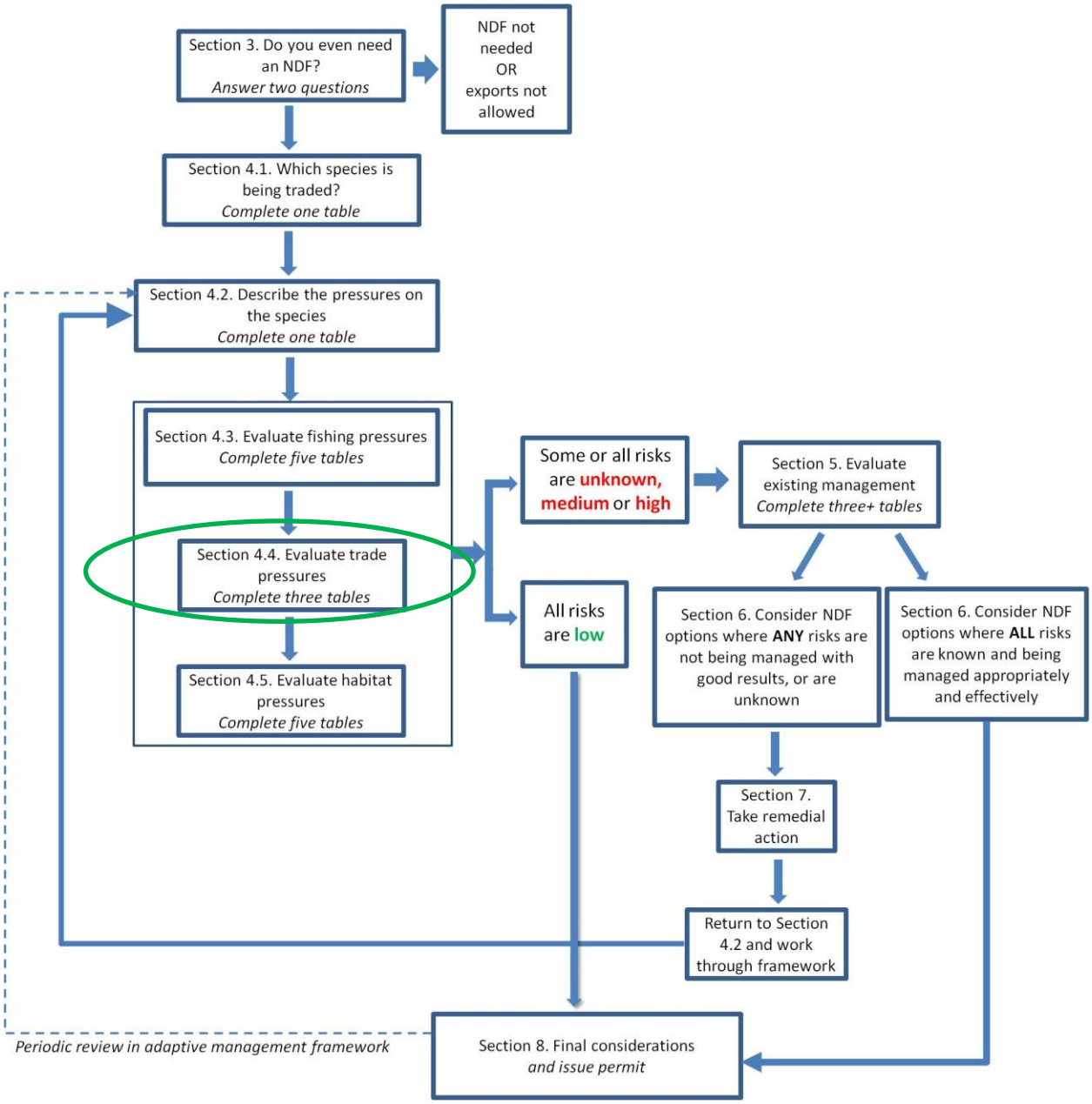
Seahorse species:	
Discarding practices	**Risk**
None or only a small proportion of total catch is thrown back	Low
A moderate proportion of total catch is thrown back	Medium
A large proportion of total catch is thrown back	High
An unknown proportion of total catch is thrown back	Unknown
Reasoning	

Table 4.3e. Evaluate indicators of adverse fishing impacts. Corresponds to Sections 4.3.4 and 4.3.5 in text.

Seahorse species:	
Indicators of fishing impacts	**Risk**
No observed declines in any of the indicators of adverse fishing impact	Low
Moderate observed declines in any of the indicators of adverse fishing impact	Medium
Large observed declines in any of the indicators of fishing impact	High
Unknown change in any of the indicators of adverse fishing impact	Unknown
Reasoning	

Congratulations! Now that you have evaluated the pressures your species faces from fishing (if any), move to Section 4.4.

Where we are headed next



4.4. Evaluate trade pressures

As we have mentioned in the introduction to this framework (Section 1), **NDFs must consider all pressures on a species**, not just that posed by export for international trade. That is why we had to consider fishing pressures in Section 4.3, and will consider threats to their habitats in Section 4.5. This is also why in this section we consider both domestic consumption, and illegal, unregulated and unreported (IUU) fisheries and trades; if either of these are big, then even a small international trade can be too much for a population to handle.

4.4.1. Factors to consider when considering trade

Parties should **consider at least three factors** when evaluating potential trade pressures on seahorses.

4.4.1.1. How many ways is the species used?

The more uses for seahorses (e.g. dried whole and/or processed for traditional medicines, dried for souvenirs, live for public aquaria, live for home aquaria, etc.), the more markets for seahorses, and the more complex the networks of domestic and international trade for seahorses. This in turn results in a seahorse trade that is very challenging to understand, monitor and regulate.

4.4.1.2. Does illegal, unregulated or unreported (IUU) fishing and/or trade comprise a significant part of the total trade in the seahorse species?

This can be answered by asking:

- How different are fishing and trade records?
- Are fisheries and trades (both domestic and international) well documented?
- Is the trade chain transparent?

Remember condition 1.2.2 for issuing a CITES permit – that the specimens were legally sourced. Therefore, if you know that the specimens to be traded came from illegal fishing practices then you cannot issue an NDF (see Section 3.2).

4.4.2. What are indicators of adverse trade impacts?

Authorities can find clues to adverse impacts of trade practices by monitoring their seahorse trades over time for any of the following parameters:

Declines in:

- Supply.
- Relative abundance [trade per unit effort (TPUE)].
- Mean size of animals.
- Frequency of male pregnancy (indicates disruption of breeding activities).
- *Sex ratio* (*not a decline per se, but a change*).

Increases in:

- Demand.
- Price.

4.4.3. Monitoring for indicators of adverse trade impacts

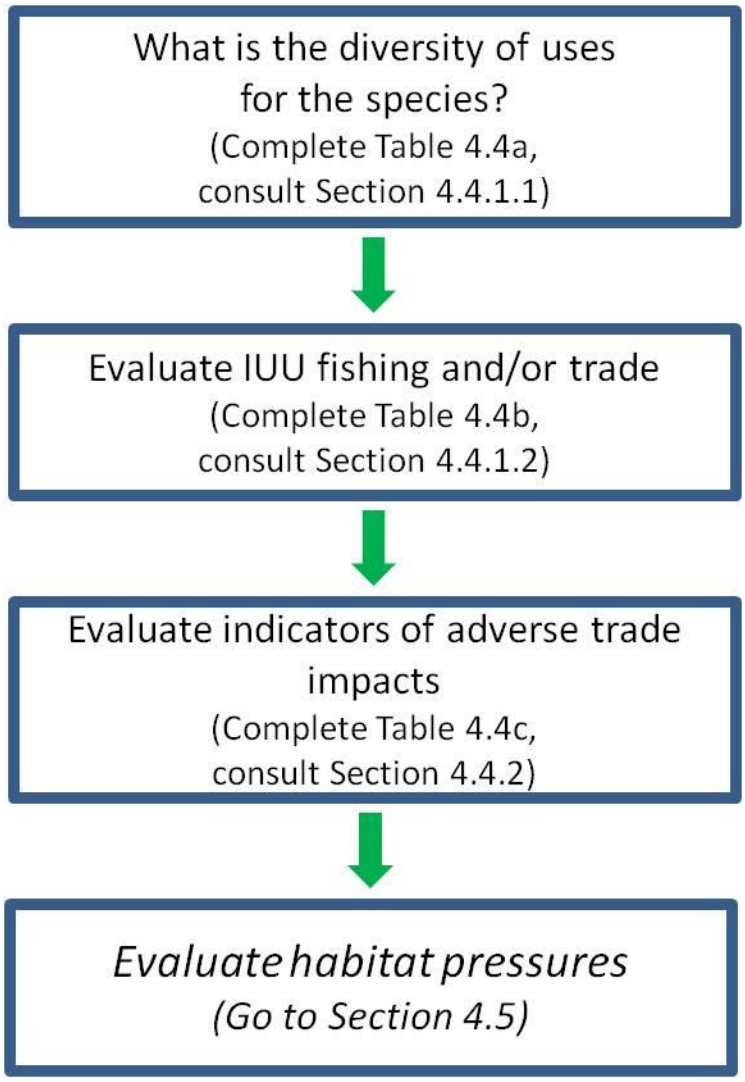
Monitoring for indicators of adverse impacts from trade activities **requires monitoring domestic and international trade volumes and characteristics.** The objective of trade research is to generate and share new knowledge about seahorse biology, fisheries and trade that might affect implementation of the CITES Appendix II listing for seahorse species. Trade research provides vital baseline data to identify fisheries of concern, determine the appropriate initial management options for a Party's particular situation, and identify gaps in information and management needs.

During trade research you gather information on seahorse biology, ecology, methods of extraction (e.g. target/incidental), catch/trade per unit effort, volumes, values (at different trade levels), uses (domestic and international), trade structure, trade routes, and seasonality of the trade. You can also probe temporal trends and geographic differences in these parameters. Information comes from (a) accessing existing but overlooked data sets, (b) interviewing a wide array of participants in fisheries and trades, and (c) measuring seahorses in trade.

Parties need to be careful when using trade data as a proxy for population information; changes in trade volumes could indicate changes either in supply or in demand. Price changes might help to explain whether a decreasing trade volume is due to declining resource, driving up the price.

Please complete Worksheet 4.4 to evaluate the trade pressures faced by your species.

Flow chart to support Section 4.4. Evaluate trade pressure



Worksheet 4.4. Evaluate trade pressures

For each table, circle the level of risk that is associated with the row option that corresponds to the species needing the NDF.

Table 4.4a. Evaluate risk from the diversity of uses for your species. Corresponds to Section 4.4.1.1 in text.

Seahorse species:		
Diversity of use	**Risk – International**	**Risk – Domestic**
Used for one purpose	Low	Low
Used for a few purposes	Medium	Medium
Used for many purposes	High	High
Reasoning		

Table 4.4b. Evaluate risk from IUU fishing and/or trade. Corresponds to Section 4.4.1.2 in text.

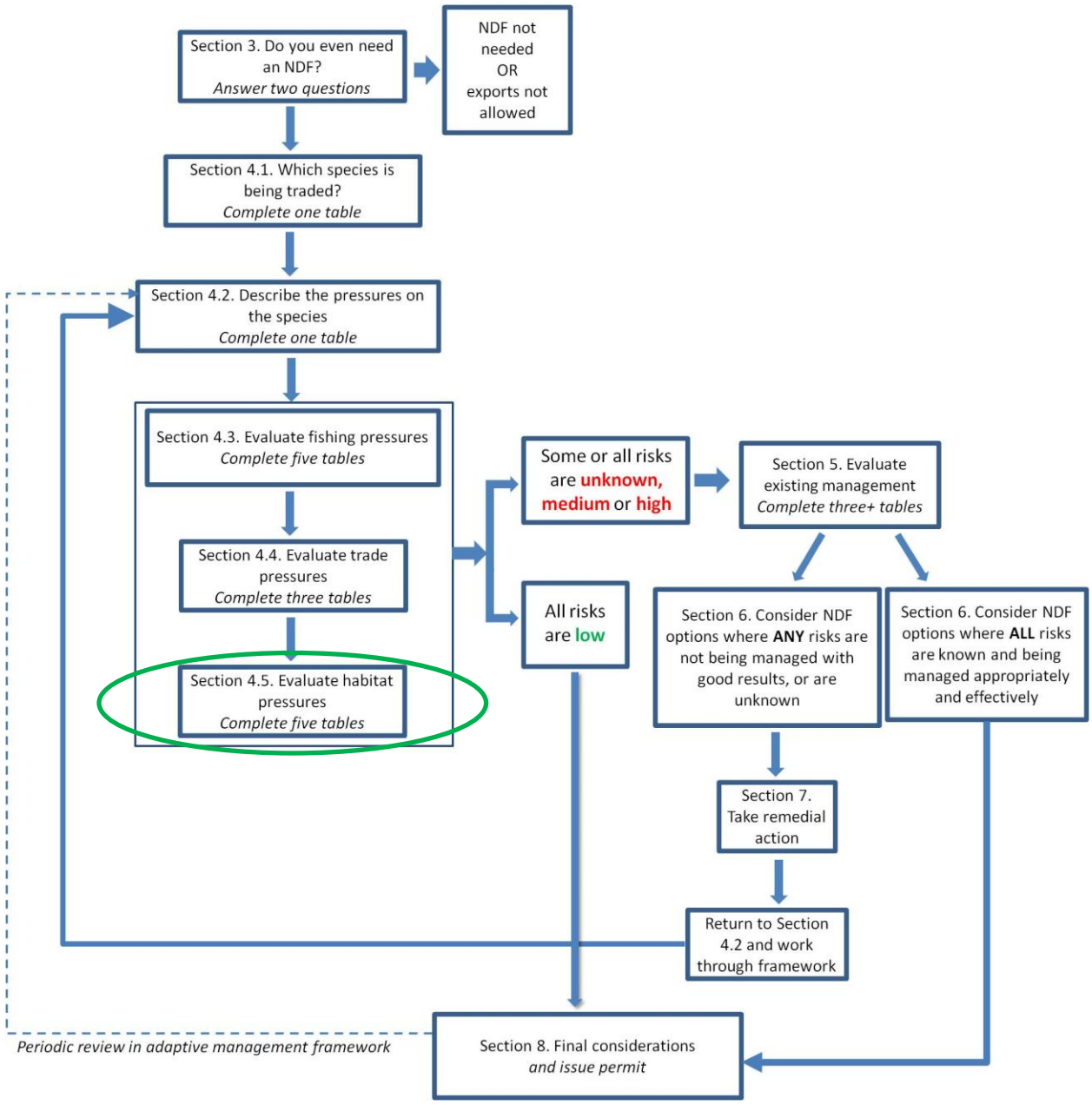
Seahorse species:			
Illegal fishing and/or trade (IUU)	**Risk – Fishing**	**Risk – International**	**Risk – Domestic**
Good documentation of catches/trade, trade chain transparent	Low	Low	Low
Some documentation of catches/trade, trade chain difficult to follow	Medium	Medium	Medium
Little to no documentation of catches/trade, trade chain not transparent	High	High	High
Reasoning			

Table 4.4c. Evaluate indicators of adverse trade impacts. Corresponds to Sections 4.4.2 and 4.4.3 in text.

Seahorse species:		
Indicators of trade impacts	**Risk – International**	**Risk – Domestic**
No observed changes in any indicators of adverse trade impact	Low	Low
Moderate changes observed in any indicators of adverse trade impact	Medium	Medium
Large changes observed in any indicators of adverse trade impact	High	High
Unknown changes in any indicators of adverse trade impact	Unknown	Unknown
Reasoning		

Congratulations! Now that you have evaluated the pressures your species faces from trade, move to Section 4.5.

Where we are headed next



4.5. EVALUATE HABITAT PRESSURES

Seahorses and other syngnathids live in some of the world's most threatened marine habitats: seagrasses, mangroves, coral reefs, estuaries and macroalgae. **Where there is a loss of seahorse habitat, there will be a loss of seahorses.**

Most areas of the world's oceans are experiencing habitat loss. But coastal areas, with their proximity to dense human population centers, have suffered disproportionately – mainly from anthropogenic stresses. Habitat loss here has far-reaching impacts on the entire ocean's biodiversity, including seahorses. Although natural causes, such as hurricanes, can cause massive habitat damage, it is usually temporary. Human activities, however, are significantly more impactful and persistent.

4.5.1. Is your species a habitat generalist or specialist?

Usually, populations of species that are widely distributed with diverse habitat associations (i.e. generalists, e.g. *H. kuda* which is found on seaweed/algae, seagrass, rocks, mangroves and artificial habitats) are more likely to be resilient to habitat damage and/or loss than populations of species with limited distributions and specific habitat needs (i.e. specialists, e.g. *H. bargibanti* which is only found on one species of gorgonian coral). Indeed, **habitat specialization is recorded as one of the central factors that make species vulnerable to extinction.** Most species fall somewhere on the continuum from highly specialized to broadly generalist when it comes to habitat.

Remember that while most species of seahorses are found in seagrasses, coral reefs and/or mangroves, they can also be found on sandy, muddy or rocky bottoms, in algae, or living on artificial habitats (like nets or cages). Seahorses may also live in different habitats at different life stages (i.e. juveniles versus adults). Some marine habitats (e.g. sand and mud), are more resilient to human activities than other habitats are (e.g. coral reefs and seagrass beds). So it is important to understand the condition of the habitats that your seahorses rely on and how they use those habitats during different parts of their lives.

4.5.2. Three main causes of damage and destruction to seahorse habitats:

4.5.2.1. Marine based activities including (but not limited to) destructive fishing practices such as bottom trawling and dynamiting; aquaculture (particularly for shrimp); tourism (boaters, snorkelers, and scuba divers come into direct contact with vulnerable marine habitats); dredging and filling (for shipping channels and coastal development); anchoring; and shipping (large ships can damage habitat with their hulls and anchors, and spill crude oil and other substances into the water). Seahorses themselves are vulnerable to the noise pollution that results from many of these activities.

4.5.2.2. Land based activities including (but not limited to) industrial and agricultural practices (which create chemical and nutrient runoff that pollutes the seas or covers benthic habitats); damming inland rivers (that increases the salinity of coastal waters, and/or can alter the temperature and lower the salinity if it is released in masse);

deforestation (causes erosion, sending silt into shallow waters); sewage (increases nutrients, can lead to toxic blooms and disease).

4.5.2.3. Climate change is expected to negatively affect inshore marine habitats and their fauna, including seahorses, through changes in, for example, temperature, rainfall patterns, atmospheric CO^2, community composition, oceanographic patterns, status of coastal habitats and storm action.

4.5.3. What are the indicators of seahorse habitat health?

Habitat indicators can track habitat conditions over time and identify seahorse habitats that are in trouble or in most risk of disturbance. Indicators can also improve understanding of linkages among habitat pressures, habitat status, and management responses (e.g. conservation and restoration actions).

Authorities can find clues to the impacts of marine and/or land based activities and/or climate change by monitoring their seahorse habitats over time for changes in any of the following parameters:

Declines in:

- Diversity of habitats that seahorses depend on[diversity of different habitat types, or of species (seagrass, mangrove, coral) within a habitat type].
- Distribution of habitats (total area covered by a habitat across a coastline).
- Percent live cover of a habitat type (e.g. coral, seagrass).
- Structural complexity (rugosity of a reef, or height of seagrass canopy).
- Oxygen.
- pH.
- Salinity.

Increases in:

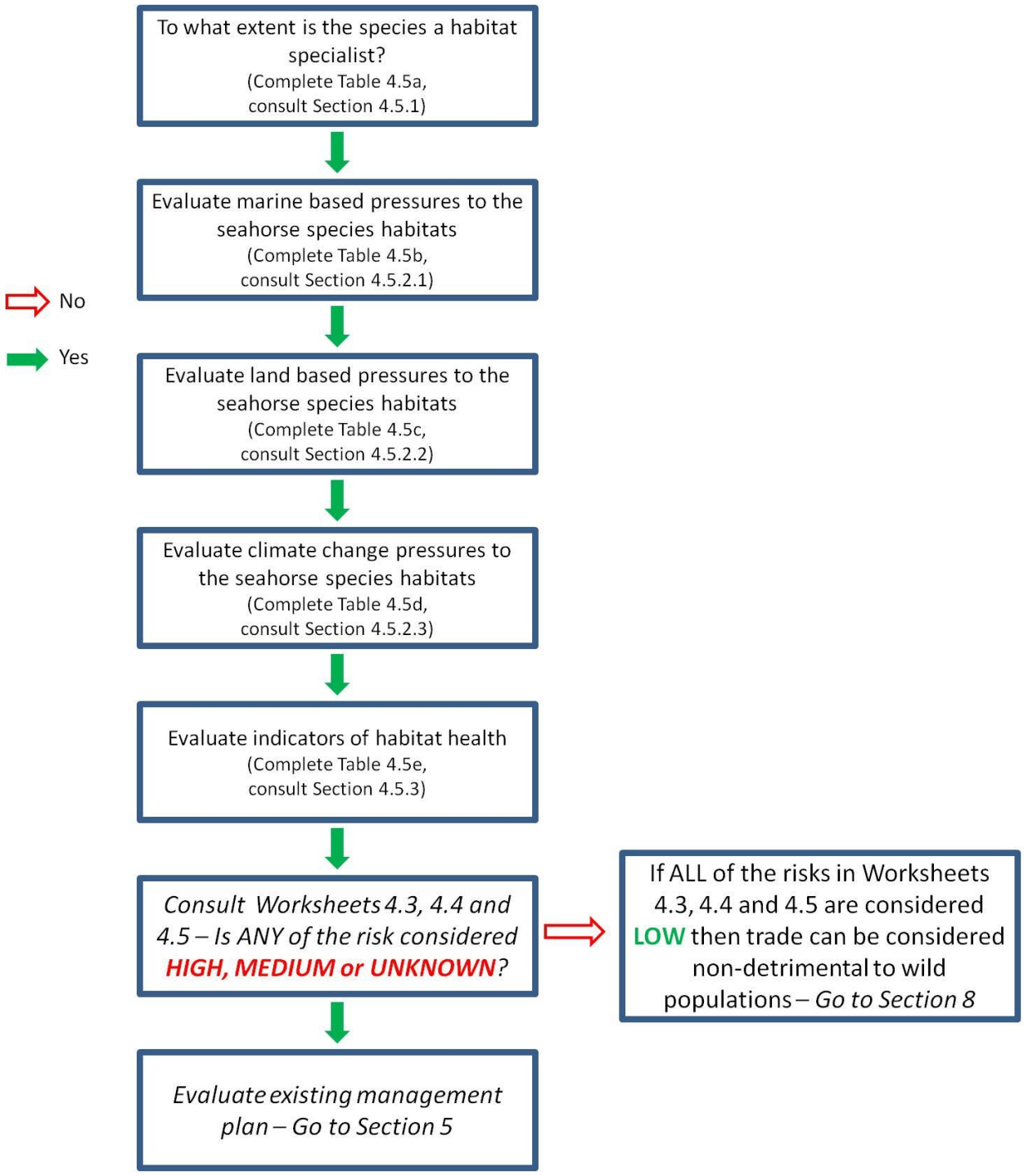
- Fragmentation of habitats (breaking apart of habitat areas into smaller patches).
- Water quality indicators (turbidity/sedimentation, nutrient levels, chemical pollution).
- Temperature.
- Salinity.
- Noise pollution.

4.5.4. Monitoring for indicators of habitat health

There are several approaches for monitoring marine habitats – ranging from complex and expensive (e.g. remote sensing), through to simple and affordable (e.g. manta tow). **You should decide which are appropriate to your situation and need.** Some of the most tractable approaches have been developed in support of "citizen science" programs that use a partnership between community volunteers and scientists to addressing both scientific and environmental management needs. For example, SeagrassWatch (seagrasswatch.org) and SeagrassNet (www.seagrassnet.org) provide detailed information on how to map and monitor seagrass resource status and condition. CoralWatch (www.coralwatch.org) provides a simple way to quantify bleaching and monitor coral health. Reef Check (www.reefcheck.org) offers another approach for regular monitoring and reporting on reef health. These and other global coral monitoring programs are addressed in *Methods For Ecological Monitoring Of Coral Reefs* (http://data.iucn.org/dbtw-wpd/edocs/2004-023.pdf). Similarly, MangroveWatch (www.mangrovewatch.org.au) is a new monitoring program that targets estuarine and coastal systems where there are mangroves, saltmarsh and saltpans.

Please complete Worksheet 4.5 to evaluate the habitat pressures faced by your species.

Flow chart to support Section 4.5. Evaluate habitat pressure



Worksheet 4.5. Evaluate habitat pressures

For each table, circle the level of risk that is associated with the row option that corresponds to the species needing the NDF.

Table 4.5a. Evaluate risk from degree of habitat specialization. Corresponds to Section 4.5.1. in text.

Seahorse species:	
Degree of habitat specialization	**Risk**
Species is found in many habitat types	Low
Species is found in a few habitat types	Medium
Species is found in only one type of habitat	High
Species habitat is unknown	Unknown
Reasoning	

Table 4.5b. Evaluate marine based pressures on the seahorse species habitats. Corresponds to Section 4.5.2.1 in text.

Seahorse species:	
Marine based activities	**Risk**
Marine based activities cause no or little damage and/or loss to seahorse habitats	Low
Marine based activities cause moderate damage and/or loss to seahorse habitats	Medium
Marine based activities cause severe damage and/or loss to seahorse habitats	High
Marine based activities cause unknown damage and/or loss to seahorse habitats	Unknown
Reasoning	

Table 4.5c. Evaluate land based pressures on the seahorse species habitats. Corresponds to Section 4.5.2.2 in text.

Seahorse species:	
Land based activities	**Risk**
Land based activities cause no or little damage and/or loss to seahorse habitats	Low
Land based activities cause moderate damage and/or loss to seahorse habitats	Medium
Land based activities cause severe damage and/or loss to seahorse habitats	High
Land based activities cause unknown damage and/or loss to seahorse habitats	Unknown
Reasoning	

Table 4.5d. Evaluate climate change pressures on the seahorse species habitats. Corresponds to Section 4.5.2.3 in text.

Seahorse species:	
Climate change	Risk
Climate change cause no or little damage and/or loss to seahorse habitats	Low
Climate change cause moderate damage and/or loss to seahorse habitats	Medium
Climate change cause severe damage and/or loss to seahorse habitats	High
Climate change cause unknown damage and/or loss to seahorse habitats	Unknown
Reasoning	

Table 4.5e. Evaluate indicators of habitat health. Corresponds to Sections 4.5.3 and 4.5.4 in text.

Seahorse species:	
Indicators of seahorse habitat health	**Risk**
No observed change in any indicators of habitat health	Low
Moderate observed change in any indicators of habitat health	Medium
Large observed change in any indicators of habitat health	High
Unknown change in any indicators of habitat health	Unknown

Reasoning

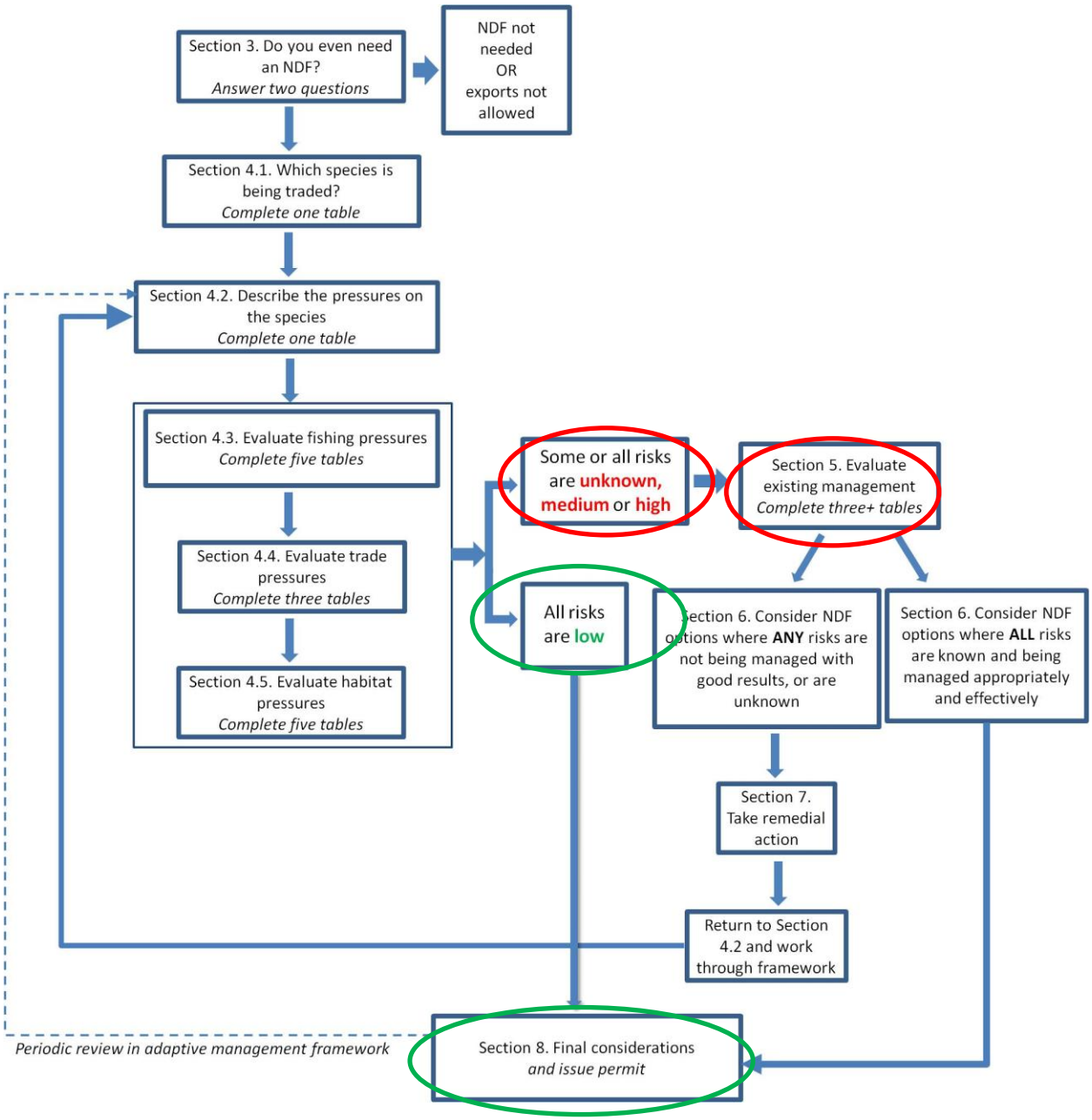
Congratulations! You have now evaluated the risk to your species from the pressures of habitat damage and/or loss (if any).

At this time please review Worksheets 4.3, 4.4 and 4.5.

If **ANY** of the risk inferred from fishing, trade and/or habitat pressures has been identified as **high, medium or unknown**, then move to Section 5 where you will consider how existing management plans (if any) might help reduce these pressures.

If **ALL OF** the risk inferred from fishing, trade and/or habitat pressures has been identified as **low** then trade can be considered non-detrimental to wild populations. Go to Section 8.

Where we are headed next



5. EVALUATE EXISTING MANAGEMENT PLAN

This section will guide you as to **assess if existing management is sufficient to mitigate the risks** identified in Section 4, in support of sustainable seahorse populations and so sustainable trade. You will consider whether existing management is:

- **appropriate** for the pressures facing your seahorse species (Section 5.3.1);
- **implemented** (Section 5.3.2); and
- **effective** at mitigating the identified risks (Section 5.3.3).

5.1. Why consider management?

For most species included in CITES Appendix II, you will need management plans in order to grant an export permit. Condition 1.2.1 for granting an export permit (see Section 1.2, above) is to ensure that proposed export of the seahorses will not harm wild populations – and this usually relies on developing good management. **Pressures do not have to be a problem for seahorses where they are appropriately and effectively managed.**

5.2. Potential management responses for seahorses

Management measures that may benefit seahorses can be species-specific or they may be generic:

- **Species-specific** management measures are those directed at the seahorse species concerned (e.g. a minimum size limit).
- **Generic** management measures are those in place to manage the overall catch or effort of a fishery, and though not specific to seahorses they may confer on them some benefit (e.g. spatial restrictions on destructive fishing activities). You need to know the overlap of the general measure with the species in space and time to determine if it can mitigate risks (refer back to Table 4.2a for information on your species range, depth and habitat preferences).

The following are 12 potential management tactics for seahorses. Each has its own benefits and limitations, which we now sketch. All measures we present are proximate, and will require distal transitions to be realised; for example, shifts in socio-economic and/or governance structures. Also, you should not feel restricted by this list of measures – we have summarised the most common measures, but other management possibilities certainly exist.

For all tactics, it is important to realise that seahorses can be sold at sea or brought to land at many different locations, making it difficult to track total take (i.e. catch volumes).

5.2.1. Limited entry

- *What:* The aim is to limit the total number of seahorses taken in the fishery by restricting participation in the fishery (e.g. the number of fishers, boats and/or gears). This is usually regulated using a system of licenses or permits. BUT limiting the entry may not limit the catch, therefore this tactic is normally used together with other effort controls [such as fishing restrictions in space or time (5.2.2, 5.2.3 or 5.2.4), or catch quotas (5.2.5)].
- *How:* For seahorses, the aim should be to use limited entry as a tool to reduce the total fishing mortality (F) to ≤ half estimated natural mortality (M) of the species (*see 5.2.5. Catch quota*).

5.2.2. Permanent, no-take Marine Protected Areas (MPAs) also known as Reserves

- *What:* The aim of MPAs is to eliminate some fishing pressure on the seahorses and to protect seahorse habitats. The hope is that some seahorse adults or young will spill out of the MPA to help repopulate adjacent areas. At the very least, the MPA will act as a reservoir for seahorses and an insurance policy against other mismanagement. The best approach is to protect areas with known seahorse populations. However, MPAs in seahorse habitats are a good idea even if you are not sure about the nature of the seahorse populations in the area.
- *How:* Determine where seahorses live with the use of underwater rapid assessments, catch landings analyses or discussions with fishers and traders (*more on this in Section 5*). Select areas with good seahorse numbers and sex/size ratios. If such work is impossible or you want to narrow your selections, then consult Appendix A for known seahorse habitats by species. Many Parties have national guidelines on how much of the ocean should be included in MPAs. The recent global marine protection targets range from 10-30%[12]. So you would want to protect 10-30% of each seahorse habitat in order to make sound NDFs.

5.2.3. Gear restrictions (spatial)

- *What:* The aim is to reduce some problematic fishing pressure on the seahorses and to protect seahorse habitats. This approach may be particularly important when unsustainable numbers of seahorses are caught by destructive and non-selective gear such as trawlers.
- *How:* See 5.2.2 (MPAs).

5.2.4. Gear restrictions (temporal)

- *What:* The aim is to reduce (i) all fishing pressure or (ii) some problematic fishing pressure on the seahorses and to protect seahorse habitats during particular periods when it might offer the greatest benefit. For example, it may be useful to stop fishing – or stop using certain gears – during periods of peak seahorse reproduction, thereby increasing the chances that seahorses will be able to reproduce – and their young disperse – before being captured. Such temporal gear restrictions may also be useful as we learn more about the offshore migrations that some seahorse populations appear to make. Finally, temporal restrictions may just be a good way of reducing total fishing pressure, even without any seasonal variation in seahorse growth, reproduction or movement.
- *How:* Try to discern seasonal patterns in seahorse behaviour. Consult the life history information at www.projectseahorse.org/NDF for known seahorse breeding seasons by species. Otherwise, just implement temporal closures and monitor overall take from the area.

[12] http://iucn.org/about/work/programmes/marine/marine_our_work/marine_mpas/

5.2.5. Catch quota

- *What:* The aim is to limit how many seahorses are being caught by limiting fishing mortality (F) for the entire area and/or gear. It is usually only possible to monitor landings. In that case, catch quotas must be set conservatively to account for discarding at sea before landing. Uncertainties in key variables (abundance, biomass and F) result in a high risk of overfishing, so catch quotas should be combined with other precautionary measures.
- *How:* For seahorses, an appropriately precautionary catch quota would be calculated as follows: current abundance*biomass^{-1}*F, where $F \leq 0.5*M$ (M = natural mortality). Setting this quota therefore requires an estimate of F or M, and of current abundance/biomass. You should be conservative when estimating abundance, especially given the patchiness of seahorse populations.

5.2.6. Minimum size limit

- *What:* The aim of a minimum size limit is to ensure seahorses can reproduce before being exploited, thereby increasing the chance that they will be replaced in the population. Such a measure can also sometimes help reduce overall take from the wild.
- *How:* The CITES Animals Committee has recommended a minimum height of 10 cm for all seahorses in trade[13]. This recommendation is under review and may well increase.
- *Note:* mesh size regulations on fishing nets are not likely to select for seahorses by size, as seahorses have body shapes that get them caught no matter what the mesh size is.

5.2.7 Maximum size limits

- *What:* The aim of a maximum size limit is to leave the larger seahorses in the sea as each larger seahorse contributes more than a smaller seahorse to the next generation. This is because larger seahorses produce more eggs (females) and carry more young (males).
- *How:* There is currently no recommended maximum height for seahorses, but Project Seahorse would be able to advise Parties on setting such a limit.
- *Note:* mesh size regulations on fishing nets are not likely to select for seahorses by size, as seahorses have body shapes that get them caught no matter what the mesh size is.

5.2.8 Slot size limits

- *What:* Slot limits means that you set both a minimum (5.2.6) and a maximum (5.2.7) size limit. The aim is to allow seahorses to reproduce before being exploited AND to leave the larger and so more fecund individuals in the sea.
- *How:* See 5.2.6 for a recommendation with respect to the lower end of the slot size, and 5.2.7 for the upper end of the slot size.
- *Note:* mesh size regulations on fishing nets are not likely to select for seahorses by size, as seahorses have body shapes that get them caught no matter what the mesh size is.

5.2.9 Leaving pregnant males

- *What:* The aim is to leave pregnant males in the water until they have released their young, hopefully to help secure wild populations.
- *How:* Ban capture of pregnant males in their natural habitat until they have given birth.

[13] CITES Decision 12.54: http://www.cites.org/eng/notif/2004/033.pdf

5.2.10. Export quota

- *What:* The aim is to limit export volumes in the expectation that this will limit catches. *This will not happen where seahorses are obtained as bycatch*. Any use of quotas should be combined with other precautionary measures, given the uncertainty as to how export quotas influence catches.
- *How:* For seahorses, a necessarily precautionary export quota would result in total fishing mortality (F) at ≤ half estimated natural mortality (M) of the species (*see 5.2.5 re Catch quota*).

*5.2.*11. Reintroduction/supplementation

- *What:* The aim is to replace seahorse populations in areas where they have been extirpated (reintroduction) or – much more *commonly – to increase* seah**o**rse densities in areas where they have been depleted (supplementation).
- *How:* The IUCN Reintroduction Specialist Group recommends against most releases of captive animals unless the wild population has disappeared AND the cause of the declines is known and has been removed AND the released animals will be very carefully monitored. In general, supplementation poses risks to wild populations (disease and genetic issues) with few likely benefits. Any releases need to be carried out with extreme caution and following best practices. Otherwise they will threaten the vital remnant wild populations. The IUCN 'Guidelines for Reintroductions and Other Conservation Translocations' can be found at http://ow.ly/mRgRG.

5.2.12. Habitat restoration

- *What:* The aim is to restore seahorse habitats in areas where they have been damaged or lost – in the hopes that this will in turn support seahorse populations (either return to areas where they have been lost, or increase in density in areas where they have been depleted). **It is much easier to protect habitats before they are lost than it is to restore them** – see 5.2.2, 5.2.3, 5.2.4**.**
- *How:* It depends on the habitat – but resources exist for restoring seagrasses and mangroves, and reviving coral reefs. However as with reintroduction/supplementation of seahorses (5.3.11), the threats that led to the original habitat declines need to have been eliminated before you proceed with any such activities.

5.3. Evaluating management responses

Parties should consider at least three factors when evaluating a management response in the context of seahorses.

- Are existing management measures **appropriate** to the pressures they need to address? (i.e. can they relieve the conservation threats, fishing and/or trade pressures?) (Section 5.3.1)
- Are the management procedures definitely being **implemented** (i.e. used/meet with compliance)? (Section 5.3.2)
- Are the management procedures definitely effective (i.e. **monitored** with good results)? (Section 5.3.3)

5.3.1. Which measures are suitable for which pressures?

Please consult Table 5a to see which of the management responses outlined above (in Sections 5.2.1 through 5.2.12) may be most appropriate to address pressures from target or bycatch fisheries for seahorses. The management responses are mostly concerned with fishing, but we have indicated the appropriateness of the response for relieving pressures on seahorse habitats – so Parties may choose measures that can address multiple pressures at once.

5.3.2. Are the measures being implemented?

Please consult Table 5a to see how you can determine if the management measure is actually being used.

5.3.3. Is the management effective?

You will need to track population trends over time in order to determine the effectiveness of any intervention. Population trends can be deduced from population surveys underwater, or by surveying fishery catches or landings, or even trade volumes over time. We discussed these monitoring options in more detail in Sections 4.3.5 and 4.4.3.

Where populations are estimated to be stable or increasing in size over time, then management can be considered effective.

If, however, population numbers are declining or you observe other indicators of adverse impacts (as described in Sections 4.3.4 and 4.4.2), then your existing management plan needs work. Is it either not the right management for the pressures (as per Section 5.3.1), it is not enough management (e.g. need more MPA coverage), or implementation is inadequate (i.e. not enough enforcement or compliance, as per Section 5.3.2). If you management needs work you need to consider remedial action, which we cover in Section 7.

Please complete Worksheet 5 to evaluate your existing management plan.

Table 5a. Potential management responses and their appropriateness for mitigating pressures on seahorse populations from fisheries and habitat pressures.

Text section	Potential management response	Appropriate for targeted capture	Explanation	Appropriate for incidental capture (including both active and static gear types)	Explanation	Appropriate for additional pressure from habitat loss	Explanation	Implementation
5.2.1	Limited entry	YES when combined	Only when used in combination with seahorse catch quotas**.**	YES when combined	Only when used in combination with seahorse catch quotas and/or spatial restrictions of gears that catch seahorses.	YES when combined	Only when used in combination with MPAs or spatial restrictions of gears that catch seahorses.	Determined by monitoring fishing activity.
5.2.2	Permanent, no-take Marine Protected Areas (i.e. reserves)	YES	Where enforced these buffer against all pressures.	YES	Where enforced these buffer against all pressures.	YES	Where enforced these buffer against all pressures.	Determined by monitoring fishing activity in and around the MPAs by probing where seahorses are being caught.
5.2.3	Gear restrictions - spatial	YES	Where enforced these buffer against fishing pressures.	YES	Where enforced these buffer against fishing pressures.	YES	Where enforced these buffer against gear pressures on habitats.	As for 5.2.2 (MPAs) for select gear.
5.2.4	Gear restrictions - temporal	Cautiously	Only when temporal gear restrictions coincide with peak seahorse reproduction periods.	Cautiously	Only when temporal gear restrictions coincide with peak seahorse reproduction periods.	NO, usually	Not appropriate where habitats are still subject to destructive fishing practices at other times of the year.	Determined by monitoring fishing activity in and around the periods of closure and by probing where and when seahorses are being caught.
5.2.5	Catch quota	YES	Fishers targeting seahorses are able to limit their catch volumes and so fishing mortality.	Cautiously	Appropriate only where a fishery is completely closed once seahorse bycatch quota is met.	Not applicable	Output controls do not protect habitats.	Determined by monitoring catch and/or landings.

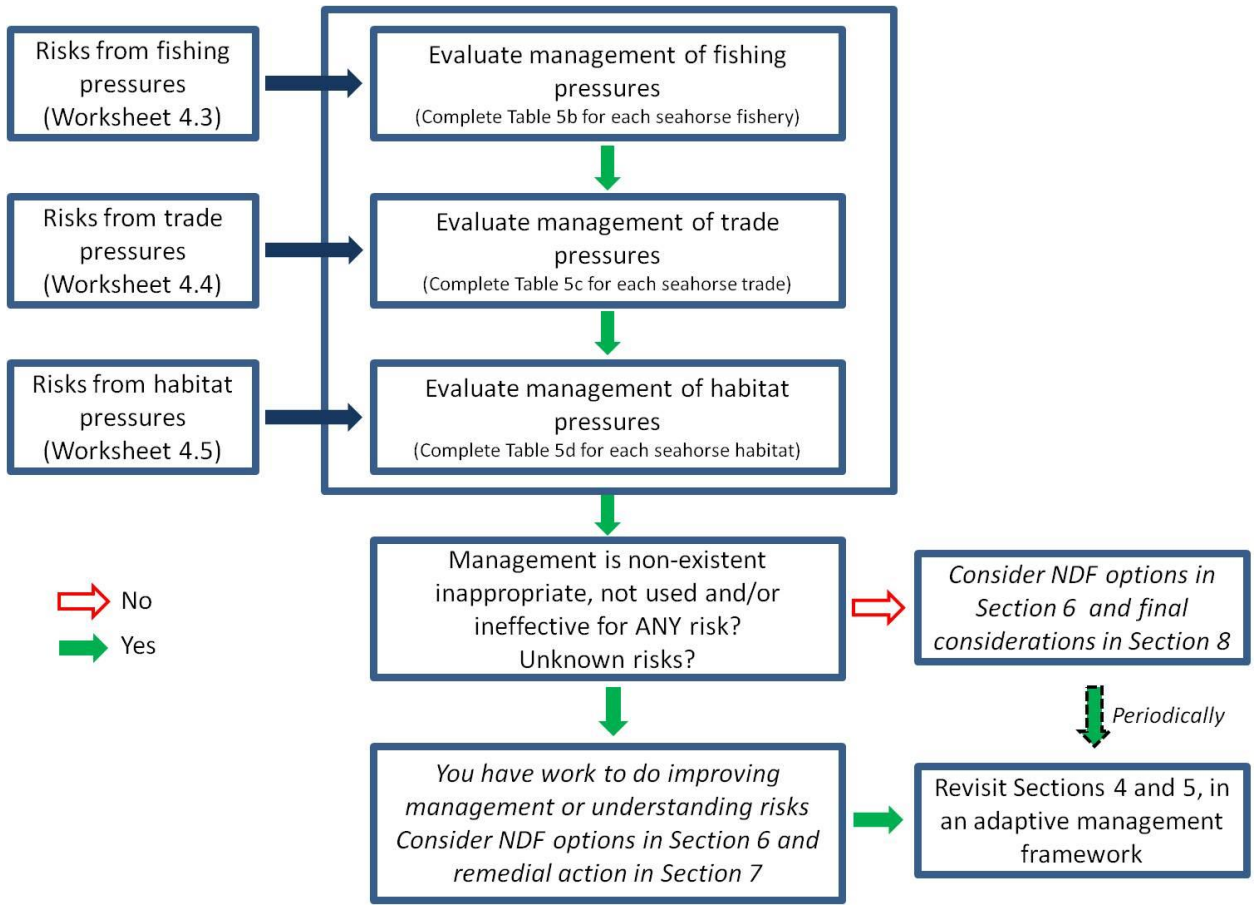
Table 5a. Continued...

Text section	Potential management response	Appropriate for targeted capture	Explanation	Appropriate for incidental capture (including both active and static gear types)	Explanation	Appropriate for additional pressure from habitat loss	Explanation	Implementation
5.2.6	Minimum size limit	YES	Fishers targeting seahorses are able to be selective, taking only those larger than the agreed minimum size, and leaving smaller individuals where they are found.	NO	Non-selective fishing gears that catch seahorses cannot be selective for seahorse size – mesh size does not matter.	Not applicable	Output controls do not protect habitats.	Determined by monitoring the size of seahorses in the catch and/or landings and/or trade.
5.2.7	Maximum size limits	YES	Fishers targeting seahorses are able to be selective, taking only those smaller than the agreed maximum size, and leaving larger individuals where they are found.	NO	Non-selective fishing gears that catch seahorses can not be selective for seahorse size – mesh size does not matter.	Not applicable	Output controls do not protect habitats.	As for 5.2.7 (Minimum size limits).
5.2.8	Slot size limits	YES	Fishers targeting seahorses are able to be selective, taking only those that fall between the agreed minimum and maximum size limits, leaving other individuals where they are found.	NO	Non-selective fishing gears that catch seahorses can not be selective for seahorse size – mesh size does not matter.	Not applicable	Output controls do not protect habitats.	As for 5.2.7 (Minimum size limits).
5.2.9	Leaving pregnant males	YES	Fishers targeting seahorses are able to be selective, leaving pregnant males where they are found.	NO	Non-selective fishing gears that catch seahorses can not be selective for seahorse reproductive state.	Not applicable	Output controls do not protect habitats.	Determined by monitoring the reproductive status of male seahorses in the catch and/or landings and/or trade.

Table 5a. Continued...

Text section	Potential management response	Appropriate for targeted capture	Explanation	Appropriate for incidental capture (including both active and static gear types)	Explanation	Appropriate for additional pressure from habitat loss	Explanation	Implementation
5.2.10	Export quota	NO, usually	Only where there is a direct feedback loop that generates a catch reduction of seahorses.	NO, usually	Only where there is a direct feedback loop that generates a catch reduction of seahorses.	Not applicable	Output controls do not protect habitats.	Determined by monitoring catches, landings or even trade volumes.
5.2.11	Reintroduction/ supplementation	Not if threat is ongoing	There is no evidence that seahorse releases can increase densities of wild seahorse populations.	Not if threat is ongoing	There is no evidence that seahorse releases can increase densities of wild seahorse populations.	Not applicable	-	Determined by monitoring the fate of the newly release seahorses in areas where there were no remaining wild seahorses. Again, the threats that led to original declines need to have been eliminated.
5.2.12	Habitat restoration	YES when combined	Only when combined with Permanent, no-take Marine Protected Areas. No sense increasing seahorse habitats if they are going to be targeted by fishers.	YES when combined	Only when combined with Permanent, no-take Marine Protected Areas. No sense increasing seahorse habitats if they are going to be fished.	Cautiously	Not if threat that caused habitat decline is ongoing	Determined by monitoring the restored habitats for increases in the number of seahorses.

Flow chart to support Section 5. Evaluate existing management plan



Worksheet 5. Evaluate existing management plan

This worksheet seeks to evaluate if your existing management is sufficient to mitigate the pressures you have described in Table 4.2a and evaluated in Sections 4.2 through 4.5. It is important you read through Section 5 before completing these tables.

First, transfer the risks from the tables of Worksheets 4.3, 4.4 and 4.5 to Tables 5b, 5c and 5d, respectively. You will need to repeat the Tables 5b, 5c and 5d for every problem fishery, trade and habitat, respectively, as described in Table 4.2a.

Second, describe existing management responses that are appropriate to the risks – you can consult Table 5a to determine if a management response is appropriate for the risk. You should not feel restricted by the list of measures in Table 5a – we have summarised the most common measures, but other management possibilities certainly exist.

Third, indicate if the management response is implemented and/or effective.

Table 5b. Evaluate existing management for fishing pressures.

Seahorse species:				
Fishing method/gear:				
Table	**Risk**	**Management response**	**Implemented?**	**Effective?**
	Transfer risks from *Worksheet 4.3.*	List existing management responses appropriate to the risk *(Consult Table 5a).*	Indicate: Yes, No, Unknown *(Consult Table 5a).*	Indicate: Yes, No, Unknown *(Consult Section 5.5).*
Diversity of fishing methods/gears *(from Table 4.3a)*				
Fishing mortality *(from Table 4.3b)*				
Fishing selectivity *(from Table 4.3c)*				
Discarding practices *(from Table 4.3d)*				
Indicators of fishing impacts *(from Table 4.3e)*				

Table 5c. Evaluate existing management of trade pressures.

Seahorse species:					
Trade/use:					
Table		**Risk**	**Management response**	**Enforced?**	**Effective?**
		Transfer risks from *Worksheet 4.4.*	List existing management responses appropriate to the risk *(Consult Table 5a).*	Indicate: Yes, No, Unknown *(Consult Table 5a).*	Indicate: Yes, No, Unknown *(Consult Section 5.5).*
Diversity of use *(from Table 4.4a)*	**international trade**				
	domestic trade				
IUU *(from Table 4.4b)*	**fishing**				
	international trade				
	domestic trade				
Indicators of trade impacts *(from Table 4.4c)*	**international trade**				
	domestic trade				

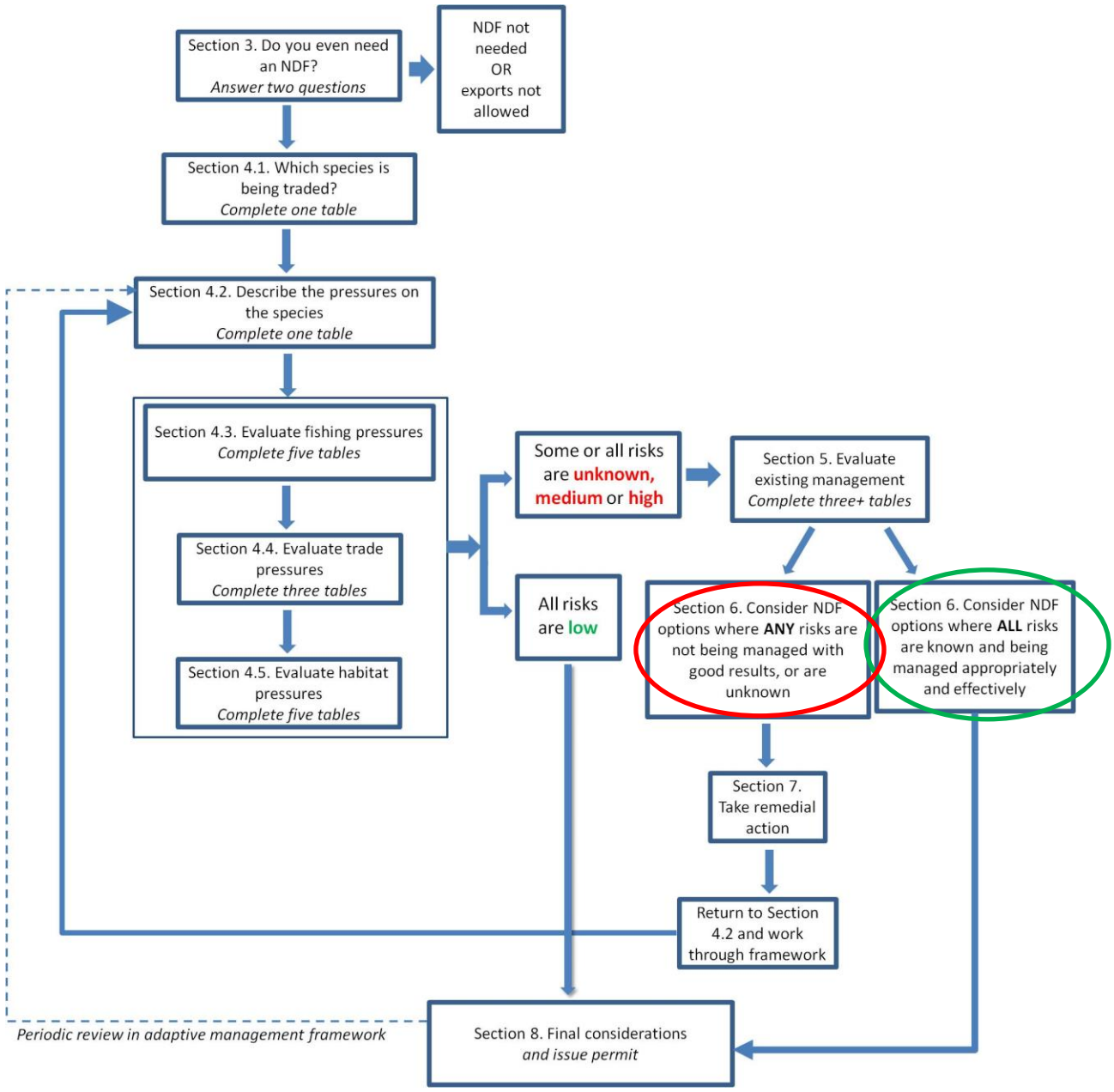
Table 5d. Evaluate management of pressures on seahorse habitats.

Seahorse species:				
Habitat type:				
Table	**Risk**	**Management response**	**Enforced?**	**Effective?**
	Transfer risks from *Worksheet 4.5*.	List existing management responses appropriate to the risk *(Consult Table 5a)*.	Indicate: Yes, No, Unknown *(Consult Table 5a)*.	Indicate: Yes, No, Unknown *(Consult Section 5.5)*.
Habitat specialization *(from Table 4.5a)*				
Marine based activities *(from Table 4.5b)*				
Land based activities *(from Table 4.5c)*				
Climate change *(from Table 4.5d)*				
Indicators of habitat health *(from Table 4.5e)*				

If any of fishing, trade and/or habitat pressures are medium, high or unknown and/or management is non-existent, inappropriate, not used or ineffectual, then you have work to do before trade can be considered non-detrimental to wild populations.

Section 6 will guide you in making a decision about the NDF, based on your assessments of i) risk from pressures (Section 4) and ii) management (Section 5)

Where we are headed next



6. MAKING A DECISION ABOUT THE NDF

You now need to make a decision about the Non-detriment Finding (NDF). Remember that under CITES provisions, a Scientific Authority should only approve exports that will not be detrimental to survival of the species in the wild.

Remember also that NDFs need to be **scientifically sound and defensible**. This means that the more uncertain you are with respect to risks from pressures (from Section 4) and/or management effectiveness (from Section 5), the more precautionary you should be in your NDF decision.

For shorthand purposes, a finding of non-detriment is referred to as a **positive NDF**, while a finding of conservation detriment is referred to as a **negative NDF**.

A positive NDF can be considered in the very rare case that exports are considered, without a doubt, to be non-detrimental to wild populations. If all risks are known and being managed appropriately and effectively, then you can turn to Section 8 which considers the final steps to take before issuing a permit.

In most cases, however, working through this framework will reveal that the export of seahorses should be limited in order to ensure non-detriment. **Where risks are not being managed with good results, or are unknown, you could consider a negative NDF or an NDF with conditions.**

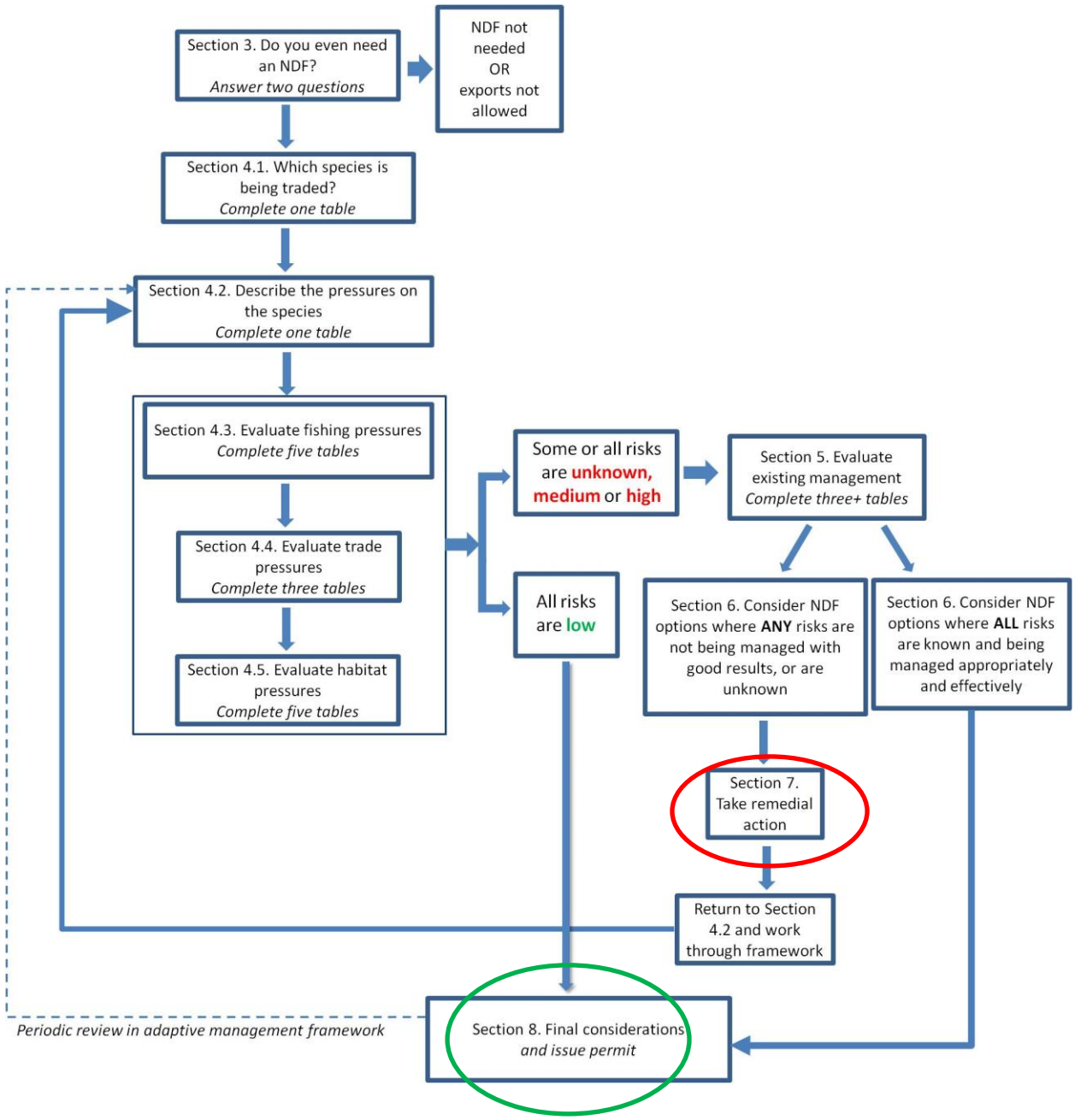
An NDF with conditions allows for precautionary levels of exports while risks are reduced, gaps in management are addressed, or quality of information is improved. In defining the conditions, **you must describe the actions** to be taken, **define the actors**, and **determine the timelines**.

In the case that you have work to do before trade can be considered non-detrimental to wild seahorse populations, **Section 7 offers guidance and advice about how to improve management** action (Section 7.1) and/or **fill knowledge gaps** (Section 7.2), in support of adaptive management.

Where risks are not being managed with good results, or are unknown, turn to Section 7.

If all risks are being managed appropriately and effectively, then you can turn to Section 8.

Where we are headed next



7. REMEDIAL ACTION

7.1. You have unmanaged risks. Now what?

If you identified any risks from fishing, trade or habitat pressures as medium or high and management is non-existent, unknown, inappropriate, not used or ineffectual then **you need to sort out your management before trade can be considered non-detrimental to wild populations** and permits can be issued. There are three main actions to consider:

- Where existing management is non-existent or inappropriate, you can **add appropriate management** (consult Table 5a).
- Where existing management is appropriate but not used, you can **increase enforcement** and/or incentives for compliance.
- Where existing management is appropriate and used, but ineffectual, you can **increase the amount or diversity of management** (e.g. increase MPA coverage).

You can use Tables 5b through 5d to set your priorities for action. **If you filled in many tables in Section 5, you may need to adjust among them.** Great gains may be made by increasing management for one fishery even when a species is caught by many, or protecting one habitat even when the species lives in many.

7.2. You have unknown risks. Now what?

If you identified any risks from fishing, trade or habitat pressures as unknown you have research to do.

There are many gaps in our understanding of the life history and conservation status of many seahorse species. Still, a lot can be done with little information. This section offers guidelines for data collection priorities in the spirit of adaptive management – you can improve your NDFs as you learn more. The more your seahorse populations are exploited or under pressure from human actions, the more attention to you will need pay to improving your NDFs.

We must re-emphasise that any data are better than no data. Authorities should not feel overwhelmed by the length of these data "wish" lists, but rather use them as starting points for which to design pragmatic programs for monitoring their populations, fisheries and trades.

Three different types of data should be collected: **population, fisheries and trade data**. Project Seahorse has made available a number of Technical Reports for Research and Management, which will prove useful for Parties who want to develop and implement data collection and population monitoring programs (see www.projectseahorse.org/NDF).

7.2.1. Population data (see also Section 4.3.5) **–** Population data can be collected via fishery-independent programs or by sub-sampling fishery catches or landings – and includes:

- Species composition
- Presence/absence
- Densities/abundance indices
- Sex ratio (males, females, juveniles)
- Size structure
- Reproductive status (males – pregnant/not pregnant)
- Habitats/depth of collection
- Variation in seahorse distribution in time and space

7.2.2. Fisheries data (see also Section 4.3.5) **–** In addition to these population data, the following types of fisheries data should be collected in order to understand the effects of fishing on wild populations:

- Methods of extraction (e.g. target/incidental, gear types)
- Fishing locations
- Seasonality of catches
- Seahorse catch volumes (including discards)
- Seahorse catch characteristics – species, sex ratios, size structure, reproductive status
- Fishing effort (number of boats, number of trips, duration of tows, etc)

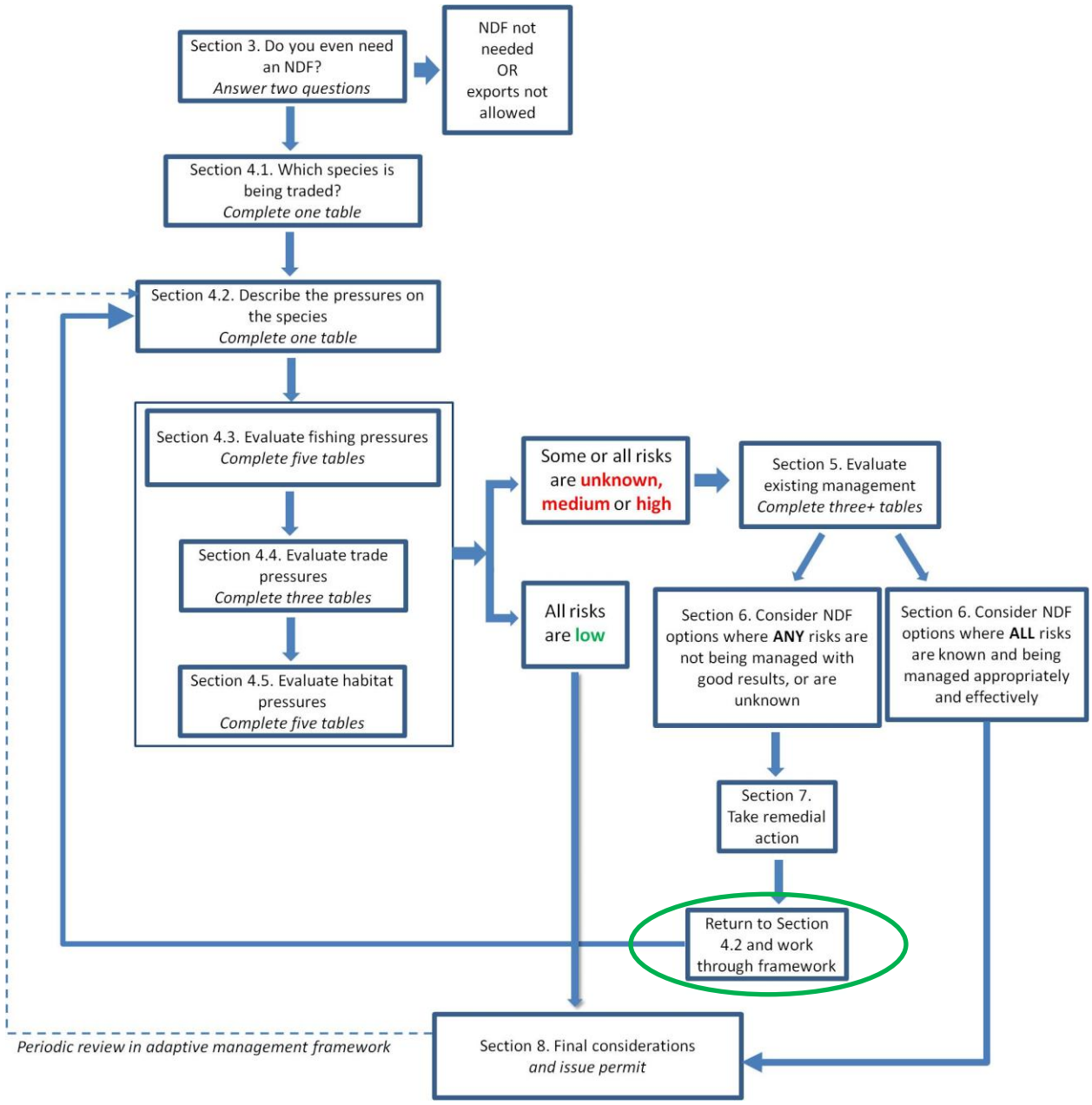
The goal is to develop an index of CPUE (catch per unit effort) by location and species.

7.2.3. Trade data (see also Section 4.4.3) – Trade data should also be collected in order to understand the effects of trade on wild populations:

- Trade per unit effort (TPUE)
- Volumes (at different trade levels)
- Values (at different trade levels)
- Uses (domestic and international)
- Trade structure
- Trade routes
- Seasonality of the trade

When you have adjusted your management, or filled knowledge gaps, you should work through the framework again starting at Section 4.2. You may need to make several adjustments before you can be confident your seahorse exports are not harming wild populations – but every adjustment will get you closer to making a positive NDF.

Where we are headed next



8. BEFORE ISSUING A PERMIT - FINAL CONSIDERATIONS

You can be hopeful. Your wild seahorse populations may be under pressure, but you are trying to address these pressures effectively. Keep up the good work and you can continue to have both healthy wild seahorse populations and a seahorse trade, as intended with a CITES Appendix II listing.

Just two more issues to consider before issuing that permit. If the proposed export is of dried seahorses, skip to Section 8.2. Otherwise, start at 8.1.

8.1. Humane transport of live animals.

It is now time to consider condition 1.2.3 for issuing a permit for international export of Appendix II listed species – that *live* seahorses have to be treated humanely when shipped from one country to another.

To understand what this means for seahorses, consult the *CITES Guidelines for transport and preparation for shipment of live wild animals and plants* at: http://www.cites.org/eng/resources/transport/E-TranspGuide.pdf.

If your seahorses are going to be treated well during shipping, you can move to Section 4.6.2.

8.2. The paperwork matters.

A clear requirement and benefit of a CITES listing is that all Parties must report their export trade to CITES each year. Each Management Authority is obliged under the Convention to compile annual reports on that Party's exports in all Appendix II listed species. These trade data are held in the CITES Trade Database, managed by The United Nations Environmental Programme's World Conservation Monitoring Center (UNEP-WCMC) (http://www.unep-wcmc-apps.org/citestrade/trade.cfm). The information required in each permit is clearly outlined by CITES (http://www.cites.org/eng/res/all/12/E12-03R15.pdf).

The submitted data should allow analysis of the international trade in threatened species. Unfortunately, the many gaps, discrepancies, oddities and contradictions in the CITES database mean that it can be very difficult to assess the international trade in seahorses – and by proxy, the possible impacts on wild seahorse populations[14].

[14] http://www.fisheries.ubc.ca/publications/tracking-international-trade-seahorses-hippocampus-species

Parties should do their utmost to follow best practices in reporting, thereby ensuring the data you report are as valuable as possible.

- Report your exports. Please complete your annual report submissions to CITES, and on time. Records often arrive several years late, greatly affecting the reliability of global analyses.
- Verify the species listed on a permit is the one being exported. Seahorses are difficult to identify, so do not assume the applicant has it right. Then report to the species level and not just as *Hippocampus* spp.
- Specify shipment units. If you leave the unit blank it defaults to 'individuals' in the CITES database. You need to be clear if your shipment was actually by weight.
- Include export records of derivatives/pre-package medicines (with clear indication of their seahorse content) to the CITES database. This is a hugely growing aspect of TM and needs careful consideration, not least as the species and sizes of seahorses in prepared medicines are no longer visible to consumers or practitioners.

Well done. You did it. Take a break. Then review this guide again. Seahorse populations, fisheries and trades are always changing so it pays to monitor and evaluate regularly in a form of adaptive management. You need to know that your management measures are actually ensuring that the exports are not detrimental to the wild populations, as required by CITES.

The final part of this framework, Section 9, lists some useful resources you can consult for more information on seahorses and CITES/NDFs. Read on.

9. USEFUL RESOURCES

9.1. Seahorses

Key resources with respect to seahorse life history, conservation and management, fisheries and trades and technical guidelines can be found at: http://seahorse.fisheries.ubc.ca/seahorses**.**

Project Seahorse also hosts a citizen science site for seahorses – iSeahorse (www.iSeahorse.org)**.** Simply put, iSeahorse is a tool for seahorse science and conservation. iSeahorse harnesses the power of 'citizen scientists' — anyone, anywhere in the world who sees a seahorse in the wild — to improve our understanding of these animals and protect them from overfishing and other threats. Scientists from Project Seahorse and seahorse experts around the world will use your vital information to better understand seahorse behaviour, species ranges, and the threats seahorses face.

9.2. CITES and NDFs

- CITES website on NDFs (http://www.cites.org/eng/prog/ndf/index.shtml)
- CITES Species database (http://www.cites.org/eng/resources/species.html)
- CITES sig trade database (http://sigtrade.cites.org/)
- WCMC CITES-database (http://www.unep-wcmc-apps.org/citestrade/trade.cfm)
- Checklist to assist in making non-detriment findings for Appendix II exports (http://data.iucn.org/dbtw-wpd/edocs/SSC-OP-027.pdf)
- Workshop summary for International Expert Workshop on CITES Non-Detriment Findings, Cancun, Mexico in 2008 (http://www.cites.org/eng/com/ac/24/E24-09-01.pdf)

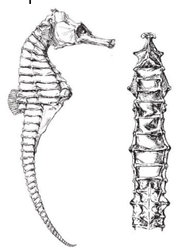
Annex 2

Seahorse ID Posters

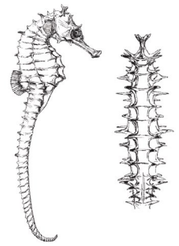
IDENTIFYING SOUTHEAST ASIAN SEAHORSES (*Hippocampus* SPP.) COMMON IN TRADE

Is the seahorse smooth or spiny?

note: If you are not certain, choose the option marked with a *.



Smooth*



Spiny

Are the cheek spines hooked, double, or single?

Hooked

Double

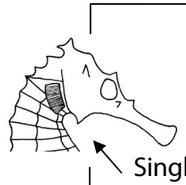
Single*

Is the nose spine low/absent or high?

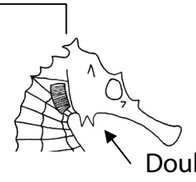
Low/absent

High*

Are the cheek spines single or double?



Single



Double

Is the coronet narrow or deep?

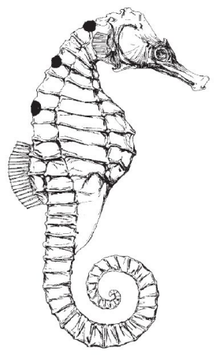
Narrow body
Distinct coronet

Deep body*
Low coronet

Is the head high coronet or low coronet?

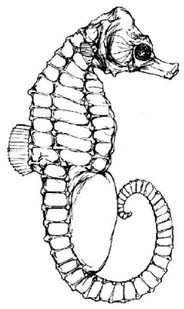
High coronet

Low coronet*



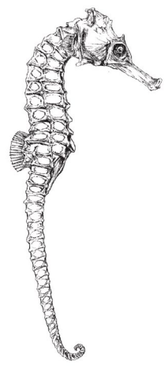
H. trimaculatus

Three spots on back
Low coronet
Max. height 17cm



H. mohnikei

Very long tail
Short snout
Max. height 8cm



H. kelloggi

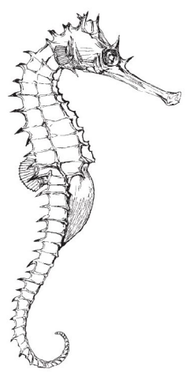
Chunky body rings
Max. height 28cm

H. kuda

Low/blunt spines
Max. height 17cm

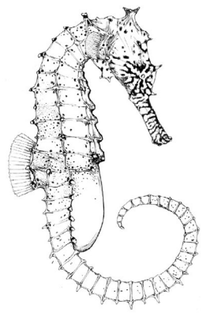
H. spinosissimus

Single or double cheek spines
Max. height 17cm



H. histrix

Long snout
Black tips on spines
Max. height 17cm



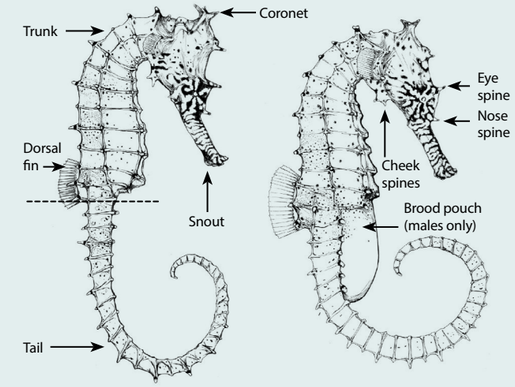
H. barbouri

Striped snout
Prominent eye spine
Max. height 15cm

H. comes

Narrow head
Striped tail
Max. height 19cm

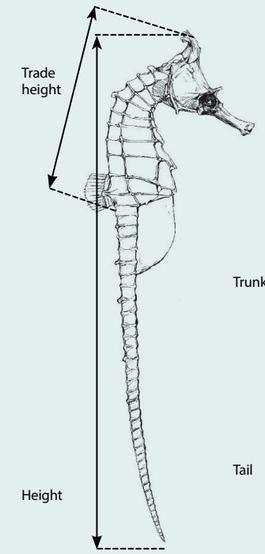
SEAHORSE MORPHOLOGY



Female
In females, body does not extend past bottom of dorsal fin. If you are uncertain it is likely male.

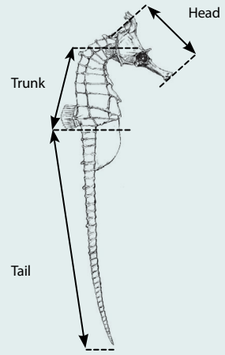
Male
Unless marked, all diagrams on this page are male seahorses.

MEASURING SEAHORSES



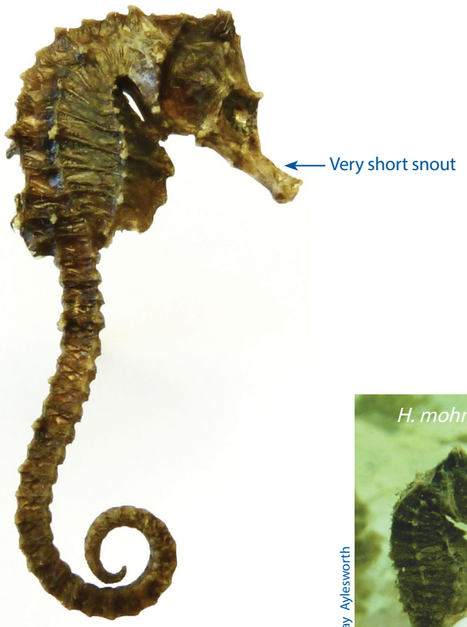
Trade height
Distance from the bottom of the dorsal fin to the tip of the coronet

Standard length
Sum of the head length, trunk length and tail height

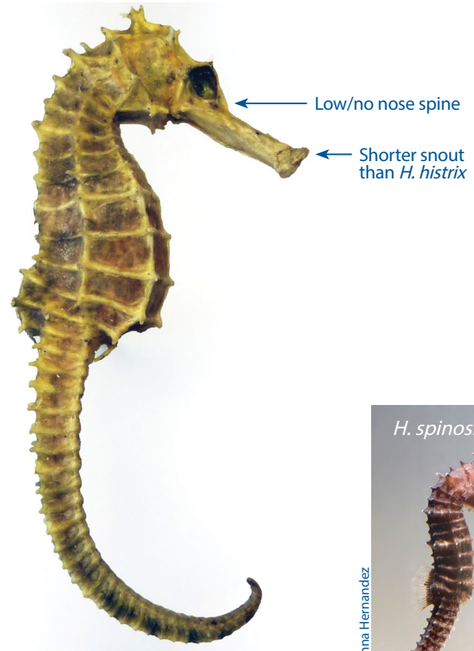


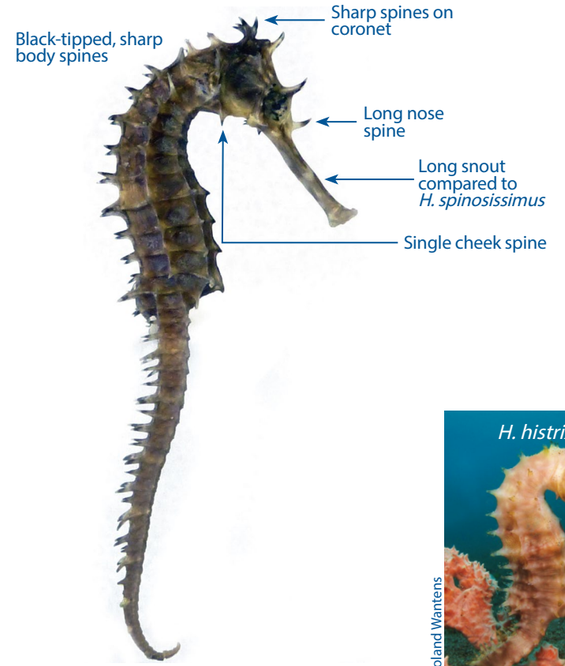
All data from Lourie et al. 2004. A guide to the identification of seahorses. Project Seahorse and TRAFFIC North America. Washington D.C.: University of British Columbia and World Wildlife Fund
This publication was funded by the European Union, through the CITES capacity-building project.

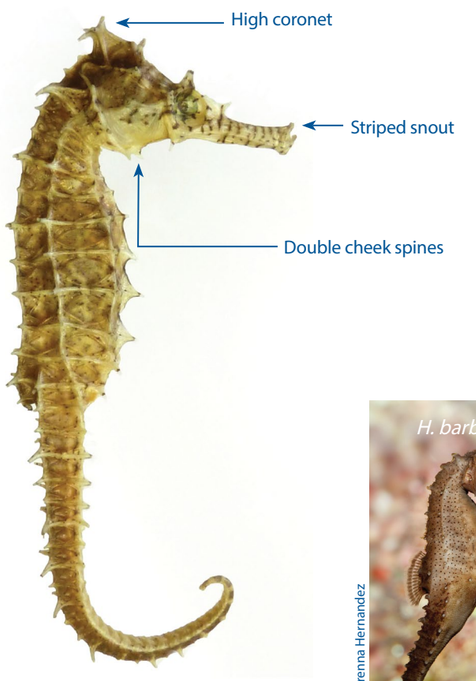
SMOOTH SEAHORSES



SPINY SEAHORSES







Annex 3

Thailand Workshop Report

Workshop: Building Thailand's capacity to under-take Non-Detriment Findings for seahorses

Objectives of workshop:
We had planned to co-organize a workshop in Thailand, with our colleagues at the Department of Fisheries, focused on implementing CITES for seahorses. The workshop aimed to bring together Thai stakeholders, including CITES Authorities, Department of Marine and Coastal Resources (DMCR), Department of National Parks (DNP), and colleagues from universities and non-governmental organizations, to:
• share and elicit available knowledge on seahorse biology, fisheries, trade, conservation and management;
• discuss techniques in marine science research (e.g. mark-recapture, hotspot mapping, population viability models;
• provide a platform to facilitate ownership and input into design of a step-by-step framework for developing an adaptive management programme and undertaking NDFs;
• design programmes to monitor catch landings (and effort) as a proxy for population assessments, taking into account different gear types and means of extraction.

Workshop report:
We are pleased to report that we indeed met or objective and had a productive meeting at Burapha University, Bangsaen from 10-12 June 2013. Both Project Seahorse and DoF colleagues learned much and had great enthusiasm for the process and experience.

Many DoF colleagues attended – including senior officials, CITES Management and Scientific Authority staff, researchers, enforcement officers, and CITES staff at the airport – along with colleagues from the Thai Department of National Parks, Department of Marine and Coastal Resources, university researchers, and a citizen group (please refer to Annex 3.i – participants list). It was an honour to have Mr. Yongyuth Taksin of DoF represent the DG for part of the meeting. We are particularly grateful for the engagement of Praulai Nootmorn, Director Marine Fisheries Research and Technological Development Institute, Marine Fisheries Research and Development Bureau, Department of Fisheries; Ratanawalee Phoonsawat, CITES SA, Department of Fisheries; and Yoo-ee Getpech, CITES MA, Department of Fisheries. Simultaneous interpretation made a big difference in communication.

We spent the first day reviewing all available knowledge of Thai seahorses, their habitats, and their catches and trade --- along with Thai fisheries and spatial management practices in general. The quality of information and energy of the speakers was excellent (please refer to Annex 3. ii - workshop agenda).

The second day was dedicated to working through a draft framework for making NDFs for seahorses (developed by Project Seahorse). We broke into three groups, each focusing on one of the three species under CITES Review of Significant Trade, and enjoyed animated and interesting discussion. The result was a draft NDF for each species and helpful amendments to

the NDF framework; this (and the ID tools, also developed by Project Seahorse) will now be revised by Project Seahorse and sent to Thailand for them to refine their NDFs.

Using the draft NDF framework, Thailand was not able to make a defensible NDF for its wild exports of *Hippocampus kelloggi, H. kuda* and *H. spinosissimus*. Workshop participants determined that all three species in Thailand are at some risk (medium, high or unknown) from fishing mortality or habitat damage / loss (Table 3.i). Thailand has established numerous initiatives to help manage its near-shore fisheries, including spatial and temporal restrictions. However, the effectiveness of such measures for mitigating pressures on Thai seahorses remains unknown. Moreover, some pressures, such as posed by unregulated small-scale crab trap fisheries have still not been addressed.

Table 3.i. Summaries of pressures and management evaluations for each species are as follows:

Species	Pressures	Management
H. kelloggi	Habitats, trawl fisheries	Uncertain – do not know if are in MPAs, do not know if covered by trawl bans, and if so whether such bans are effective
H. kuda	Habitats, small-scale trap and gill-net fisheries	Uncertain – do not know if are in MPAs, and no management of small-scale fisheries
H. spinosissimus	Habitats, trawl fisheries and small-scale trap fisheries	Uncertain – do not know if are in MPAs, do not know if trawl bans are effective, no management of small-scale fisheries

Participants agreed there is a need for more research and management action before NDFs can be made for the three species. Participants also recognized the need to collect information on *H. trimaculatus* as Thailand's trade in this species is currently under Review of Significant Trade. Thailand may also be asked to justify NDFs for *H. histrix*, for which the Party is mistakenly currently not recognized as a range state.

The following action points were agreed, relating to research and management action in support of sustainable trade. Completing such action will support Thailand to meet most of the recommendations set down by the CITES Animals Committee. CITES Thailand is responsible for coordinating the completion of these action points, but we invite Project Seahorse to assist as time and resources allow.

Table 3.ii: Agreed Action Points following seahorse NDF workshop

What	Who	DRAFT Targets	CITES Recommendation (see Table 3.iii)
A. Sig trade process			
Report to CITES the complete array of spatial and temporal management measures that may serve seahorses – e.g. trawler exclusion zone extension, temporal closures on gillnets, VMS monitoring, etc.	TH CITES MA	March 2557 / 2014	a
Document and report to CITES the level and viability of enforcement for the trawler exclusion zone	TH CITES MA	March 2557 / 2014	a, g
B. Trade research			
Find funding for further trade research, focused on upper level traders and exporters	Project Seahorse	September 2556 / 2013	e, f, h
Expand on trade research by adding to interviews with traders, exporters	Project Seahorse and DoF with Parichart Laksanawimol	September-October 2556 / 2013	e, f, h
Analysis and report writing	Project Seahorse with DoF and Parichart Laksanawimol	October-December 2556 / 2013	e, f, h
Use results from trade research to inform report to CITES with respect to recommendations	DoF	March 2557 / 2014	e, f, h
C. Biological research – in situ			
Identify seahorse populations suitable for life history studies	DoF with colleagues	December 2557 / 2014	i
Execute field work in strategic areas of Thailand	Project Seahorse with TH counterparts	January-May 2557 / 2014	i
Preliminary analysis of results to date and report writing	Project Seahorse with DoF	March 2557 / 2014	i
Use results from biological research to inform report to CITES with respect to recommendations	DoF	March 2557 / 2014	i
Finalise analysis and report on biological research in TH	Project Seahorse with TH counterparts	October 2558 / 2015	
Feed results from biological research into adaptive management framework for seahorses (see J, below)	DoF	Annually	j, k
D. Fisheries monitoring – port sampling			
Re-analyze data from 2010 buyer sampling to show % of each species caught by different gears	DoF	October 2556 / 2013	h
Develop and send landings sampling protocol	Project Seahorse	Nov 2556 / 2013	h
Maintain regular port sampling for seahorses – location caught, depth, effort, species, size and sex – add reproductive status if possible. *Effort metrics* are critical for all analyses.	DoF	Ongoing	h
Evaluate feasible frequency for port sampling, seeking consistency in timing (e.g. consider four times a year every year instead of monthly every three years)	DoF	March 2557 / 2014	h
Report plan for a detailed monitoring program of	DoF	March 2557 /	h

landings of TH seahorse spp. at representative sites, taking into account different gear types and means of extraction and recording catch and effort metrics to the CITES Secretariat		2014	
Analyze data and prepare report on seahorse catches and landings, by time and space, to evaluate seahorse pressures, population status and effectiveness of mitigation measures	DoF with professional expertise from TH and overseas (including Project Seahorse)	Annually	e, g, h
Feed results from port sampling into adaptive management framework for seahorses (see J, below)	DoF	Annually	j, k
E. Fisheries monitoring – trawl surveys			
Finish analysis of 2011, 2012 trawl survey data and submit report to CITES	DoF	March 2557 / 2014	e
Maintain documentation of seahorses in annual experimental trawl surveys – location caught, depth, effort, species, size and sex – add reproductive status if possible	DoF	Ongoing	e
Analyze data and prepare report on seahorse catches during trawl surveys, by time and space, to evaluate seahorse pressures, population status and effectiveness of mitigation measures	DoF with professional expertise from TH and overseas (including Project Seahorse)	Annually	e
Feed results from trawl surveys into adaptive management framework for seahorses (see J, below)	DoF	Annually	j, k
F. Fisheries management in support of sustainable seahorse exploitation			
Develop partnership project to examine feasibility of returning seahorses caught in small-scale fishing gears (e.g. traps)	DoF with university partners	January 2557 / 2014	f
Document plan for moving (i) gillnet fisheries (ii) crab pot catches toward conservation in Thailand and report to CITES	DoF	March 2557 / 2014	j, k
G. Seahorse distribution and population trends in TH			
Determine how to access TH dive shops/clubs in order to publicize iSeahorse – citizen science site for seahorses	Project Seahorse with DoF, DNP, SOS	August 2556 / 2013	e
Publicize iSeahorse – citizen science site for seahorses – across TH	Project Seahorse with DoF, DNP, SOS	First push in September-October 2556 / 2013, second in January-April 2557 / 2014	e
Use iSeahorse survey protocol to seek out and document seahorse populations in Thailand – *including MPAs*	SOS with TH agencies (DoF, DNP, DMCR) and Project Seahorse	Ongoing	e
Add seahorse surveys to current monitoring of coral and seagrass at next team meeting	DMCR	Next team meeting	e
Consult DNP to determine if MPAs can be surveyed as part of RAP – to determine seahorses presence in MPAs	DoF with DNP	September 2556 / 2013	e

Complete RAP in Gulf of Thailand – field work	Project Seahorse and DoF	September-November 2556 / 2013	e
Analysis of RAP results and report writing	Project Seahorse and DoF	March 2557 / 2014	e
Use results from RAP to inform report to CITES with respect to recommendations	DoF	March 2557 / 2014	e
H. Spatial and temporal protection for seahorses in TH			
Send report to CITES about when each province extended the trawl ban to 5.4 km	DoF	March 2557 / 2014	a, b, g
Document depths and habitats covered by MPAs, especially no-take zones.	DoF with DNP	30 September 2556 / 2013	a, b
Document depths and habitats covered by the trawl exclusion zone, and other spatial and temporal fisheries closures in Thailand.	DoF	30 September 2556 / 2013	a, b
For each species, map the overlay of seahorses and/or their habitats (from steps B, D, E and G), with MPAs and other spatial management (from this step, H) to analyse what coverage such measures provide for each of the species.	DoF with professional expertise from TH and overseas (including Project Seahorse)	March 2557 / 2014	b, e
Use results from mapping exercise to apply NDF framework (see step I, below) and report to CITES with respect to recommendations	DoF	March 2557 / 2014	b, e
Feed results from mapping into adaptive management framework for seahorses (see J, below)	DoF	March 2557 / 2014	j, k
I. NDF framework for seahorses			
Revise NDF framework and send back to CITES Thailand for further comment and consideration	Project Seahorse	September 2556 / 2013	
Review revised NDF framework	DoF	October 2556 / 2013	
Return final NDF framework to Thailand	Project Seahorse	December 2556 / 2013	
Apply revised NDF framework to seahorse species under Sig Trade for AC27, and report outcome to Secretariat	DoF with collaborators	March 2557 / 2014	
J. Adaptive management framework for seahorses in Thailand			
Bring together colleagues (DoF, DMCR, DNP, university experts) in annual meeting to review progress with CITES implementation for seahorses	DoF	Annually	k
Develop adaptive responses if research, monitoring indicates continued declines in CPUE in seahorses	DoF	March 2557 / 2014	k

The third day revolved around a brainstorm session on how best to address remaining CITES recommendations. We considered what existing information could be compiled to round out the seahorse story, what more needed to be done, what might be the trigger points for a change in adaptive management, and what such changes might be. The latter was largely left for further consideration. The Director of the Marine Fisheries Research and Tech Development Institute proposed an annual Thai review process for seahorses, with an array of agencies and institutions represented.

A comprehensive list of action points were agreed, relating to research and management action in support of sustainable trade. Completing the agreed actions will support Thailand to meet most of the recommendations set down by the CITES Animals Committee. CITES Thailand is responsible for coordinating the completion of the action points, but invite Project Seahorse to assist as time and resources allow.

Table 3.iii: Research and action recommendations provided by the CITES Animals Committee to Thailand's CITES Management Authority for *Hippocampus kelloggi, H. kuda* and *H. spinosissimus*, which was listed as "Urgent Concern" during a CITES Review of Significant Trade

***Hippocampus kelloggi, H. kuda* and *H. spinosissimus* (Urgent Concern) – Recommendations to Thailand**
Within **150 days** the Management Authority should: a) Clarify what legal protection is afforded to these species in Thailand and provide information to the Secretariat on controls or regulation of fishing activity that might otherwise detrimentally impact on seahorse populations; b) Provide available information to the Secretariat on the distribution, abundance, threats and conservation status of, and any current management measures in place for, the three *Hippocampus* spp in Thailand; and c) Provide justification for, and details of, the scientific basis by which, it has been established that the quantities of the three *Hippocampus* spp. exported will not be detrimental to the survival of the species and in compliance with Article IV, paragraphs 2 (a) and 3 taking into account any potential unregulated and/or illegal off-take and trade. d) Initiate measures to ensure that descriptions on all CITES permits are standardized such that trade is only permitted at **species level** and that, in compliance with Resolution Conf. 12.3 , XIV trade ceases to be reported or permitted at higher taxon levels (genus or family).
Within **one year** the Management Authority should: e) Undertake studies to provide evidence on variation in the spatial and temporal abundance of the three species of *Hippocampus* to enable areas of high seahorse density to be identified and provide the results of the analysis to the Secretariat, as the basis for considering area restrictions on nonselective fishing gear that obtains *Hippocampus* species as bycatch; f) Examine the technical and logistical feasibility of returning to the sea live seahorses taken as bycatch in various types of fishing gear, particularly by inshore gear such as crab gill nets and other traps, as the basis for considering the feasibility of minimum size limits and/or other output controls. g) Develop and implement adequate control measures and inspection to enhance the enforcement of the reported ban on trawling within 3-5 km of the coast, as the main means of reducing incidental capture of these *Hippocampus* species.

Within **2 years** the Management Authority should:

h) Establish a detailed monitoring program of landings of the three *Hippocampus* spp. at representative sites, taking into account different gear types and means of extraction and recording catch and effort metrics and provide a report to the Secretariat;

i) Conduct a detailed study of the life history parameters of the three *Hippocampus* spp., including growth rate, size and age at maturity, average annual reproductive output, and annual survivorship of different age classes and provide a report to the Secretariat. Based on the outcome of this study, model population responses to exploitation pressures in order to review and revise management measures;

j) Implement additional measures, including spatial and/or temporal restrictions on fishing activities, to support non-detriment findings;

k) Based on the studies and measures in h), i) and j) above, establish an adaptive management programme for extraction of, and trade in, the three *Hippocampus* spp., enabling management measures to be reviewed and, if necessary, revised to ensure that trade is not detrimental to the survival of the species in the wild and complies with Article IV.2.a and IV.3;

Figure 3.i. Translated draft framework for making NDFs for seahorses.

Annex 3.i – Participants list

Name	Affiliation
Department of Fisheries	
Mr. Manoch Roongratri	Director, Marine Fisheries Research and Development Bureau
Mr. Yangyuth Taksin	Senior Specialist of Marine Fishery Development and Research Office
Ms.Praulai Nootmorn	Director of Marine Fishery Technology Development and Research Institute
Ms.Ratanawalee Poonsawat	Marine Fishery Development and Research Centre in the upper Gulf of Thailand (Samutprakarn)
Mr.Tasanapol Krachangdara	Marine Fishery Development and Research Office in Andaman (Phuket)
Mr.Montri Sumonta	Marine Fishery Station, Ranong
Mrs. Tiwarat Sinanan	Marine Fishery Development and Research Centre in the Western Gulf of Thailand (Samutprakarn)
Mr.Nantachai Boonjorn	Marine Fishery Development and Research Centre in the central Gulf of Thailand (Chumporn)
Ms.Suwantana Tosapornpitakkul	Marine Fishery Development and Research Centre in the lower Gulf of Thailand (Songkla)
Mr. Suriya Chongyota	Director of Fisheries Licensing and Management Measures
Mr. San Sringam	Director of Marine Fishery Management Section
Mrs. Yoo-ee Getpech	Head of Fisheries Resources Conservation and Convention Group, Fisheries Licensing and Management Measures Section
Mr. Ekkawit Wongsrisung	Fisheries Licensing and Management Measures Section
Mr. Weera Jitsuwan	Marine fisheries suspension and prevention Section
Mr. Weera Ratanajinda	Head of Marine Fishery Management Section in the upper Gulf of Thailand (Samutprakarn)
Mr. Worawoot Soocharern	CITES-DoF Officer, Suvannabhurm Airport
Mr. Kittipat Rochanarat	CITES-DoF Officer, Suvannabhurm Airport
Mr. Anggoon Rattanaprom	Head of Marine Fishery Management Centre on Eastern Gulf of Thailand
Department of Marine and Coastal Resources	
Mr. Ronnakorn Boonprakob	Phuket Marine Biological Centre, DMCR
Department of National Parks	
Mr. Wannasak Rungrojwanich	National Parks Office, DNP, Wildlife and Plants Conservation
Kasetsart University	
Dr. Suchai Varachananan	Marine Science, Fishery Faculty
Dr. Pasinee Varachananan	Marine Science, Fishery Faculty
Ms. Parichart Laksanawimol	Marine Science, Fishery Faculty
Sahaob Dockaew	Marine Science, Fishery Faculty
Prince of Songkla University	
Ekkalak Rattanachart	Seaweed and Seagrass Research Unit, Department of Biology
Save our Sea	
Nagnnoy Yossundara	President
Somyod Yossundara	Vice-President
Project Seahorse	
Dr. Amanda Vincent	Director

Dr. Sarah Foster	Programme Manager
Lindsay Aylesworth	PhD Student
Radda Larpun	Workshop Coordinator
Sampan Panjarat	Interpreter
Wansiri Rongrungmeang	Interpreter

Annex 3.ii – Workshop agenda

TRAINING PROGRAMME

Building Thailand's capacity to under-take
Non Detriment Findings for seahorses
June 10 – 12, 2013
Venue: Tao-Thong Hotel, Burapha University, Bangsan, Chonburi

Time	Activities
9 June 2013	
	Arrival of participants and guests
10 June 2013	
08:00 – 08:30	Registration
08:30 – 09:00	**Opening Ceremony** • **Statement** from Mr. Youngyuth Taksin, Senior Specialist, DoF • **Background Report** by Ms. Praulai Nootmorn, Marine Fishery Technology Research and Development Institute, DoF • **Statement from Project Seahorse Director** by Dr. Amanda Vincent
09.00 – 10:00	**Introduction to course** • **Course goals and objectives:** Dr. Sarah Foster, Project Seahorse • **Course program, Expectation & need:** Ms. Praulai Nootmorn , Marine Fishery Technology Research and Development Institute, DoF
10:00 – 10:30	*Coffee Break*
10:30 – 12.30	**Session 1: Sharing available knowledge on seahorses (will be presented by experts and open discussion afterward)** • **Seahorse taxonomy and biology**: Mr. Sahapob Dokkeaw, Faculty of Fishery, Kasertsart University • **Conservation status of TH seahorses** (global – IUCN – and national): Ms. Parichart Laksanawimol, Kasetsart University • **Reviewing information in support of NDF framework**: Dr. Sarah Foster, Project Seahorse
12:30 – 13:30	*Lunch Break*
13:30 – 15:30	• **Habitats**: *Coral reef & mangroves Forest*: Mr. Ronnakorn Boonprakob, DMCR *Sea Grasses*: Mr. Ekkalak Rattanachart, Prince of Songkla University • **Threats:** *Seahorse catch and utilization* By Mr. Montri Sumontra, Marine Fishery

	Station, Ranong, DoF *Seahorses and CITES*: Mr.Suriya Jongyotha, Director of *Fisheries* Registration and Licensing Management Measures Section *Seahorse trade in Thailand*: Mrs. Yoo-ee Getpech, DoF; Dr. Amanda Vincent, Project Seahorse; Ms. Parichart Laksanawimol, Kasetsart University • **Reviewing information in support of NDF framework**: Dr. Sarah Foster, Project Seahorse
15.30 – 15.45	*Coffee Break*
15.45 – 17.00	• **Conservation/management** *Fishing control areas, marine protected areas in Thailand and Exclusive Economic Zone: EEZ) and Seahorse export controls*; Panel discussion • Mr.Manop Changkij, Director of Fishery Management office, DoF • Mr.San Sringam, Director of Marine fishery inspection section, Fishery management Office • Mr. Wannasak Rungrojwanich, DNP **Reviewing information in support of NDF framework**: Dr. Sarah Foster, Project Seahorse
18:30 – 19:30	*Dinner*
11 June 2013	
08.30 – 08.45	Review and Orientation
08:45 – 10:00	**Session 2: Presenting draft framework for making NDFs for seahorses**: Sarah Foster (presentation with lots of discussion)
10:00 – 10:20	*Coffee Break*
10.30– 12:00	**Revising and adapting the framework for making NDFs for seahorses**: led by Sarah Foster but mostly discussion
12:00 – 13:00	*Lunch*
13:00 – 14:30	**Session 3: Next steps for seahorses in Thailand:** led by TH CITES Authority and Project Seahorse (but mostly discussion) Setting priorities in support of adaptive management and making NDFs for seahorses in Thailand – figuring out the pragmatic way forward.
14:30 – 15:00	*Coffee break*
15:00 – 17:00	**Session 4: Designing programmes to monitor catch landings and effort data** • *Existing monitor catch landing of DoF*: Mr. Nantachai Boonjorn, Fishery and resources condition Survey and Analyst group, Research and development unit in the Central Gulf of Thailand Centre (Chumporn), DoF • *Monitoring techniques in seahorse catch landing in other countries:* Dr. Sarah Foster, Project Seahorse ***Discussion***: devising a monitoring plan for Thailand
18:30 – 19:30	*Dinner*

12 June 2013	
08.00 – 12.00	**Open session to follow up on issues, ideas, discussions that have arisen in previous days**
10:00 – 10:30	*Coffee Break*
10:30 – 12:00	**Session 4: Introducing the emerging iSeahorse citizen science programme (created by Project Seahorse) and explain how it engages volunteers to monitor wild seahorse populations and fisheries** By Project Seahorse
12:00 – 13:00	*Lunch Break*
13:00 – 14:00	**Course conclusion and evaluation**
14.00 – 14.30	**Closing ceremony & Certificate delivery:** Mr.Manoch Roongratri, Director of Marine Fisheries Research and Development Bureau

Annex 4

Viet Nam Workshop Report

Workshop: Building Viet Nam's capacity to under-take Non-Detriment Findings for seahorses

Agreed plan of action following "Building Viet Nam's capacity to under-take Non-Detriment Findings for seahorses", May 29-31, 2013

Workshop participants indentified the level of risk from several pressures related to *Hippocampus kuda* in Viet Nam as medium or high – these included pressures from damaged and degraded seahorse habitats, and a complex, unmanaged and unregulated trade. However participants only identified three existing management measures appropriate for mitigating the medium/high risks associated with several issues: two MPAs and a seasonal fisheries closure (on coastal areas less than 0.5 m in depth). The enforcement and effectiveness of these measures are unknown. As a result, Viet Nam is not able to make a defensible NDF for its wild exports of *H. kuda* at this time (including F1).

Participants agreed there is a need for more research and management action before NDFs can be made for *H. kuda* and the trade can be re-opened. Participants also recognized the need to collect information on *H. trimaculatus* as Viet Nam's trade in this species is currently under Review of Significant Trade. What follows are the agreed action points with respect to research and management action in support of sustainable trade. Completing these action points will also support Viet Nam to meet most of the recommendations set down by the CITES Animal's Committee.

CITES Viet Nam is responsible for coordinating the completion of these action points, but we invite Project Seahorse to assist as time and resources allow.

Table 4.i: Agreed Action Points following seahorse NDF workshop:

What	Who	Target
A. Sig trade process		
Contact CITES Standing Committee to learn what Viet Nam needs to do to remove get the ban on *H. kuda* exports	Dr. Tung (CITES MA)	15 June 2013
B. Trade research		
Develop proposal for trade research in Viet Nam	Dr. Ha (CITES SA) and Dr. Sarah (Project Seahorse)	15 July 2013
Find funding for trade research	Project Seahorse	1 September 2013
Carry out field research	Collaboration among Dr. Ha (CITES SA) in partnership with Dr. Hoang (IO) and Dr. Ut (Can Tho University)	September-November 2013
Analysis and report writing	Dr. Ha (CITES SA) and Dr. Sarah (Project Seahorse)	February 2014
C. Biological research – ex situ		
Develop list of questions for industry (ex situ research) on matters relating to wild seahorse populations	Dr. Sarah (Project Seahorse) with Dr. Hoang (IO)	31 July 2013
Coordinate industry to collate biological information on wild populations as inferred from accessing broodstock – where/how captured, what sizes, times of year, reproductive	Dr. Hoang (IO) (to coordinate)	31 August 2013

state, brood size, etc.		
Put IO in touch with aquarium culture community, and seahorse husbandry manual	Dr. Sarah (Project Seahorse)	July 15, 2013
Coordinate with industry to consolidate all information to improve culture approaches and increase chance of viable F2 production	Dr. Hoang (IO)	Ongoing
D. Biological research – in situ		
Develop proposal and find funding for seahorse research in strategic areas of VN	Project Seahorse	Late 2013
Execute field work in strategic areas of VN (possibly Phu Quoc, Con Dao or Phu Yen).	PS in partnership with VN counterparts	mid 2014
Fisheries research		
Explore whether seahorses can be added to existing fisheries dependent monitoring in Viet Nam	Mr. Cuong (Dept of Fisheries)	July 2013
Develop and send landings sampling protocol	Dr. Sarah (Project Seahorse)	Nov 2013
Use sampling protocol to document seahorse landings in Phu Quoc and two other island in Vung Tau	Dr. Thi (Southern Sub-Institute of Fisheries Research), Dr. Ut (Can Tho University)	2014
Prepare report on seahorse landings, by time and space	Dr. Tung (CITES MA) with Dr. Ha (CITES SA)	2014
E. Spatial and temporal protection for seahorses in VN		
Send map indicating current and proposed MPAs in Viet Nam to Mr. Tung	Mr. Cuong (Dept of Fisheries)	15 July 2013
Send maps of coral, seagrass, mangrove, and other seahorse habitats to Mr. Tung	Mr. Bat (Dept of Fisheries)	15 July 2013
Send map indicating current spatial and temporal fishing closures in Viet Nam to Mr. Tung	Mr. Bat (Dept of Fisheries)	15 July 2013
Send maps to relevant stakeholders asking them to indicate spatial distribution of *H. kuda* and *H. trimaculatus*	Mr. Tung (CITES MA)	31 July 2013
Determine how to access dive shops/clubs in order to publicize iSeahorse – citizen science site for seahorses	Dr. Sarah (Project Seahorse) and Dr. Tung (CITES MA)	October 2013
Develop MOU between UBC and Dept of Fisheries in Viet Nam	Dr. Sarah (Project Seahorse) and Mr. Bat (Dept of Fisheries)	31 July 2013
Develop MOU between UBC and IO in Viet Nam	Dr. Sarah (Project Seahorse) and Dr. Tuan (IO)	31 July 2013
Secure research permission for Rapid Assessment of seahorse distribution, seahorse trade and seahorse biology in Viet Nam	Dr. Sarah (Project Seahorse) and Mr. Bat (Dept of Fisheries)	31 September 2013
Carry out RAP – field work	Project Seahorse	January-February 2014
Preliminary analysis and report writing for CITES AC meeting	Dr. Ha (CITES SA) with Dr. Sarah (Project Seahorse)	March 2014
Map seahorse distribution in Viet Nam, based on information from all other steps	Dr. Ha (CITES SA) with Dr. Sarah (Project Seahorse)	March 2014
Map overlay of seahorses / seahorse habitats and MPAs (and other spatial management)	Dr. Ha (CITES SA) with Dr. Sarah (Project Seahorse)	March 2014
F. NDF framework for seahorses		
Revise NDF framework and send back to CITES Viet Nam for further comment and consideration	Dr. Sarah (Project Seahorse)	31 August 2013
Review revised NDF framework	Dr. Ha (CITES SA) with Dr. Tung (CITES MA) and colleagues	31 September 2013

Finalise NDF for AC27	Dr. Tung (CITES MA) and Dr. Ha (CITES SA) with collaborators	March 2014
Find funds for CITES Viet Nam to attend AC27	Dr. Tung (CITES MA), Dr. Ha (CITES SA) and Dr. Sarah (Project Seahorse)	January 2014

Annex 4.i – Participants list

Name	Affiliation
CITES Authorities	
Ong Do Quang Tung	Vietnam CITES MA
Ong Thai Truyen	Vietnam CITES MA
Ong Nguyen Van Doan	Vietnam CITES MA
TS. Nguyen M Manh Ha	Vietnam CITES SA
Fisheries	
Ong Nguyen Viet Cuong	Department of Fishery Exploitation and Protection
Ong Le Huu Tuan Anh	Department of Fishery Exploitation and Protection
Ts. Nguyen Van Thi	Southern Sub-Institute of Fishery Research
TS. Nguyen Khac Bat	Research Institute for Marine Fisheries
Ong Vo The Dung	Institute of Fishery Research and Aquaculture
Ba Nguyen Thi Thanh Thuy	Institute of Fishery Research and Aquaculture
National Parks	
Ong Nguyen Huu Binh	Phu Quoc National Park
Ong Nguyen Duc Thang	Con Dao National Park
Academia	
Ong Nguyen Thanh Nam	Faculty of Biology, University of Nature Science
TS. Vu Ngoc Ut	Can Tho University
TS. Dang Thuy Binh	Institute of Biotechnology and Environment, Nha Trang University
TS. Ngo Dang Nghia	Institute of Biotechnology and Environment, Nha Trang University
Pham Thi Anh	Institute of Fishery Aquaculture, Nha Trang University
Research	
TS. Le Dinh Mau	Institute of Oceanology
TS. Truong Sy Ky	Institute of Oceanology
TS. Do Huu Hoang	Institute of Oceanology
Ba Ho Thi Hoa	Institute of Oceanology
Industry	
Ng Thuy Layi	Dong Thanh Hung, seahorse captive breeding facility
Nguyen Huy	Dong Thanh Hung, seahorse captive breeding facility
Doan Trang Kuen	seahorse captive breeding facility
Project Seahorse	
Sarah Foster	Project Seahorse
Amanda Vincent	Project Seahorse

Annex 4.ii – Workshop agenda

WORKSHOP

Building Viet Nam's capacity to under-take Non Detriment Findings for seahorses

May 29-31, 2013

Maritime Hotel, 34 Tran Phu, Nha Trang, Viet Nam

Time	Activities
28 May 2013	
	Arrival of participants and guests
29 May 2013	
08:00 – 08:30	Registration
08:30 – 09:00	**Opening Ceremony** • **Opening statement** from VN CITES MA (Mr. Do Quang Tung, CITES MA) • **Opening statement** from Project Seahorse Director, Dr. Amanda Vincent • **Opening statement** from Institute of Oceanology, Dr. Vo Si **
09.00 – 10:00	**Introduction to course** • **Course goals and objectives**: Project Seahorse, Dr. Sarah Foster • **Course program, expectation & need:** from VN CITES SA, Dr. Nguyen Manh Ha
10:00 – 10:30	*Coffee Break*
10:30 – 12.30	**Session 1: Sharing available knowledge on seahorses (will be presented by experts and open discussion afterward)** • **Seahorses in VN: Dr. Do Huu Hoang**, Institute of Oceanology Taxonomy of VN seahorses Biology and ecology of VN seahorses Seahorse distribution in VN Conservation status of VN seahorses (global and national) • **Status of seahorse habitats in VN**: **Dr. Do Huu Hoang**, Institute of Oceanology Coral reefs Mangroves Sea Grasses • **Reviewing information in support of NDF framework**: Dr. Sarah Foster, Project Seahorse
12:30 – 13:30	*Lunch Break*
13:30 – 15:30	• **Seahorse trade globally and in VN:** Dr. Amanda Vincent, Project Seahorse • **Seahorse aquaculture in VN:** Ms. Ho Thi Hoa, Institute of Oceanology • **Reviewing information in support of NDF framework**: Dr. Sarah Foster, Project Seahorse
15.30 – 15.45	*Coffee Break*
15.45 – 17.00	• **Conservation/management:** Mr. Nguyen Viet Cuong, Department of Fishery Resources Exploitation and Protection *Fishing control areas in VN* *Marine protected areas in VN*

	Seahorse export controls • **Reviewing information in support of NDF framework**: Dr. Sarah Foster, Project Seahorse
18:30 – 19:30	*Dinner*
30 May 2013	
08.30 – 08.45	Review and Orientation
08:45 – 10:00	**Session 2: Presenting draft framework for making NDFs for seahorses**: Dr. Sarah Foster, Project Seahorse (presentation with lots of discussion)
10:00 – 10:30	*Coffee Break*
10.30– 12:00	**Revising and adapting the framework for making NDFs for seahorses**: led by Dr. Sarah Foster, Project Seahorse (but mostly discussion)
12:00 – 13:00	*Lunch*
13:00 – 14:30	**Session 3: Next steps for seahorses in VN:** led by Mr. Tung and Dr. Amanda Vincent (but mostly discussion) Setting priorities in support of adaptive management and making NDFs for seahorses in VN – figuring out the pragmatic way forward.
14:30 – 15:00	*Coffee break*
15:00 – 17:00	Visit to Dong Thanh Hung seahorse breeding facility and seahorse habitat at Hon Mun Marine Protected Area
18:30 – 19:30	*Reception Dinner*
31 May 2013	
08.00 – 09.30	**Session 4: Designing programmes to monitor catch landings and effort data** • *Existing fisheries monitoring in VN*: Dr. Nguyen Khac Bat, Southern Sub-Institute of Fishery Research • *Monitoring techniques in seahorse catch landing in other countries:* Dr. Sarah Foster, Project Seahorse ***Discussion*: devising a monitoring plan for Viet Nam**
09:30 – 10:30	**Session 4: Introducing the emerging iSeahorse citizen science programme (created by Project Seahorse) and explain how it engages volunteers to monitor wild seahorse populations and fisheries:** Dr. Sarah Foster, Project Seahorse
10:30 – 10:45	*Coffee Break*
10:45 – 11:30	**Course conclusion and evaluation**
11:30 – 12:30	**Closing ceremony & certificate delivery: ****
Participants leave for airport	