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

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Santiago (Chile), 3-15 November 2002

Interpretation and implementation of the Convention

Species trade and conservation issues

CONSERVATION OF SEAHORSES AND OTHER MEMBERS OF THE FAMILY SYNGNATHIDAE

1. This document is submitted by the Animals Committee pursuant to paragraph b) of Decision 11.97 regarding seahorses and other members of the family Syngnathidae.

Summary

2. At its 11th meeting (CoP11) of the Conference of the Parties to CITES adopted Decisions 11.97 and 11.153 regarding seahorses and other members of the family Syngnathidae to take action for the management and conservation of these fishes. The Animals Committee (AC) submits the present repot on the biological and trade status of seahorses and other syngnathids at the 12th meeting of the Conference of the Parties (CoP12) to outline the implementation of the Decisions and to provide guidance towards further trade management for these animals.

3. The large international trade in seahorses (genus *Hippocampus*) is leading to population depletion in some regions. Most other syngnathids are either not traded internationally or not known to be threatened, although concern is rising about the conservation status of *Solegnathus* pipehorses. Seahorse species are susceptible to overexploitation because of their low population densities, low mobility, small home ranges, inferred low rates of natural adult mortality, obligatory and lengthy paternal care, fidelity to one mate, and a small brood size.

4. Seahorses are often target-fished by subsistence fishers, although most are caught in non-selective fishing gear as bycatch or secondary catch. Syngnathid fisheries are generally not managed because syngnathid biology and population dynamics are little known, partly because the fisheries often involve multiple fishery gears and multiple species in developing countries, and partly because these fishes are often landed as bycatch. Consultations with seahorse fishermen, resource managers, biologists, traders and consumers to devise possible fisheries management plans for seahorses indicate that the consensus across these groups so far is that no-take marine protected areas (MPAs) and minimum-size limits would be of great value, and that tenurial rights and reduced harvesting of brooding males should be considered.

5. Available trade data come primarily from surveys during the period 1993 to 1995 (Vincent, 1996), and then again from 1998 to 2001 (Vincent and Perry, in prep.). Analysis of these latter surveys indicates that the syngnathid trade is almost entirely legal, dependent on complex trade routes, expanding geographically (now involving at least 75 countries), larger than first recognized (probably exceeding 70 tonnes of dried seahorses per annum and hundreds of thousands of live seahorses), and valuable (worth hundreds of USD per kg).

6. Several species of seahorse are now considered to be threatened. Collaborative research and conservation efforts for seahorses and other syngnathids are, however, gathering momentum. These

involve a wide array of interested parties (stakeholders) and offer considerable promise but are insufficient in themselves. The global distribution of seahorses and the growing trade mean that international support is needed to complement local conservation programmes.

7. As required under Decision 11.153, the Secretariat requested information from Parties on syngnathids in two Notifications to the Parties (No. 2001/023 and No. 2001/034 of 16 march and 18 May 2001 respectively) during 2001, and hosted a technical workshop on seahorses and other syngnathids in May 2002. Thirteen Parties responded to the Notifications, confirming that very little was known about syngnathid biology and trade, and that only Australia had a management approach specifically for syngnathids. Most responding Parties acknowledged that certain populations of syngnathids might be declining.

8. Workshop participants agreed that some species of seahorse meet the biological criteria for a CITES Appendix-II listing and that others qualify for listing under the look-alike provisions of the treaty. They felt that such a listing would be useful for seahorse conservation and management, while syngnathid bycatch fishing should be addressed through expanded management programmes and continued capacity building in source countries.

9. The AC recommends that all species of seahorse (genus *Hippocampus*) be included in Appendix II, that Conference of the Parties adopt a decision to support the implementation of the Convention for *Hippocampus* spp. in case one or more species is included in the Appendices, and that government agencies, trade organizations, inter-governmental bodies, non-governmental organizations, and communities should adopt supportive measures for syngnathid conservation.

10. Given that the inclusion of species in Appendix II seeks to allow trade without compromising conservation, the AC encourages Parties to assist seahorse fishermen to manage this resource. It particularly hopes that any Party where domestic legislation prohibits trade in marine species included in Appendix II might consider adjusting these measures to allow trade in compliance with Article IV of the Convention.

Introduction and background

11. CITES first became involved with the management and conservation of syngnathid fishes (seahorses, pipefishes, pipehorses, and seadragons) at CoP11 (Gigiri, June 2000). A working group was formed to consider document Doc. 11.36, submitted by the United States of America and Australia. As a result, the Parties adopted two decisions directed to the AC (Decision 11.97) and to the Secretariat (Decision 11.153). These decisions were unusual because syngnathids fell outside the scope of the Convention and had never been proposed for inclusion in any Appendix.

Decision 11.97

12. Decision 11.97 regarding seahorses and other members of the family Syngnathidae states that:

    The Animals Committee shall:

    a) review, with the assistance of experts as may be needed, the outcomes of the technical workshop convened by the Secretariat and other available information concerning the biology, catch and bycatch of and trade in seahorses and other syngnathids and develop appropriate recommendations; and

    b) prepare, for consideration at the 12th meeting of the Conference of the Parties, a discussion paper on the biological and trade status of seahorses and other syngnathids to provide scientific guidance on the actions needed to secure their conservation status.

13. This discussion paper is intended to meet the requirements placed on the AC in paragraph b) of Decision 11.97, offering input to Parties on how to ensure sustainable trade in fishes of the family Syngnathidae. The present document begins with a review of the family but will focus on seahorses, genus *Hippocampus*, as they are the species most affected by international trade.

Syngnathids in trade

14. The family Syngnathidae (seahorses, pipehorses, pipefishes and sea dragons) includes at least 215 species in 52 genera from most coastal countries (and some freshwaters) around the world. The vast majority of species are not traded, domestically or internationally. To apply the provision of the Convention to this entire family as an entity would therefore be neither appropriate nor feasible.

15. The genus *Hippocampus* (seahorses) includes about 32 species found around the world, although taxonomy remains unclear in some areas. Most of the world's seahorse species are traded for traditional medicine, aquarium display and as curios. All indications point to a significant conservation problem on a global scale from a combination of unmanaged and unregulated targeted fishing, bycatch in non-selective fishing gear, and habitat degradation or loss. Populations of seahorses in many regions of the world are showing marked declines in numbers. Trade is undoubtedly putting substantial pressures on wild populations. The 2002 IUCN Red List categories for this genus will be 'data deficient' (DD; 11 species), 'vulnerable' (VU; 20 species), and 'endangered' (EN; 1 species) (Hilton-Taylor, 2002). Most VU listings in this genus arise from population declines as a result of exploitation and habitat loss, but *H. capensis* is listed as EN because of its restricted range and threats to habitat.

16. The five to eight species of the genus *Solegnathus* (pipehorses) are known as 'sea dragon' in traditional East Asian medicine, where they are heavily traded. These species should not be confused with the leafy and weedy seadragons of Australian waters. Pipehorses are the most valuable syngnathids in trade. This genus is found primarily in Australia, where it comes under formal conservation management at the national level. Pipehorses in trade are largely derived from bycatch landings in Australia's prawn trawl fisheries. Very little is known of their biology and no population assessments exist. In Australia, studies of *Solegnathus* bycatch are underway and logbook programmes to record catches are in place in some fisheries. Other countries where *Solegnathus* is found (from Japan to New Zealand) do not apply any specific management for this genus. The 2002 IUCN Red List will record all *Solegnathus* as VU.

17. The pipefish *Syngnathoides biaculeatus* is among the most heavily traded syngnathids, predominantly for traditional medicine but also for a small aquarium market. Effectively no species-specific trade data exist. Very limited knowledge of the biology of this species and a complete dearth of population assessments mean that the 2002 IUCN Red List will include this species as DD.

18. The pipefish *Microphis boaja* is traded solely for traditional medicine, but the scale of this trade is unknown. Very little is known about the biology of this fish. In this genus, only *M. caudocarinatus* and *M. spinachoides,* are assessed as DD in the IUCN Red List.

19. Species in the genus *Doryrhamphus* are traded only in small volumes for aquarium use. Many species are locally quite common and there is no recorded evidence of population declines. Limited studies on *Doryrhamphus* biology indicates that they are pair-bonded and site faithful. *D. dactyliophorus* is the only species in the 2002 IUCN Red List that is categorized as DD.

20. The monospecific genera *Phycodurus* and *Phyllopteryx* (seadragons) are seldom traded. They are found only in Australia, where they are entirely protected in many states and also managed under national domestic legislation. Any export occurs only under tight management regimes, in many cases from captive rearing of the young borne by one wild-caught male. These species are held almost entirely in public aquaria, and then only in the largest institutions. They are not traded dried for traditional medicine, where the term 'seadragon' refers to *Solegnathus*. Very little is known about their biology. Only very limited population assessments exist, and both species will be included in the 2002 IUCN Red List as DD.

21. The rest of this discussion paper focuses on seahorses, *Hippocampus* spp., as the species thought to be most affected by trade. Other syngnathids, particularly *Solegnathus* pipehorses, should also be monitored for over-exploitation and conservation concern. The sections in this discussion paper dealing with the biology of seahorses, fisheries management agreements and trade are based on background documents that were presented at the technical workshop on seahorses and other syngnathids, convened by the Secretariat in Cebu, the Philippines, in May 2002 (see paragraphs 64 to 73).

Biology of seahorses

22. A lack of knowledge on the biology of seahorses, particularly life history parameters, makes it difficult to manage effectively a population, let alone a species. However, existing information on life history does indicate that many species are susceptible to high levels of exploitation: low population densities mean that seahorses may have trouble finding a new partner; low mobility and small home range sizes mean that adult seahorses will be slow to recolonize over-exploited areas; possible low rates of natural adult mortality means that heavy fishing will place new pressures on the population; male 'pregnancy' means that survival to birth of the young depends on the survival of the male; monogamy in most species means that a 'widowed' partner stops reproducing, at least temporarily; and a small brood size limits the potential reproductive rate (although this may be offset by higher juvenile survival).

Taxonomy

23. All seahorses are members of the family Syngnathidae, along with the pipefishes, pipehorses, and seadragons. These fishes are found in the same order (Gasterosteiformes, e.g. Dawson and Vari, 1982, sometimes called Syngnathiformes, e.g. Kuiter, 2000) as the trumpetfishes, snipefishes, cornetfishes, and pegasids (sea moths). At least 32 species of seahorses (genus *Hippocampus*) are currently recognized from morphometric and genetic analysis, although more species will emerge from further taxonomic research (Lourie *et al.*, 1999). The vast majority of seahorse species have not been studied adequately in the wild.

Distribution and movement

24. Seahorses occupy both temperate and tropical coastal waters, with a distribution from about 50 degrees North to 50 degrees South. Most seahorses are found among sea grasses, macroalgae, mangrove roots, and corals, while others live on open sand or muddy bottoms. Some species are also found in estuaries or lagoons (e.g. *H. capensis,* Whitfield, 1995). Seahorses tend to be patchily distributed at low densities (e.g. *H. comes*, Perante *et al*., 2002; *H. capensis,* Bell *et al*., in review; *H. whitei,* Vincent *et al*., in prep.) and are highly influenced by anthropogenic activities, especially habitat degradation (Bell *et al*., in review).

25. Seahorses swim by using the propulsive force of the rapidly oscillating dorsal fin, and employ the pectoral fins on either side of the body for steering and stability. More adapted to manoeuvrability than speed, seahorses apparently rely on camouflage to avoid detection from predators, rather than on speed for escape. Most seahorse species studied to date exhibited high site-fidelity and small home range sizes, at least during the breeding season (e.g. *H. whitei,* Vincent *et al.*, in prep.; *H. guttulatus,* J. Curtis, pers. comm.; *H. comes,* Perante *et al*., 2002).

Morphology

26. Seahorses have a head at right angles to the body and a fully prehensile tail that wraps around any suitable holdfast, including human made objects (e.g. fish cages or shark nets). Their thin skin is stretched over a series of bony plates that are visible as rings around the trunk and tail. The number of rings is useful in identifying species, as are the cheek spines, fin rays, and coronet on top of the head (Lourie *et al*., 1999). Some species also have bony bumps or skin filaments protruding from these bony rings (e.g. *H. bargibanti*, Whitley, 1970). Seahorses are masters of camouflage, changing color and

growing skin filaments to blend in with their surroundings. Short-term colour changes may also occur during courtship displays and daily greetings (e.g. *H. whitei*, Vincent and Sadler, 1995).

27. Seahorses are either measured in height (coronet to tip of uncurled tail) or in standard length. Adult seahorse heights vary among species, ranging from the large Australian big-bellied seahorse (*H. abdominalis,* > 30 cm) to the tiny pygmy seahorse (*H. bargibanti*, < 2 cm) (Lourie *et al*., 1999). Sexual maturity in males can be recognized by the presence of a fully developed brood pouch. Seahorse weights vary with reproductive stage, increasing a great deal when they have ripe eggs (females) or are 'pregnant' (males). Young seahorses look like miniature adult seahorses, are fully independent after birth, and receive no further parental care. Newly released young of most species measure 7-12 mm (Vincent, 1990).

Survival

28. Lifespan for seahorses is estimated (generally from laboratory observations) to range from about one year in the very small species (e.g. *H. zosterae,* Strawn, 1953, Vari, 1982) to an average of 3 to 5 years for larger species (e.g. *H. capensis*, Lockyear *et al*., 1997; *H. comes*, Meeuwig *et al*., in prep.). Mortality from predation is probably greatest in juveniles, which are eaten by many fish and invertebrates (A. Vincent, pers. obs.). Adult seahorses are presumed to have few predators as a result of excellent camouflage and unpalatable bony plates and spines (Lourie *et al.*, 1999). Crabs may be among the main predators. Seahorses have also been found in the stomachs of large pelagic fishes such as tunas and dorados (Herald, 1949; Wilson and Beckett, 1970) and are eaten by skates and rays (Whitley and Allan, 1958), penguins, other water birds (Kuiter, 2000), and the occasional sea turtle (Burke *et al*., 1993).

Feeding

29. Seahorses are voracious feeders, typically relying entirely on live, moving food. They are primarily ambush predators, sucking passing prey quickly out of the water with their long snouts. Their eyes move independently of each other, allowing the seahorse to maximize its search area (Ocken, 1994). They will ingest prey small enough to fit into their mouths, mostly small crustaceans such as amphipods, but also fish fry and other invertebrates (e.g. Boisseau 1967; Tipton and Bell, 1988; Do *et al.*, 1998; Teixeira and Musick, 2001). Seahorses have neither teeth nor stomach, and pass food through an undifferentiated digestive system (Rauther, 1925).

Reproduction

30. The male seahorse, rather than the female, becomes 'pregnant', although it is the female that produces the eggs and the male the sperm. The female deposits the eggs into the male's brood pouch, where he fertilizes them. The pouch acts like the uterus of a mammal, complete with a placental fluid that bathes the eggs, and provides nutrients and oxygen to the developing embryos while removing waste products (Boisseau, 1967; Linton and Soloff, 1964). The pouch fluid is altered during 'pregnancy' from being similar to body fluids to being more like the surrounding seawater (Linton and Soloff, 1964). The 'pregnancy' lasts about 2 to 6 weeks, the length decreasing with increasing temperature. At the end of gestation the male goes into labour, pumping and thrusting for hours to release his brood.

31. Males of most species release about 100 to 200 young per 'pregnancy', but the total ranges from 5 for the smaller species (e.g. *H. zosterae*, Masonjones and Lewis, 1996) to a record 1,572 young (*H. reidi,* Vincent, 1990). The low number of young produced may be somewhat offset by their more advance stage of development at release, such that each young should have a higher chance of survival than in most fish, in the absence of other pressures.

32. The breeding season varies according to species, and is most likely dependant on water temperature, monsoon patterns, and the lunar cycle. Most (but perhaps not all) species of seahorses studied to date appear to be monogamous, forming pair bonds that last the entire breeding season. Pair bonds in

monogamous species are commonly reinforced by daily greetings that are extended into courtship once the male gives birth (e.g. *H. fuscus,* Vincent, 1995; *H. whitei,* Vincent and Sadler, 1995; *H. zosterae*, Masonjones and Lewis, 1996).

Fisheries management arrangements for seahorses

33. Generally, management of syngnathid fisheries around the world is not well developed. The majority of syngnathids in trade come from developing countries in the tropical Indo-Pacific where even the food fisheries are not strongly managed. Furthermore, much of the catch is from artisanal, multi-species fisheries and bycatch, both of which are extremely difficult to manage.

34. The most-developed management schemes for syngnathid fisheries in 2002 are probably in Australia. Since 1998, the export of seahorses and other syngnathids from Australia has only been permitted from fisheries operating under an approved management plan or captive-breeding operation. However, the vast majority of syngnathids exported from Australia (primarily *Solegnathus* pipehorses) are bycatch from the Queensland east coast trawl fishery and there is controversy over the effectiveness of current arrangements to ensure sustainability of bycatch species (I. Zethoven, pers. com., Dec. 2001). For most other countries, fisheries for seahorses and other syngnathids are in fact unmanaged in any direct way. Syngnathids may, however, benefit from general policies that establish MPAs or control certain fishery gear (e.g. for trawling) in particular times and places.

35. The management and conservation of resources in artisanal fisheries remain an enormous challenge, especially given the lack of livelihood alternatives to fishing (for food or income) and of data with which to formulate management decisions (Jennings and Polunin, 1997; Johannes, 1998; Mosquera *et al.,* 2000). Yet, faced with declines in resources and threats to species or populations, management measures have to be instituted. Co-management, wherein stakeholders have a large involvement in decisions affecting the fishery, is increasingly considered to be essential to successful management of fisheries (Katon *et al.,* 1999; Westmacott, 2002).

36. In one example, 11 management options were identified by biologists and presented by Project Seahorse to groups involved with an artisanal seahorse fishery in the central Philippines. These consisted of five input controls (number of fishermen, gear restriction, temporal closures, MPAs and other spatial closures, and tenurial systems) and six output controls (total allowable catch (TAC), minimum, maximum, and slot size limits, sex-selective fishing and caging 'pregnant' males). Feedback from fisheries scientists, fishermen, resource managers, aquarium and traditional medicine groups was obtained, and the degree of preference for each of the options from the different stakeholder groups was used to identify those that had broad support.

37. The management options are likely to consist of a combination of the options that were highly preferred by a range of stakeholder groups (i.e. MPAs, minimum size limits and a tenurial system). The use of multiple management measures should help to spread the risk if some of the biological or economic assumptions are invalid. In addition, the three highly preferred options have different temporal scales for their implementation and subsequent effects.

38. There appears to be a consensus that MPAs offer an important precautionary measure for conservation in general, with MPAs having significant effects on the whole ecosystem (Mosquera *et al.,* 2000; Jennings, 2001). Certainly, MPAs enhance protection and habitat for other fished species (Rogers-Bennett and Pearse, 2001), for which spill-over and export of larvae may be greater than for seahorses. Such gains can help seahorses, which are just one part of a multi-species fishery. The introduction of a tenurial system would be another important contribution to the long-term sustainable management of seahorse populations and other marine fauna. However, implementation would take time and would not in itself create security for seahorse populations. Imposing minimum size limits on specimens allowed to be harvested would need to be evaluated carefully, but might operate more quickly than MPAs in re-building seahorse populations (Bohnsack, 2000; Nowlis, 2000). The potential loss of income could be mitigated by introducing these management measures gradually (Bohnsack, 2000).

39. Minimum size limits could help address recruitment overfishing (where animals are caught before they have the opportunity to start reproducing) and are common in a many different fisheries (Pitcher and Hart, 1983; King, 1995), although often established in conjunction with other measures (e.g. Kruse *et al.,* 2000; Hutton *et al.,* 2001). A general minimum size limit could probably be implemented since almost all traded species are similarly sized (Lourie *et al.,* 1999). This problem of devising minimum size limits for many species caught in the same fishery has already been tackled in the coral trout fishery on Australia's Great Barrier Reef: all species were managed under one size limit. Recent recognition that one coral trout species matures at a substantially larger size than the others led to a new and specific size limit for that species: fortunately, it is easily recognized by fishers (QFMA, 1999).

40. Managing bycatch of syngnathids will be problematic. MPAs can serve target and bycatch species alike and have been advocated for both fisheries management and conservation purposes (Bohnsack, 1998; Mosquero *et al.,* 2000). Other input controls such as the number of fishermen, or temporal and spatial closures, are often part of management regimes for non-selective gear types. Technical changes to fishing gear might also allow escapement of certain sizes and/or sex, although they would not work where the target species were similar in size or exhibited similar behaviour to the bycatch species. The non-selective nature of bycatch means that output controls such as size limits or sex-selective fishing would be extremely difficult to implement, and might not even serve a conservation goal if the fish were landed dead anyway. Other innovative management options of particular utility to bycatch fisheries, such as mandatory use of sorting hoppers, will need to be considered.

Trade in seahorses and other syngnathids

41. Global trade surveys were conducted from 1998 to 2001 to complement official Customs data (Vincent and Perry, in prep.). Findings are being used to analyze and update a report based on previous surveys and on Customs data, gathered in the period 1993-1995 (Vincent, 1996). This survey is still in progress and all figures cited here should be regarded as preliminary. As a specific example, data for Indonesia, Thailand and Vietnam are still being assessed and are incomplete in this discussion paper.

42. Most seahorse species (*Hippocampus* spp.) are valued for use in traditional medicines (TM), curiosities and ornamental display. Among the pipefishes, only one genus (*Solegnathus* spp.) has high value in TM. A few more pipefish species are traded as dried medicinal ingredients and others are sold for aquarium display. Syngnathids have a life history that probably makes them ill-suited to heavy exploitation (see paragraphs 22 to 32 above). Strong social and spatial structure, combined with essential parental care, mean that populations are easily disrupted and slow to recover.

43. The majority of dried syngnathids traded for use in TM and as curios are landed as bycatch, primarily from shrimp and prawn trawlers. Many syngnathids that are traded as both dried and live specimens are also target-caught, primarily by subsistence fishermen. Trade for the three main purposes runs parallel, diverging when the syngnathids are sold to the primary buyer.

44. Most syngnathid fisheries and trade are entirely legal. However, 15 countries regulate or monitor the use of dried syngnathids, while 19 regulate or monitor the use of live syngnathids. The 15 Member States of the European Union (EU) monitor importations of whole dried and live specimens of *Hippocampus* spp. Official trade data, however, continue to exhibit serious gaps and discrepancies.

45. Trade routes are complex and erratic. At least 75 countries traded syngnathids during the period 1996-2001, up from a recognized set of 32 trading countries in 1995. Much of the expansion is in Africa and Latin America, and appears to represent genuinely new trade routes, not merely those that have been recently described. More countries are involved in trade in dried specimens than in live ones. The largest exporters of dried syngnathids are thought to be India, Mexico, the Philippines, Thailand and Vietnam. The largest importers are probably mainland China, Hong Kong SAR, Singapore and Taiwan, province of China. For the trade in live specimens, Brazil, Indonesia and the Philippines appear to be the major exporters, primarily to the EU and United States.

46. A combination of official data, trade surveys and qualitative evidence indicate that the trade in dried seahorses through Asia exceeded 70 tonnes in 2000. This would amount to at least 24.5 million seahorses, using an estimate of 350 seahorses per kilogram. These figures include only the international trade that passes through China, Hong Kong SAR, Singapore, and Taiwan, province of China, excluding domestic harvests and consumption. Even so, such totals represent a considerable increase on the inferred trade of more than 45 tonnes of seahorses through Asia in 1995. The difference probably represents improved knowledge of the trade as well as real trade increases.

47. Information from source countries suggests that many hundreds of thousands of seahorses were caught for the aquarium trade in 2000, as in 1995. However, import records and industry data suggest much lower levels to the point where focused research is needed to reconcile these figures. The aquarium trade was the primary purchaser of seahorses in some regions.

48. Prices increased along trade routes, with fishers getting USD 0.10-0.50 per dried seahorse whereas retailers sold them for many hundreds of dollars per kilogram: the highest price was about USD 2,400 per kilogram for a large smooth species, with approximately 60 individuals per kilogram (USD 40 per individual).

49. Known global volumes of pipefishes in trade have reached tens of tonnes annually. Pipehorses, imported from Australia, can retail for as much as the most valuable large seahorses.

50. Several syngnathids are listed as threatened under international or national criteria. Fishermen and other informants have reported considerable declines in seahorse catches and trade, without commensurate decreases in effort. Syngnathid conservation will best be achieved through reduced fishing in general and improved habitat management.

Conservation initiatives for syngnathids

51. Members of the family Syngnathidae are benefiting from considerably enhanced interest in their research and management. Much of the activity has begun since the publication of *International Trade in Seahorses* (Vincent, 1996), documenting the growing exploitation of these fishes. While global efforts are still inadequate for 215 species distributed worldwide, progress is both heartening and promising.

52. A number of countries have risen to the challenge of managing syngnathids. Australia has shown the most notable progress in syngnathid conservation, as explained above. The EU and Hong Kong SAR began monitoring *Hippocampus* spp. trade in 1997 and 1998 respectively, but without management requirements. Other countries have also adopted protective or management measures for these fish, while many more have marine conservation policies of indirect benefit to syngnathids.

53. Further initiatives are undertaken by Project Seahorse, a non-government organization working in eight countries to preserve for syngnathids. It coordinates research and collaborates with a wide range of stakeholders and partners to build capacity for marine conservation. Using seahorses as a focus for broader marine conservation and resource management activities, it runs community-based programmes in the Brazil, Philippines and South Africa, and previously in Vietnam.

54. User communities have begun to play an active role in syngnathid conservation. The Hong Kong Chinese Medicine Merchants Association (HK CMMA) has collaborated most helpfully with a conservation alliance for marine medicinal species (comprised of Project Seahorse, TRAFFIC East Asia and WWF Hong Kong). The HK CMMA contributes expertise, trials management approaches, distributes information materials, participates in discussion meetings, and helped fund the CITES technical workshop on syngnathids. Several public aquaria in Europe and North America as well have made syngnathids a focus, to the point where their largest inter-institution collaboration is for these fish. Some public aquaria in developed countries are now launching conservation initiatives for their local syngnathid populations.

55. Public interest in syngnathids and their conservation has been nurtured by high profile television programmes and magazine articles. In addition, more than 10 large public aquaria are featuring seahorses in very well-received major exhibitions. Divers monitoring programmes such as Dragon Search (Australia), Survey Seahorse 2000 (New Zealand) and the British Seahorse Survey (United Kingdom) further foster public interest, and make contributions to research.

Decision 11.153

56. Decision 11.153 regarding seahorses and other members of the family Syngnathidae states that:

The Secretariat shall:

a) assist in obtaining funds from interested Parties, intergovernmental and non-governmental organizations, exporters, importers and other stakeholders, to support a technical workshop of relevant experts on the conservation of seahorses and other syngnathids;

b) contingent on the availability of external funding, cooperate with other relevant bodies, including the fisheries sector, to convene a technical workshop to consider and review biological and trade information that would assist in establishing conservation priorities and actions to secure the conservation status of seahorses and other syngnathids;

c) request Parties to provide, for discussion at the technical workshop, all relevant available information concerning the status, catches and bycatches of, and trade in, seahorses and other syngnathids and on any domestic measures for their conservation and protection, and to review the adequacy of such measures;

d) encourage scientific research to promote the long-term conservation and sustainable use of seahorses and other syngnathids; and

e) explore ways to enhance the participation of fishermen, traders and consumers in the conservation and sustainable use of seahorses and other syngnathids.

57. In compliance with Decision 11.153, paragraphs c), d) and e), the Secretariat issued Notifications to the Parties No. 2001/023 of 16 March 2001 and No. 2001/034 of 18 May 2001 concerning seahorses and other members of the family Syngnathidae *inter alia* to seek information on agencies and institutions dealing with their management, on relevant research, on species, distribution, population data, fisheries and trade data, conservation concerns and national protection measures, as well as funding for the technical workshop.

Review of responses to Notifications to the Parties

58. The Secretariat received a total of 13 responses to the two Notifications to the Parties from the following sources: Australia, Belgium, Ecuador, Germany, Israel, New Zealand, Romania, Slovakia, South Africa, Sweden, Ukraine, United States and European Commission (EC). Italy provided a partial and unofficial preliminary response at the 17th meeting of the AC.

59. All respondents except for Slovakia were, or included, range States. None of the most significant exporters or importers of dried seahorses, or the major exporters of live seahorses, responded. However, Australia is the world's major exporter for (dried) pipehorses, *Solegnathus* spp., while Ecuador and the United States also export syngnathids. The United States and EU Members States are thought to be the major importers of live seahorses.

60. The responses confirmed that very little was known about syngnathid biology, and that the taxonomy remained unclear. Diverse sources of expertise in related matters were available but few of the

scientists involved were studying syngnathids *per se*. This lack of biological information severely handicaps decision-making with respect to fisheries and trade management.

61. Most respondents maintained some form of trade monitoring for at least some syngnathids, but this is certainly not characteristic of most Parties. The data varied greatly in completeness and reliability, and it is possible that gaps will emerge when these data are compared with trade information from countries that did not respond to the Notifications.

62. Only Australia has a management approach specifically for syngnathids, although four other Parties reported documenting trade. Many respondents reported that some populations of syngnathids were currently protected *de facto* within no-take MPAs, although usually without specific management. Others were protected under fisheries guidelines requiring permits, which had not been granted, to retain bycatches.

63. Many countries alluded to a vague awareness that certain populations of syngnathids might be declining. But no country had comprehensive data on the population dynamics of any syngnathid species, so assessments remain incomplete.

Outcomes of the technical workshop

64. The Secretariat convened a technical workshop on seahorses and other members of the family Syngnathidae in Cebu, the Philippines, from 27 to 29 May 2002. The CITES Management Authority of the Philippines and Project Seahorse organized the workshop. Project Seahorse was contracted to provide background documents on biology, management and trade of syngnathids.

65. Funding for the technical workshop was generously provided by the governments of Australia, the Netherlands, the United Kingdom and the United States, the Hong Kong Chinese Medicine Merchants Association, the International Fund for Animal Welfare, the National Oceanic and Atmospheric Administration of the United States of America, WWF-US/TRAFFIC North America, and the WWF International Species Programme.

66. The workshop considered and assessed a range of approaches to syngnathid conservation and management, CITES listing and implementation issues, the impact of illegal, unreported, and/or unregulated (IUU) fishing for syngnathids, and socio-economic and stakeholders concerns associated with syngnathid management. Specialists gave 15 presentations in four sections (trade and socio-economic background, biology and fisheries, conservation strategies and practices, management options). These were followed by 10 country and regional reports, covering all continents. Most of the documents that were produced for and presented at the workshop will become available on the CITES website.

67. Three working groups evaluated conservation priorities for Syngnathidae, possible CITES actions, and socio-economic and policy aspects of possible management actions respectively. The participants in the workshop advised that all species of *Hippocampus* be included in Appendix II, and recommended that the inclusion should be accompanied by the adoption by the Conference of the Parties of a decision. They also formulated other conservation recommendations not directly related to the implementation of CITES. Since the Philippines Fisheries Code of 1998 precludes fishing of and trade in species covered by CITES, the participants to the workshop recommended that solutions should be found that would allow continued sustained exploitation by subsistence fishermen in the Philippines of *Hippocampus* species should these be included in the CITES Appendices.

68. The recommendation for an Appendix-II listing represented the view of a significant majority at the workshop. Participants from some range States preferred more time for biological, fisheries and trade research, and expressed concern about the challenges of implementation and enforcement. Participants from the aquarium export and traditional Chinese medicine (TCM) trade communities also sought more

information and were concerned that bureaucracy might hamper trade. Nonetheless, all participants agreed on the need to act to secure the future for wild populations of seahorses.

69. The workshop advised that range States for *Solegnathus* undertake monitoring of *Solegnathus* bycatch and develop *Solegnathus* population assessments. This recommendation arose from discussions about the potential benefits of considering *Solegnathus* for Appendix-II listing. Large volumes of this genus are traded as the most valuable syngnathids in TCM. The working group recognized that Australian populations of *Solegnathus* are already subject to considerable fisheries management and trade monitoring. However, it expressed concern about the lack of knowledge and understanding of *Solegnathus* in New Zealand, which is exporting pipehorses to Hong Kong SAR, and in other range States north up to Japan.

70. All participants were very aware that seahorse fisheries support many subsistence fishermen and small traders. There was a concerted desire to uphold exploitation of seahorses as long as it can be maintained at sustainable levels. Consultations in November 2001 with 47 small-scale seahorse fishermen in the Philippines about seahorse management measures indicated a preference for no-take MPAs, a minimum size limit and sex-selective fishing; moderate support for a possible total allowable catch (TAC) quota, among other management measures; and opposition to a maximum size limit or slot size.

71. After considering the socio-economic impact of many potential fisheries management measures, the technical workshop suggested that the following offered the best combination of expected implementation success and perceived conservation benefits: fisheries and trade monitoring, no-take MPAs, minimum size limits, sex selective fishing (leaving 'pregnant' males), national trade quotas, and some form of selective sourcing (perhaps through certification). Limits on TAC were evaluated to have high conservation benefits but only a low to moderate chance of successful implementation. The inclusion of *Hippocampus* spp. in Appendix II, with an associated draft decision, could help to achieve most of these goals.

72. The workshop recognized that trade monitoring and recording, as would be required under the provisions of the Convention, might impose demands on traders, CITES Authorities and enforcement officers. No-take MPAs may impose initial costs on fishermen and their communities, so other forms of income generation may need to be identified and promoted. The establishment of minimum size limits or sex selective fishing could also disadvantage fishermen and their communities, again requiring development of alternative livelihoods. The impact of seahorse management measures will diminish along trade routes, as those participants farther away from the source deal in an ever more diverse range of products. Resource managers and enforcement officers may need additional support. TAC quotas or national trade quotas would affect stakeholders at all trade levels, and prices for traded seahorses might well have to rise. Price rises in compensation for sustainable resource management might most easily be achieved through some form of certification, giving consumers the choice of purchasing their products from acceptable sources.

73. The participants concluded *inter alia* the following:

    a) At least some species of *Hippocampus* meet the biological criteria for inclusion in Appendix II.

    b) Most other seahorse species would qualify for listing under the look-alike provisions of the Convention.

    c) Data on biology of and trade in several species of *Hippocampus* are sufficient to support a listing proposal.

    d) A CITES listing might encourage the allocation of the necessary resources and technical support to manage the exploitation of seahorses sustainably.

e) A delay in implementation of the provisions of the Convention in case one or more species of *Hippocampus* is included in the Appendices should allow Parties that currently prohibit trade in marine Appendix-II species to consider amending domestic legislation to permit continued sustainable exploitation and trade of seahorses.

f) Further initiatives are needed to address trade in species caught incidentally in non-selective fishing gear, although the management of such fisheries is a national matter.

74. Three main sets of recommendations were drafted which were forwarded to the AC for its review and for the development of its own recommendations.

AC recommendations

75. Based on the outcomes of the technical workshop convened by the Secretariat and other available information concerning the biology, catch and bycatch of and trade in seahorses and other syngnathids, the AC considers the following:

a) There is good evidence that some species of *Hippocampus* are undergoing population declines that could lead to qualification for an Appendix-I listing unless trade is regulated (see Article II, paragraph 2 (a) of the Convention and Annex 2 a of Resolution Conf. 9.24 concerning the criteria for the inclusion of species in Appendix II). It is also inferred and projected that exploitation of *Hippocampus* spp. from the wild for international trade exceeds levels that can be sustained in perpetuity. Moreover, such trade is likely to reduce populations to levels where they become particularly vulnerable to habitat destruction.

b) In accordance with Article II, paragraph 2 (b) of the Convention and Annex 2 b of Resolution Conf. 9.24, trade in other species of *Hippocampus* spp. requires to be regulated under the provisions of the Convention because they resemble those included under paragraph 2 (a). Some of these look-alike species are also inferred to be experiencing considerable population declines.

c) The inclusion of *Hippocampus* spp. in Appendix II would have direct conservation benefits for seahorse species, in monitoring and managing trade, in promoting research and management, in attracting international attention, and in drawing resources to the genus.

d) No other species or genera of syngnathids meet the criteria for inclusion in the Appendices of the Convention at this time. Although *Solegnathus* spp. require attention, they are caught solely as bycatch and primarily in Australia, which has already implemented strong management policies for syngnathids.

76. The AC makes the following recommendations to the Conference of the Parties:

a) All species of seahorses, genus *Hippocampus*, should be included in Appendix II.

b) Parties should consider adopting a decision to foster and support appropriate management of seahorses and implementation of an Appendix-II listing should *Hippocampus* species be included in the Appendices of the Convention. This decision should:

i) suggest that the provisions of the Convention concerning *Hippocampus* species only become applicable 18 months after their inclusion in the Appendices to allow Parties time for planning and preparation, and particularly for implementing activities described in paragraphs v) and vi) below;

ii) request the Secretariat to convene, contingent on the availability of external funding, a dialogue meeting among 10 leading exporting Parties before CoP13 regarding enforcement, adaptive

fisheries management, community-based management, and bycatch issues relating to international trade in *Hippocampus*;

iii) request the Secretariat, in coordination with the Animals Committee, to address the challenge of managing syngnathid bycatch in support of CITES responsibilities, in consultation with FAO;

iv) request the Secretariat to consider and incorporate issues relating to *Hippocampus* trade management in its capacity-building programme;

v) request the Animals Committee to identify a minimum size limit for all *Hippocampus* in trade as one component of an adaptive management plan, and as a simple precautionary means of making initial non-detriment findings in accordance with Article IV of the Convention;

vi) encourage Parties where domestic legislation bans fishing of and trade in species listed in the Appendices, as a matter of priority, to allow sustainable trade in *Hippocampus* under the provisions of the Convention;

vii) encourage Parties to explore the benefits of trade certification options offered by independent organizations;

viii) request CITES Management Authorities to strengthen their collaboration and cooperation on *Hippocampus* management with appropriate fisheries agencies; and

ix) request the Nomenclature Committee to propose a standard taxonomy for species in the genus *Hippocampus.*

c) Governmental and non-governmental agencies and groups should implement measures to promote the conservation of seahorses and other syngnathids, to achieve a sustainable trade in seahorses, and to reduce the probability that other syngnathids may need to be listed on CITES Appendices in the future. It is proposed that:

i) government agencies monitor all trade in syngnathids, with associated training in syngnathid taxonomy;

ii) government agencies develop syngnathid fisheries management plans for sustainability that include: Catch Per Unit Effort (CPUE) monitoring; reduction in trade of brooding male syngnathids; minimum size regulations for syngnathid fisheries; no-take zones for all marine fish; registration of syngnathid fishers and traders; reduction of syngnathid bycatch; and use of FAO's FishBase nomenclature, or other CITES agreed nomenclature;

iii) government agencies undertake biological research on syngnathids, with special emphasis on population assessments;

iv) independent organizations explore possibilities of certification for syngnathids;

v) trade organizations and communities prepare and adopt voluntary guidelines that reduce take of "pregnant" males and juvenile (pre-reproductive) seahorses;

vi) trade organizations and communities establish networks for dialogue on syngnathid conservation and management;

vii) the World Customs Organization develop harmonized codes for live seahorses, dried seahorses, live pipefishes (and pipehorses), and dried pipefishes (pipehorses);

viii) government agencies and non-governmental organizations support local communities to enhance their management capacity for syngnathid fisheries; and

ix) range States of *Solegnathus* spp. undertake monitoring of bycatch and develop population assessments for species of this genus.

77. In the event of an Appendix-II listing for species of *Hippocampus*, the AC considers it important that countries whose domestic legislation prohibits fishery of and trade in marine Appendix-II listed species, such as the Philippines, should review their domestic legislation. Thousands of subsistence fishermen in the Philippines, in particular, obtain substantial portions of their income from these fish. Seahorses need management but are not yet judged to require a trade ban. Indeed, an Appendix-II listing for seahorses, if effectively implemented, should help secure sustainable trade in this genus, and thus ensure their continued availability for use.

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COMMENTS FROM THE SECRETARIAT

A. The Secretariat welcomes this discussion paper and the general guidance that the Animals Committee provides to promote the long-term conservation and management of the Syngnathidae. The Secretariat has in principle expressed support for the proposal by the United States of America to include *Hippocampus* spp. in Appendix II, and therefore concurs with the recommendation of the Animals Committee in this regard [see paragraph 76. a)]. However, the Secretariat remains concerned about the implementation problems of such a proposal, particularly regarding the ability of certain exporting range States to implement Article IV of the Convention for these species.

B. The Secretariat has the following comments on the recommendation of the Animals Committee to adopt a specific decision if species of *Hippocampus* were to be included in the Appendices [see paragraphs 76. b) i) to ix)]:

1. If one or more species of *Hippocampus* were to be included in the Appendices, the Animals Committee proposes that the Convention become applicable to the species 18 months after the adoption of the proposal, in lieu of the 90 days provided under the Convention [see paragraph 76. b) i)]. This delay would allow the Animals Committee to recommend a minimum size for certain specimens of *Hippocampus* spp. to be traded, and certain range States to adapt domestic legislation. Such a entry into force of an amendment to the Appendices is possible, and has been done twice. However, the justification for proposing a deviation from the normal date of entry into force in the case of *Hippocampus* spp. is not very convincing. The Animals Committee can (and perhaps should) suggest size limits less than 18 months after the meeting. The postponement to allow a few range States, the Philippines in particular, to amend their national legislation seems equally unnecessary.

2. The Secretariat would be requested to convene a meeting among 10 leading *Hippocampus* exporting Parties before CoP13 [see paragraph 76. b) ii)]. The Secretariat believes that there is no need or rationale for organizing a further meeting on the management of *Hippocampus* spp. at this time. The Secretariat already convened a technical workshop on seahorses and other species of Syngnathidae in May 2002, where most of the issues that are mentioned in paragraph 76. b) ii) were discussed. It is unlikely that substantially new information or management techniques would become available between May 2002 and the next meeting of the Conference of the Parties. To hold a further technical meeting would in addition require substantial funding and resources which may be very difficult to obtain, as was the case for the recent workshop.

3. The Animals Committee recognizes the problem concerning bycatch of Syngnathidae (see paragraph 40). However, the Secretariat does not have the resources to address this complex and technical issue, as suggested in paragraph 76. b) iii). This recommendation is therefore unrealistic. The Secretariat also notes that the request concerns other species of Syngnathidae than those included in the Appendices, even though the Animals Committee itself considers that, except for *Hippocampus* spp., "no other species or genera of syngnathids meet the criteria for inclusion in the Appendices of the Convention at this time" [see paragraph 75. d)]. Given the expected difficulties in implementing the Convention for species of Syngnathidae that may be included in the Appendices and in meeting relevant obligations and recommendations, such as those proposed by the Animals Committee, the Secretariat cautions against broadening the scope of the draft decision beyond species included in the Appendices.

4. The Animals Committee requests the inclusion of *Hippocampus* trade management in the Secretariat's capacity-building activities if the taxa are included in the Appendices [see paragraph 76. b) iv)]. The Secretariat considers that there is no need to formulate a specific decision in this regard as it routinely addresses the management of CITES-listed species in its training and capacity-building programmes.

5. The Secretariat supports the suggestion to identify a size limit for specimens fo *Hippocampus* spp. in trade, recognizing that this would only concern whole dried or live specimens [see paragraph 76. b) v)]. The Secretariat encourages the Animals Committee to provide more guidance regarding the time-frame for the identification of such a size limit and the follow-up process, particularly how such a size limit might best be communicated to and put into practice by Parties.

6. The Secretariat questions whether it is necessary to include a general statement regarding national measures that Parties should take to manage and protect *Hippocampus* spp., as recommended in paragraph 76. b), vi). This paragraph is apparently only addressing the specific case of the Philippines (see paragraph 77), and should be best dealt with at national level (see also paragraph B. a) above).

7. The Secretariat supports the activities proposed in paragraphs 76. b) vii), viii) and ix), encouraging Parties to explore trade certification options and collaboration between their Management Authorities and fisheries agencies, and requesting the Nomenclature Committee to propose a standard nomenclature for *Hippocampus* spp.

C. The recommendations of the Animals Committee to government agencies, trade organizations, inter-governmental bodies, non-governmental organizations and communities concerning measures to conserve and trade syngnathids sustainably are timely and comprehensive [see paragraph 76. c)]. However, in view of the relatively limited commercial value of the fishery and trade compared to other fisheries, its small scale, and the non-targeted nature of a significant portion of syngnathid fisheries, it appears unlikely that many range States will be able to or willing to commit to their implementation. Such commitments can not in practice be monitored or required from Parties and other stakeholders, reducing further their effectiveness. The Secretariat is also concerned that some of the proposed measures are unrealistic in their scope or demands upon government agencies [for instance paragraph c) i), ii) and iii)] or intergovernmental organizations [paragraph c) vii)]. The Secretariat will nevertheless support initiatives that would lead to improved protection and management of species of syngnathids included in the Appendices of the Convention.